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The Financial Crises of the 1990s and Environmental Sustainability: A Comparison of Developed versus Less Developed Countries

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Abstract:

In this study, we examine the impact of the financial crises of the 1990s on developed versus less developed countries' environmental sustainability scores. Our results for the developed countries show that while these crises have not had a significant impact on the Environmental Performance Index or its two main components (*i.e.* Environmental Health, and Ecosystem Vitality), it affected a few subcategories. Our results for the less developed countries show that the crises have not had a significant impact on any main component or any major subcomponents. Developed countries, on the other hand, are affected in terms of several indicators including "Environmental burden of disease trend", "Biodiversity and habitat", and "Forestry". These countries' scores on many environmental components including "Child mortality", "Agricultural subsidies", and "Pesticide regulation" also declined.

Keywords EPI; environment; ecosystem vitality; sustainability

JEL Classification: Q50; Q53; Q54; Q56; Q57; Q58

Introduction

In this study, we examine the impact of the financial crises that occurred between 1997 and 2001 on developed versus less developed countries' environmental quality. As we know, the world had seen several financial crises during this period which includes the Thai crisis, the Hong Kong crisis, the Russian crisis, the Brazilian crisis, and the bursting of the dot-com bubble in the developed countries. In this study, we argue that, since financial crises affect developed countries more, these countries' environmental protection efforts should slow down more when compared to less developed countries.

To achieve our objective, we use the EPI (Environmental Performance Index) data produced by Yale University and Columbia University, in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission. This dataset covers 132 countries, and includes the EPI data, as well as data on its two main components, which are Environmental Health and Ecosystem Vitality. The dataset also includes detailed data on the subcomponents of Environmental Health and Ecosystem Vitality.

The dataset classifies the countries into three income groups: "Upper", "Middle", and "Lower". Using these three income classifications, we create two income classifications of our own: "High GDP/capita" which includes all of the countries classified in the dataset as "Upper", and "Low GDP/capita" which includes all of the other countries. After differentiating between the developed (*i.e.* High GDP/capita) countries and the less developed (*i.e.* Low GDP/capita) countries, we run our empirical tests. We first examine how the financial crises have affected the developed countries' environmental indicators. We show which indicators are affected significantly due to these crises. Then, we do a similar analysis for the less developed countries.

We are hoping that the findings here will guide policymakers in both developed and less developed countries. By looking at the findings here, policymakers will know which environmental areas they should focus on more when a financial crisis hits. We will see that the precautions that need to be taken by developed countries should be different from those that need to be taken by less developed countries.

Our paper proceeds as follows: Section 1 reviews the previous literature. Section 2 states our hypotheses. Section 3 explains the data and the methodology. Section 4 shows the empirical results. Finally, Section 5 concludes.

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1. Literature Review

The most prominent theory on the relation between economic growth and environmental quality is the “Environmental Kuznets Curve” (EKC). The EKC states that there is an inverted U-shape relationship between economic growth and environmental degradation: Environmental degradation tends to get worse as economic growth occurs until average income reaches a certain point; after this point, environmental degradation improves.

In one of the earlier studies, Selden and Song (1994) examine the relationship between air pollution and economic development. They find that per capita emissions of pollutants exhibit inverted-U relationships with per capita GDP. In another study, Stern *et al.* (1996) suggest that there is an inverted U-shape relation between income per capita and environmental degradation. Barrett and Graddy (2000) explains that certain measures of pollution worsen and later improve as income per head increases. According to the authors, the inverted-U curve is due to the fact that, as incomes rise, citizens demand improvements in environmental quality, and that these demands are delivered by the political system. The authors also explain that, for a number of pollution variables, an increase in civil and political freedoms significantly improves environmental quality. Welsch (2004) explains that the relationship between per capita income and a number of pollution indicators have an inverted U-shaped or downward-sloping pattern. The author contends that corruption may affect this relationship. It may raise pollution at given income levels (direct effect) and reduce per capita income (indirect effect). Welsch (2004) argues that developing countries can improve both their economic and environmental performance by reducing corruption.

While the above mentioned studies support EKC, there are a few other studies that do not support it. Broad (1994) examines Philippines and shows that, under certain conditions, poor people can become “environmental activists” rather than “environmental degraders”. Grossman (1995) finds no evidence that environmental quality deteriorates steadily with economic growth. Rather, the author finds that, for most indicators, economic growth brings an initial phase of deterioration followed by a subsequent phase of improvement. Ekins (1997) finds that there is a monotonically increasing relationship between income and environmental damage. The author explains that overall environmental quality even in the richest countries is still declining. Galeotti (2007) also does not support an inverted U-shape relation between economic development and environmental degradation. The author contends that a de-coupling or de-linking between economic development and environmental degradation is possible, at least after certain levels of income.

Other studies go deeper and look into the issue from different perspectives. John and Pecchenino (1994) develop a model for the inverted U-shape relation between economic growth and environmental degradation. They show the circumstances in which sustained growth of both capital and environmental quality may occur. Lopez (1994) contends that economic growth and trade liberalization decrease the degradation of natural resources if producers internalize their stock feedback effects on production.

Arrow *et al.* (1995) argue that excessive environmental degradation may hurt economic activity in the end. Smulders (1995) summarizes under which conditions unlimited economic growth with limited natural resources is feasible. The author describes how sustainable growth can be achieved.

Scruggs (1998) examines whether economic and political equality result in less environmental degradation. The author explains that equality may or may not be necessary to minimize degradation. According to the author, under certain conditions, greater inequality may even reduce degradation. Lopez and Mitra (2000) examine the impact of corruption on the relationship between pollution and growth. They show that corruption is not likely to preclude the existence of an inverted U-shape.

Spangenberg *et al.* (2002) argue that governments can develop strategies that can help economic competitiveness, low unemployment rates and the pressure on the environment at the same time. They argue that reduced work times, social and technical innovation, a modern social security system, salary increases proportional to labour productivity growth, and green taxes are essential parts of any such strategy. The authors show the effectiveness of such strategies regarding social, environmental, and economic sustainability. Panayotou (2003) explains that in order to improve the inverted U-shape relation between economic growth and environmental quality, governments should integrate environmental and economic policies, and also phase out environmentally harmful subsidies.

Copeland and Taylor (2004) show a model where government policy and private sector behavior interact to determine the equilibrium level of pollution. Brock and Taylor (2005) explain that while some of the previous papers are more pessimistic because they focus on the current serious environmental problems, others are more optimistic because they focus on the improvement in living standards. According to the authors, these two views are not necessarily inconsistent.

Dasgupta *et al.* (2006) suggest that strong environmental governance is possible for poor countries. The authors show that climate and terrain factors account for much of the observed variation in developing countries' air pollution levels. Zhang (2008) examines Asia and argues that having the right policy mix and having a better cooperation at national, local and regional levels, will ensure continuing economic growth in the region without compromising its environmental quality.

Bartz and Kelly (2008) show that, for less developed countries, pollution peaks at a lower level of income in less developed countries when compared to developed countries. Therefore, according to the authors, the threshold depends on whether the country is a developed or a less developed country.

Costantini and Monni (2008) suggest governments to increase their investments in human capital accumulation and to increase the quality of their institutions. The authors suggest that developing countries should get help from developed countries and promote environmental protection as soon as possible. Costantini and Monni (2008) explain that maintaining environmental quality and achieving a higher standard of living could be complementary goals.

Van den Bergh (2011) suggests that rather than following the strategy of "de-growth", government should follow the strategy of "a-growth" (*i.e.* being indifferent about growth) since income per capita is a very imperfect indicator of social welfare. Antal and van den Bergh (2013) examine the feasibility of decoupling environmental pressure from aggregate income. They argue that decoupling is very risky because even if it is successful, it may hurt economic growth.

Janicke (2012) explains that governments should focus on environmental and resource-saving technologies. They should also focus on reducing or eliminating products and processes that undermine long-term living and production conditions. Zenghelis (2012) argues that green investments support economic growth. The author explains that governments should promote such investments. Perez (2013) explains that "green growth" is probably the most effective route to saving the economy. Rodrik (2014) supports "green growth" and argues that green technologies should be supported.

Acharyya (2009) examines the inverted U-shape relation between economic growth and environmental degradation in India. The author finds that FDI inflow has a positive impact on both GDP growth and CO₂ emissions. Urhammer and Røpke (2013) explains the previous papers that offer solution to the economic crisis as well as achieving a sustainable economy. Geels (2011) examines the relation between the macro-economy and environmental efforts. The author explains that the financial/economic crises weaken public, political and business attention for environmental problems.

More recent papers offer additional suggestions to the public and the scientists. Witt (2013) explains that there is a balance between the desire for economic growth and sustainability efforts. According to the author, the public does not accept lower economic growth therefore sustainability efforts are ignored. Witt (2013) suggests that scientific community, especially economists, should convince society to rethink growth expectations and political priorities. Loorbach and Huffenreuter (2013) contend that the economic crisis is an opportunity to accelerate fundamental systemic change that will lead to sustainability. Foxon (2013) explains that ecological, behavioral, institutional and evolutionary economics could form the basis for a new economics.

In this current study, we explore the detailed impact of a crisis period on environmental quality. We go deeper than the previous papers because we examine the impact on many subcomponents of environmental performance. We also have more breadth because we examine the impact of a crisis period on 132 countries' environmental quality.

2. Hypotheses

Since financial crises, especially the 2000-2001 financial crisis, mainly affect certain groups of countries (*i.e.* in this case, the developed countries), we expect to see these countries to suffer more in terms of different issues including environmental issues when compared to other countries. Therefore, our first hypothesis is as follows:

Hypothesis 1: The developed countries' EPI was more negatively affected due to the financial crises when compared to the less developed countries' EPI.

Similarly, we expect to see the developed countries to suffer more with regard to both components of the EPI. These are Environmental Health and Ecosystem Vitality. We also expect to see more deterioration in these countries with regard to the subcomponents of Environmental Health and Ecosystem Vitality. Therefore, our second and third hypotheses are:

Hypothesis 2: Due to the financial crises, the Environmental Health and its subcomponents were more negatively affected in developed countries when compared to the less developed countries.

Hypothesis 3: Due to the financial crises, the Ecosystem Vitality and its subcomponents were more negatively affected in developed countries when compared to the less developed countries.

The next section explains our data and methodology.

3. Data

Yale University and Columbia University, in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission, developed the EPI Index which includes the EPI index itself, its two main components (*i.e.* Environmental Health and Ecosystem Vitality), and their subcomponents. This dataset covers 132 countries. We use this dataset in our paper (available at <http://epi.yale.edu> and distributed by the NASA Socioeconomic Data and Applications Center at <http://sedac.ciesin.columbia.edu/data/set/epi-environmental-performance-index-pilot-trend-2012>).

The two main components of the EPI Index are “Environmental Health” and “Ecosystem Vitality”. Each of these two components has several subcomponents. “Environmental Health” has three subcomponents: “Environmental burden of disease trend”, “Air pollution (effects on humans)”, and “Water (effects on humans)”. “Ecosystem Vitality” has six subcomponents: “Air pollution (effects of ecosystem)”, “Water (effects on ecosystem)”, “Biodiversity and habitat”, “Agriculture”, “Forestry”, “Fisheries”, and “Climate Change Trend”.

The dataset classifies the countries into three income groups: “Upper”, “Middle”, and “Lower”. Using these three income classifications, we create two income classifications of our own: “High GDP/capita” which includes all of the countries classified in the dataset as “Upper”, and “Low GDP/capita” which includes all of the other countries.

Figure 1 shows that the EPI of both developed countries (*i.e.* High GDP/capita) and less developed countries (*i.e.* Low GDP/capita) had gradually improved over time until 2008 or 2009. Then, both groups were flat after that. The developed countries’ EPI was approximately 57 in year 2000. It climbed up to approximately 60 in 2008. After that, it was flat. The less developed countries’ EPI was approximately 47 in year 2000. It climbed up to approximately 49 in 2009. After that, it was flat.

Figure 1. EPI for High GDP/Capita versus Low GDP/Capita Countries over time

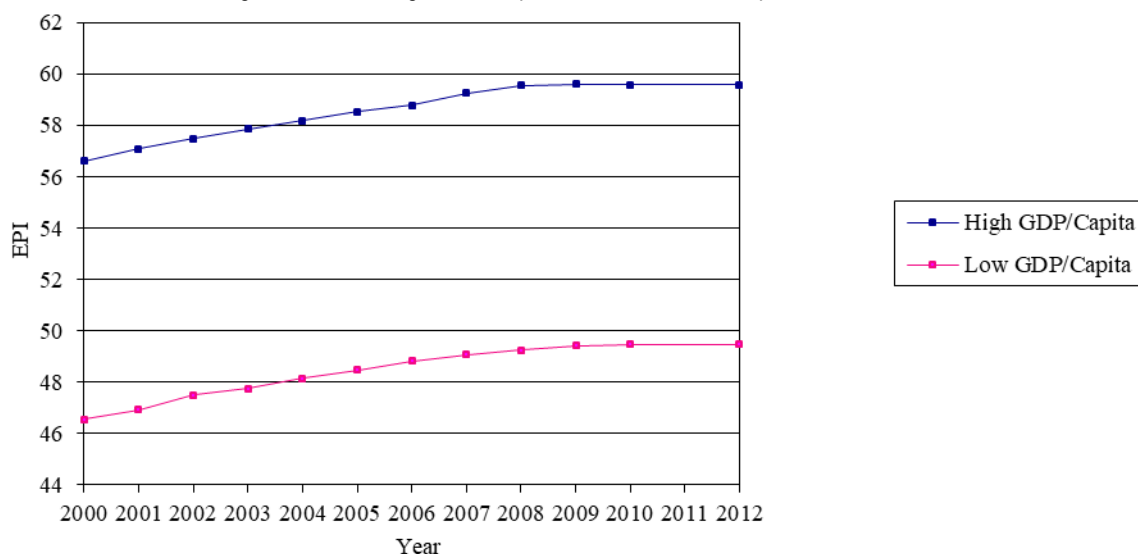


Figure 2 shows that the Environmental Health (EH) of both developed countries (*i.e.* High GDP/capita) and less developed countries (*i.e.* Low GDP/capita) had gradually improved over time until 2009. Then, both groups were flat after that. The developed countries’ EH was approximately 89 in year 2000. It climbed up to approximately 92 in 2009. After that, it was flat. The less developed countries’ EH was approximately 46 in year 2000. It climbed up to approximately 52 in 2009. After that, it was flat.

Figure 2. Environmental Health (EH) for High GDP/Capita versus Low GDP/Capita Countries

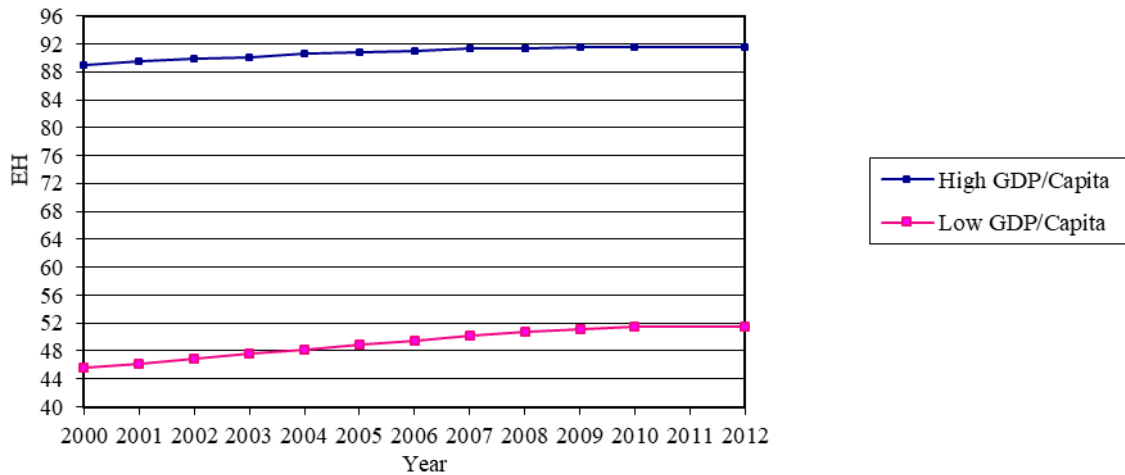
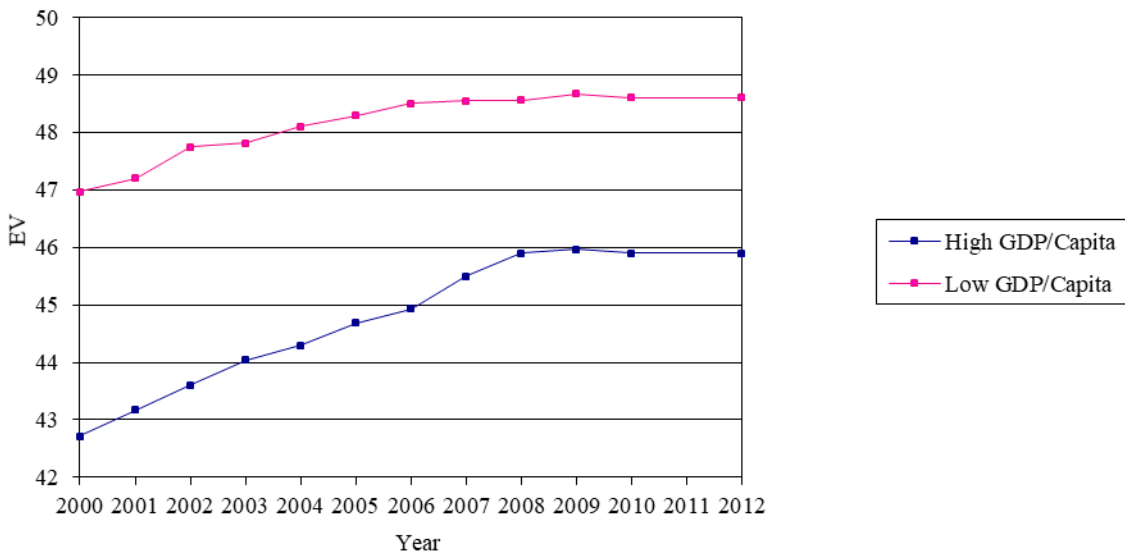


Figure 3 shows that the Ecosystem Vitality (EV) of both developed countries (High GDP/capita) and less developed countries (Low GDP/capita) had gradually improved over time until 2008 or 2009. Then, both groups were flat after that. The developed countries' EV was very low. It was approximately 43 in year 2000. It climbed up to approximately 46 in 2008. This was a sharp improvement for these countries. After that, EV was flat for these countries. The less developed countries' EV was approximately 47 in year 2000. It climbed up to almost 49 in 2009. After that, it was flat.

Figure 3. Ecosys. Vitality (EV) for High GDP/Capita versus Low GDP/Capita Countries



By looking at these figures, we can see that the EPI measure and its two components improved until 2008 or 2009, and then this improvement stopped. These figures indicate that the financial crises did not have a significant impact on these measures. There was a positive trend and it continued for a long time.

In the next section, we will look into the impact of the financial crises on EPI, EH, EV, and their subcomponents using nonparametric tests (*i.e.* the Mann-Whitney-Wilcoxon tests). In our tests, we will compare the percentage change in each variable during year 2000 (*i.e.* the midpoint of the crises period) to the percentage change in each variable during years 2002 and 2003.

4. Results

Table 1 compares the percentage change in EPI for developed countries pre- and post-crises. It also compares the percentage change in EH, EV, and their main subcomponents pre- and post-crises. We are seeing that the financial crises have not had a significant impact in the general categories of EPI (Environmental Performance Index), Environmental Health, and Ecosystem Vitality scores, but that the crises affected a few subcategories. The improvements in “forestry”, “environmental burden of disease trend”, and “biodiversity and habitat” scores all have slowed down (or even became negative) due to the crises.

The “environmental burden of disease trend” was improving at annual rate of 0.98% (mean value) before the crises. The average change after the crises was 0.62%. This drop in the improvement rate was marginally significant ($p=0.1072$). The “biodiversity and habitat” was improving at annual rate of 4.16% before the crises. The average change after the crises was 1.47%. This drop in the improvement rate was marginally significant ($p=0.1018$). The “forestry” was improving at annual rate of 1.07% before the crises. The change after the crises was -0.45% (which means a deterioration). This drop in the improvement rate was significant at 10% level ($p=0.0876$).

On the other hand, there was a positive impact on “agriculture” and “fisheries”. The “agriculture” was improving at annual rate of 1.98% before the crises. The change after the crises was 2.47%. This increase in the improvement rate was significant at 1% level ($p=0.0008$). The “fisheries” was sharply deteriorating (annual rate was -6.35%) before the crises. There was a big improvement in this measure also. The change after the crises was positive 1.22%. This change was significant at 1% level ($p=0.0023$).

Although the change in the improvement rate in a few subcomponents are statistically significant, we are seeing that the trend in EPI and its two main components did not change significantly due to the crises. These results indicate that the impact of the financial crises on developed countries’ environmental indicators are minimal.

Table 1. Env. Indicators for High GDP/Capita Countries before and after the Financial Crises

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
EPI	0.870	0.450	2.343	0.610	0.540	1.640	0.4882
Environmental Health	0.540	0.550	0.530	0.360	0.370	1.380	0.5559
Ecosystem Vitality	1.260	0.710	5.090	0.890	0.610	2.870	0.3641
Env. Burden of Disease Trend	0.980	1.140	0.980	0.620	0.000	1.020	0.1072
Air Pollution (on humans)	0.060	0.000	0.390	0.230	0.000	3.730	0.2470
Water (on humans)	0.200	0.000	0.630	0.190	0.000	0.610	0.9413
Air Pollution (on ecosystem)	2.380	1.790	7.040	3.990	2.590	12.110	0.2657
Water (on ecosystem)	0.000	0.000	0.000	0.000	0.000	0.000	1.0000
Biodiversity and Habitat	4.160	0.070	13.620	1.470	0.000	5.600	0.1018
Agriculture	1.980	1.950	7.950	2.470	0.000	20.970	0.0008
Forestry	1.070	0.000	4.080	-0.450	0.000	3.350	0.0876
Fisheries	-6.350	-4.370	13.220	1.220	0.020	12.300	0.0023
Climate Change Trend	-1.380	-0.590	5.360	-0.310	0.420	12.210	0.2714

Table 2 goes into more detail and shows the results of the comparisons for the environmental components which are the subcomponents of the measures that we show in Table 1. We are seeing that the “child mortality” improvement rate slowed down. It was improving at annual rate of 0.978% (mean value) before the crises. The average change after the crises was 0.616%. This drop in the improvement rate was marginally significant ($p=0.1072$). The “agricultural subsidies” improvement rate also slowed down. It was improving at annual rate of 6.605% before the crises. The average change after the crises was 2.885%. This drop in the improvement rate was significant at 1% level ($p=0.0004$). The “pesticide regulation” improvement rate slowed down too. It was improving at annual rate of 1.071% before the crises. The average change after the crises was 0.141%. This drop in the improvement rate was significant at 5% level ($p=0.0248$).

On the other hand, there was a positive impact on “fishing stocks overexploited” and “coastal shelf fishing pressure”. The “fishing stocks overexploited” was deteriorating (annual rate was -9.265%) before the crises. The change after the crises was positive 3.547%. This increase in the improvement rate was significant at 1% level ($p=0.0032$). The “coastal shelf fishing pressure” was deteriorating (annual rate was -0.84%) before the crises. There was a big improvement in this measure also. The change after the crises was positive 41.305%. This change was significant at 10% level ($p=0.0590$).

Table 2. Env. Components for High GDP/Capita Countries before and after the Financial Crises

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
Child mortality	0.978	1.141	0.985	0.616	0.000	1.022	0.1072
Indoor air pollution	0.141	0.000	0.964	0.475	0.000	7.896	0.8107
Particulate matter	0.000	0.000	0.000	0.298	0.000	1.855	0.2397
Access to drinking water	0.359	0.000	1.204	0.322	0.000	1.139	0.9264

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
Access to sanitation	0.083	0.000	0.487	0.077	0.000	0.461	0.9730
SO2 emissions per capita	3.425	2.306	10.526	5.448	1.337	31.323	0.7888
SO2 emissions per GDP	2.351	1.422	6.465	3.840	2.440	8.552	0.1584
Change in water quantity	0.000	0.000	0.000	0.000	0.000	0.000	1.0000
Biome protection	3.792	0.068	12.930	1.691	0.000	4.812	0.1872
Marine protection	3.136	0.000	11.253	0.998	0.000	5.378	0.1942
Critical habitat protection	0.007	0.000	0.021	0.000	0.000	0.000	0.4795
Agricultural subsidies	6.605	8.135	12.596	2.885	0.000	33.403	0.0004
Pesticide regulation	1.071	0.000	2.913	0.141	0.000	0.844	0.0248
Growing stock change	1.183	0.000	7.445	-1.329	0.000	9.244	0.3269
Forest loss	0.000	0.000	0.000	-0.109	0.000	0.764	0.3214
Forest cover change	3.074	0.000	10.233	0.594	0.000	5.308	0.2255
Fishing stocks overexploited	-9.265	-6.830	16.854	3.547	0.000	32.831	0.0032
Coastal shelf fishing pressure	-0.840	0.165	18.951	41.305	2.465	334.151	0.0590
CO ₂ per capita	-3.469	-2.633	11.650	-5.250	-1.610	18.470	0.9422
CO ₂ per GDP	4.582	0.117	46.106	0.166	0.877	17.550	0.2421
CO ₂ emissions per elec. gen.	23.795	-0.132	138.389	8.675	0.018	73.522	0.4422
Renewable electricity	-0.561	0.010	16.893	9.082	0.143	32.010	0.2915

Table 3 compares the percentage change in EPI for less developed countries pre- and post-crises. It also compares the percentage change in EH, EV, and their main subcomponents pre- and post-crises. We are seeing that the financial crises have not had a significant impact in the general categories of EPI (Environmental Performance Index), Environmental Health, and Ecosystem Vitality scores, as well as their main subcategories, for these countries. None of the results is statistically significant.

Table 3. Env. Indicators for Low GDP/Capita Countries before and after the Financial Crises

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
EPI	0.841	0.757	1.896	0.691	0.747	1.793	0.9720
Environmental Health	1.634	1.452	1.214	1.565	1.261	1.485	0.4785
Ecosystem Vitality	0.654	0.291	2.721	0.394	0.513	2.541	0.8861
Env. Burden of Disease Trend	2.805	1.904	4.078	2.431	1.631	2.766	0.4976
Air Pollution (on humans)	0.158	0.000	1.793	0.680	0.038	3.946	0.3186
Water (on humans)	2.612	2.030	2.578	2.328	1.949	2.102	0.5586
Air Pollution (on ecosystem)	2.574	1.902	14.237	3.085	1.858	13.215	0.6517
Water (on ecosystem)	0.000	0.000	0.000	0.000	0.000	0.000	1.0000
Biodiversity and Habitat	1.092	0.000	3.479	0.613	0.000	2.376	0.5953
Agriculture	2.476	0.000	20.552	1.480	0.000	17.732	0.8708
Forestry	2.124	0.254	5.526	1.585	0.401	3.594	0.9311
Fisheries	-2.057	-1.817	10.735	0.169	0.000	11.155	0.2308
Climate Change Trend	-0.088	-0.342	3.975	-0.258	-0.312	5.172	0.8649

Table 4 goes into more detail and shows the results of the comparisons for the environmental components which are the subcomponents of the measures that we show in Table 3. We are seeing that only two measures' improvement rates changed significantly. The CO₂ per capita was deteriorating (annual rate was -0.203%). It deteriorated even faster after the crises (annual rate was -0.772%). This change was significant at 10% level (p=0.0688).

Table 4. Env. Components for Low GDP/Capita Countries before and after the Financial Crises

Variables	Before			After			Wilcoxon
	Mean	Median	St. dev.	Mean	Median	St. dev.	p-value
Child mortality	2.805	1.904	4.078	2.431	1.631	2.766	0.4976
Indoor air pollution	2.938	0.000	19.285	5.667	1.128	24.190	0.2702
Particulate matter	0.000	0.000	0.000	0.356	0.000	4.141	0.1957
Access to drinking water	2.876	2.371	3.395	2.484	2.237	2.618	0.5327
Access to sanitation	2.304	1.665	2.683	2.037	1.596	2.294	0.6229
SO2 emissions per capita	1.644	0.897	11.429	1.438	0.806	11.309	0.9780

Variables	Before			After			Wilcoxon
	Mean	Median	St. dev.	Mean	Median	St. dev.	p-value
SO2 emissions per GDP	9.563	3.207	55.713	90.404	3.076	1054.740	0.6163
Change in water quantity	0.000	0.000	0.000	0.000	0.000	0.000	1.0000
Biome protection	1.711	0.000	6.028	0.657	0.000	2.863	0.3314
Marine protection	0.570	0.000	1.981	0.577	0.000	2.379	0.7706
Critical habitat protection	1.204	0.000	4.284	0.342	0.000	2.037	0.1249
Agricultural subsidies	3.876	0.000	30.560	2.811	0.000	25.432	0.7141
Pesticide regulation	2.684	0.000	11.928	0.565	0.000	4.053	0.1604
Growing stock change	15.304	0.000	126.227	-1.007	0.000	9.085	0.7143
Forest loss	0.000	0.000	0.000	0.000	0.000	0.000	1.0000
Forest cover change	78.114	3.119	387.875	14.345	5.268	29.211	0.8235
Fishing stocks overexploited	4.028	-1.216	65.312	4.129	0.000	29.033	0.0609
Coastal shelf fishing pres.	10.785	0.227	74.903	1.121	-0.002	26.063	0.6243
CO2 per capita	-0.203	0.000	2.231	-0.772	0.000	3.105	0.0688
CO2 per GDP	8.595	-0.076	53.394	1.397	0.352	10.917	0.8413
CO2 emissions per elec. gen.	19.976	0.011	175.150	16.404	0.066	123.030	0.6531
Renewable electricity	-2.152	-0.545	16.589	3.950	0.000	32.520	0.2083

We can conclude from Tables 3 and 4 that the financial crises did not have a significant impact on less developed countries' environmental indicators (except for only two subcomponents).

Conclusion

In this study, we examine the impact of the financial crises in the 1990s on developed and less developed countries' environmental scores. First, we examine Environmental Indicators which are more general measures of environmental issues. Then, we go deeper and examine the components, which are called Environmental Components.

Yale University and Columbia University, in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission, developed the EPI Index which includes the EPI index itself, its two main components (*i.e.* Environmental Health and Ecosystem Vitality), and their subcomponents. This dataset covers 132 countries. We use this dataset in our paper.

Using nonparametric tests, we compare the pre-crises period to the post-crises period. Our results for the developed countries show that while the financial crises have not had a significant impact in the general categories of EPI (*i.e.* Environmental Performance Index), Environmental Health, and Ecosystem Vitality scores, they affected a few subcategories. The improvements in forestry, environmental burden of disease trend, and biodiversity and habitat scores all have slowed down (or even became negative) due to the crises. On the other hand, there was a positive impact on agriculture and fisheries scores.

Our results for the less developed countries show that the financial crises have not had a significant impact in the general categories of EPI (Environmental Performance Index), Environmental Health, and Ecosystem Vitality scores, or in any of the other major areas. They only affected CO₂ per capita negatively. In this study, we show how developed versus less developed countries perform environmentally when facing financial crises.

We contend that policymakers in developed versus less developed countries should focus on different environmental areas when a financial crisis hits. Developed countries should take measures to prevent deterioration in the areas of forestry, environmental burden of disease trend, and biodiversity and habitat areas, while Less Developed Countries should focus on CO₂ measures.

Future research should examine the environmental impacts during a larger crisis like the 2008-2009 Global crisis which is both a financial and an economic crisis. We know that the Global Crisis affected more countries in more areas, therefore we expect to see stronger results (and in more areas) in such a study.

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Stock Market Volatility and Non-Macroeconomic Factors: A Vector Error Correction Approach

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Abstract:

Macroeconomic and non-macroeconomic factors are considered important in measuring market volatility; therefore, cannot be ignored, and the level of impact of these factors needs be determined in different economies. This study considered the impact of non-macroeconomic factors that drive stock market volatility in a developing economy using Nigeria annual stock data from 1985 to 2016.

In order to achieve the objective, sets in this study, vector error correction model (VECM) is adopted. The impulse response function (RF) and the variance decomposition were used to determine the component of the VECM. Based on the VECM, a long run relationship was established between stock market volatility and non-macroeconomic variables considered. The empirical analysis revealed that gross domestic product, interest rate and the number of listed firms were found to decline in response to positive shock on stock market price volatility. The study recommended financial literacy of investors as it has the potential of boosting investment in the stock market. Investors are also encouraged to get their business listed on the stock exchange to improve diversification and stability in the stock market.

Keywords: stock market volatility; vector error correction model; non-macroeconomic factors; macroeconomic factors

JEL Classification: E44; G1; G4; O16

Introduction

The stock market represents a financial market where funding is made available through the issuance, buying and selling of shares. The stock market aids capital formation and efficient allocation. Stock market development can be viewed as an all-round concept that can be assessed through liquidity, volatility, size, concentration and the extent of international integration (Garcia and Liu 1999). Adeniji (2015) explains stock price volatility as assessment of the degree of stock price movement. The fluctuation in the prices of stocks is a crucial ingredient in the stock market as it helps to influence the kind of returns that accrues to investors. In addition, fluctuations in stock prices are associated with macroeconomic behaviour in developed countries (Muradoglu *et al.* 2001). Stock market volatility is of great value to investors as it helps investors to effectively take advantage of any decline in the stock market to buy more stocks. Stock market volatility creates opportunity for long term investors as it aids their accumulation of a larger share of the market. It is a critical factor that investors watch out for in the process of portfolio management. Prempeh (2016) mentioned that stock prices are usually determined by some important macroeconomic variables such as exchange rate, interest rates, inflation, *etc.* Mahedi (2012) opined that macroeconomic variables have a significant role to play in stock returns performance. Stock price fluctuation is not only triggered by macroeconomic variables (Osisanwo and Atanda 2012). There are some other non-macroeconomic factors that affect the instability of stock prices, Xing (2004) identified non-macroeconomic factors like average education level of investors, market concentration, the relative size of the equity market and the numbers of firms listed as factors that drive stock market volatility. However, results from Xing (2004) is no

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longer recent, there is need to conduct an updated research on the validity of such factors in the light of the developing economies. Moreover, Nigeria was excluded from the emerging markets considered by Xing (2004). Can these non-macroeconomic factors impact on stock market volatility in the Nigerian context? A number of studies have been carried out to determine factors that impact significantly on stock market volatility in developed countries as well as emerging market, but the stock market in sub-Sahara Africa countries have been ignored (Tennant and Tracey 2014). Research on the non-macroeconomic factors that drive stock market volatility is still a grey area that needs to be explored. This study primarily aims at determining if non-macroeconomic factors also drive stock market volatility (SMV), and to what extent it drives SMV in the context of the Nigerian economy. The remaining part of this paper is organised as follows: Section Two, related studies are highlighted. Section Three, outlines the methodology, in section four, empirical analysis was done. Lastly, in Section five; conclusion was drawn and recommendations were made.

1. Literature Review

Stock price volatility reflects the behaviour of stock prices. Maku and Atanda (2009) stated that there are five schools of thought on stock price behavior, and the authors discussed these schools of thought accordingly, which are; the technical, the fundamentalist, the random walk hypothesis, the Behavioural and the Macroeconomic hypothesis schools. The first school is the technical school believes that share price movements can be forecast by examining its behavioural charts of past sequence of prices. The technical school believes that stock price behaviour can be projected through the usage of economic or financial data. This school maintains that the forces of supply and demand are the major determinant of security prices and that stock prices follow historical pattern which means that past prices can be utilised to predict future prices. The second school of thought is the fundamentalist School. This school of thought is rooted in fundamentals such as the underlying firm's performance. The fundamentalist believes that the prices of any security is the information content of its worth. They advocate that every security has an intrinsic value which may or may not be revealed in the prices of the security. Thus, a detailed analysis of companies' fundamentals (dividend declaration, earnings per share, merger and acquisition among others) will enhance the quality of investment decisions.

Random walk hypothesis school explained movement of stock price in terms of a probability distribution of varying possible outcome. This hypothesis considers movement of stock price as a random walk, that is, such price is difficult or can hardly be predicted. This assumption follows that investments are adjusted based following the new information investors received. Behavioural finance is a new approach to capital markets having crucial role in financial decision making process (Birau 2012). The behavioural school believes that market might not show economic basics under three conditions. In a situation where all the three conditions apply, the behavioural school assumes that pricing preferences in financial market can be weighty. The first condition is the irrational behaviour and it is based on the fact that investors conduct themselves irrationally when they are unable to process the information available to them while forming their expectation of the performance of a company in the future. The systematic pattern of behaviour is the second condition that is based on the fact that even if individual investors makes decision to buy or sell without considering economic basics, the effect on equity prices would be restricted. The third condition is limiting arbitrage in financial markets. This will help to avoid unusual bidding for shares that may cause an increase in price as investors might want to use a company's recent strong performance alone to make decision about future economic performance.

Finally, the macroeconomic hypothesis school is based on the role played by macroeconomic variables in shaping the price movement of assets. They acknowledged the fact that changes in interest rate is a vital factor in explaining return as variations in interest rate are connected with risk premia. The macroeconomic schools made an effort to study how sensitive stock prices react to changes in macroeconomic variables. The macroeconomic school suggests that stock prices are affected by variations in interest rate, inflation, money supply and other macroeconomic variables. The macroeconomic school utilised a general to equilibrium approach laying emphasis on the associations between sectors as being vital to the comprehending the macroeconomic time-series co-movement as well as persistence

Empirical Literature

Some authors have worked on related subject matter being considered in this study as earlier stated. First, looking at the study carried out by Zakaria and Shamsuddin (2012), the authors analyzed the connection between stock market volatility and the volatility of macroeconomic variable using Malaysia stock market as a case study. The authors established both a weak association and absence of causality between stock market volatility and macroeconomic variable volatilities. The authors also confirmed that only interest rate and inflation have

relationship with stock market volatility. However, the authors underestimated the relationship as they did not consider possibility of structural break in volatility while establishing a relationship between the macro economy and the stock market.

An attempt was made by Lawal *et al.* (2016) to carry out an examination on stock market price volatility with exchange rate volatility and oil price volatility in the Nigeria economy. Using monthly data, the authors found that stock market volatility is caused by both exchange rate volatility and oil price volatility. It was suggested that the policy makers should focus policies that stabilise the exchange rate and guarantee the net oil exporting position for the economy. The authors however ignored the effect of stock price volatility on economic growth. Since the ultimate goal of any economy is to boost economic, pursuing policies that could help stabilise the exchange rate without considering economic growth would be seen as an exercise done in futility. Badshah, Alvi and Sayilir (2016) to contribute to the body of knowledge through the examination of the correlation between Karachi stock exchange (KSE) and macroeconomic variables. Adopting Vector Error Correction model (VECM), the authors established a long run co-integrated relationship among the variables and KSE. All the variables were also found to granger cause the KSE 100 index in the long run however in the short run, only foreign exchange granger cause KSE. The result of this study might not be really reliable as condition of using VECM was not met.

Using EGARCH technique, Xing (2004) made attempt to answer the question on why market volatility varies across countries. Measuring relationship across the selected countries, a negative relationship was found between average education level of investors and market volatility. The study also confirmed that number of firms listed, market industry concentration and the relative market size, may also be associated with volatility across countries. This study can be seen as obsolete as it utilised data that ended in the year 2000 and the Nigerian economy was not included in their analysis. In order to advance knowledge, Naik and Padhi (2012) explored the correlation between Indian stock market and macroeconomic variables. Using the VECM, a positive association was found to exist between stock prices and these two variables: money supply and industrial production however a negative link was found between stock price and inflation. Though, exchange rate and short term interest rate are unimportant determinant of stock prices. The authors could have utilised the autoregressive redistributive lag (ARDL) instead of the VECM as the variables have mixed roots. The precondition of using the VECM was not fulfilled.

Akinlo (2013) investigated the relationship between inflation and stock price index in Nigeria using data from 1986 to 2010. The author established the presence of long run connection between inflation and stock price index. The author concluded that in the long run and short run period, stocks are better inflation hedges. The result of this study might not be reliable as the multicollinearity problem was identified in the correlation test that was conducted and the author did not make attempt to resolve the issue. Yartey (2008) added to the empirical literature by examining both the macroeconomic and institutional determinant of stock market development. The study was based on data from 42 emerging countries, some determinants like stock market liquidity, banking sector development domestic investments were identified as being crucial to stock market development in emerging markets. It was also revealed that institutional determinants like quality of bureaucracy, political risk, law and order *etc.* are crucial determining factors of stock market development in emerging market. The study only identified the institutional and macroeconomic factors that determine stock market development without giving cognizance to whether non-macroeconomic factors also have impact on stock market development.

Akinlo (2014) utilised the VECM method to examine the association between the changes in oil price and stock market growth. Using annual data from 1981 to 2011, the study identified a long run association between stock market growth and the variables considered. Oil price was found to granger cause stock market development. The impulse response function revealed the brief positive effect of oil price on the stock market. The variance decomposition affirmed that the stock market development is heavily reliant on shock on oil price. The study would have been more robust if the author had incorporated other variables like the gross domestic product in their analysis since GDP is a very important macroeconomic variable that impacts stock market development.

The empirical review of literature above, the authors focused on how macroeconomic variable factors influences stock market volatility as one of the measures of stock market development. By implication, none of the authors identified the non-macroeconomic factors that may affect stock market volatility except for Xing (2004) who recognised average education level of investors, market industry concentration, relative size of the market and the number of listed firms as factors that drives stock market volatility. On the other hand, Yartey (2008) examined macroeconomic as well as institutional determinants impact on stock market development; however, the author ignored the non-macroeconomic factors that were singled out by Xing (2004). This study

seeks to add to literature by considering how non-macroeconomic factors also drive stock market volatility in the Nigerian economy.

2. Methodology

This study followed the empirical work of Xing (2004), in detecting the non-macroeconomic factors that drive volatility in Nigeria stock market. The background theory (macroeconomic hypothesis) of this study suggests that stock market prices are affected by changes in interest rate, inflation, money supply, and other macroeconomic variables. Okodua and Ewetan (2013) also advocate that macroeconomic variables are sufficient in establishing the long run direction of an economy. Moreover, non-macroeconomic factors cannot solely affect stock market performance without the influence of macroeconomic indicators; the study therefore incorporates gross domestic product and interest rate as macroeconomic variables in the model of Xing (2004). Gross domestic product has been confirmed by authors like Ibrahim and Aziz (2003) to be one of the most important factors that determines the stock market performance. In addition, Olokoyo *et al.* (2009) included this variable in their study. Interest rate has also been established to be one of the major variables which can exert significant effect on the stock market volatility (Waqar and Saifullah 2017). Thus the specific functional form of Xing (2004) adapted model is stated implicitly and explicitly in equation (1) and (2), respectively as follows:

$$SMV = f(GDP, INT, AEL, NLF, RSE, MIC) \quad (1)$$

where: SMV: Stock market price volatility; GDP: Gross domestic product; INT: Interest rate; MIC: Market industry concentration; AEL: Average education level of investors; RSE: Relative Size of equity market; NLF number of listed firms (total number of listed domestic firms).

$$SMV_t = \beta_0 + \beta_1 GDP_t + \beta_2 INT_t + \beta_3 AEL_t + \beta_4 NLF_t + \beta_5 RSE_t + \beta_6 MIC_t + \varepsilon_t \quad (2)$$

where: β_0 is the constant, $\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficient of the variables, ε is the error term.

$$\beta_1, \beta_6 > 0, \beta_2, \beta_3, \beta_4, \beta_5 < 0$$

The Stock market price volatility (SMV) is the dependent variable and it is proxied by all share index. The stock returns (R_t) are obtained by using the formula: $R_t = \log P_t - \log P_{t-1}$ where R_t is the stock market return in year t , \log is the logarithm and P_t is the Nigerian stock price index at the end of current year t , while P_{t-1} is the price index for the previous year.

The study utilised annual data for the period 1985 to 2016 for Nigeria. The data were sourced from secondary sources. The data used for 'All share index' was sourced from the Central Bank of Nigeria Statistical Bulletin and was used to measure stock market price volatility. For the macroeconomic variables, gross domestic product (GDP) was measured using the annual growth rate of GDP while interest rate (INT) was measured using the base lending rate. Both are sourced from the World Development Indicators of World Bank.

The average education level of investors (AEL) was measured using the school life expectancy and it was sourced from United Nations Organization for Education, Science and Culture, (UNESCO); the number of listed firms (NLF) was measured using the number of domestic listed firms and it was sourced from the world development Indicators of World Bank. The logarithm value of the non-macroeconomic variables (average education level of investors, and number of listed firms) were used. This is to keep in line with Roll (1992) and Xing (2004). Market industry concentration (MIC) is also known as industry concentration. The Herfindahl – Hirschman Index was used to measure industry concentration:

$$IND_i = \sum_{j=1}^n \left(\frac{MVIND_{ij}}{CAP_i} \right)^2$$

where IND_i is the industry concentration measure for the country, $MVIND_{ij}$ is the market value of industry j ($j = 1, 2, \dots, n$) in the country i , n is the number of industries considered for the country and CAP_i is country i 's total market capitalisation.

The Relative Size of the Equity market (RSE) is measured by ratio of total market capitalisation (CAP) to gross domestic product (GDP) multiplied by hundred. Following Xing (2004), the relative size of the equity (RSE) market is computed as follows: $RSE = CAP/GDP \times 100$

3. Estimation Technique and Empirical Results

Estimation Technique

Vector autoregressive (VAR) is considered to model the factors which stock market volatility in Nigeria is driven. The VAR model is sufficient in providing an efficient way of establishing variables under consideration. The VAR model has been confirmed to be credibly useful for making a description of the dynamic behaviour of economic and financial time series, particularly in forecasting. The VAR are easily applied as all variables are treated as endogenous variable, therefore there is no need of figuring out which variable(s) is endogenous and which is exogenous. The VAR takes advantage of decomposition (VDs) and impulse response function (IRFs) to determine the impact of a given variable on itself and all variables. In order to have a good estimate in VAR, it is required that the time series data is subjected to co-integration test and should be found to integrated of order 1 [(1)], existence of co-integration justifies the use of Vector Error Correction model (VECM) in estimating IRFs and VDs. The VECM works with VAR in such a way that it limits the long run behaviour of variables that are endogenous and converges to their co-integrating relationships while giving room for short run amendment dynamics.

The error correction term is taken as co-integration term since deviance from the long run equilibrium is adjusted gradually via a series of partial short run amendments. The time series properties of the variables (see Table 3) under study revealed a co-integrated, non-stationary series that are all integrated of order 1 [I (1)]. Thus, following Ndako (2010), the VECM specification adopted in this study is specified as:

$$\Delta SMV_t = \phi_1 + \alpha_{11} ECT_{t-1} + \sum_{i=1}^{\rho-1} \beta_{11i} \Delta SMV_{t-i} + \sum_{i=1}^{\rho-1} \beta_{12i} \Delta GDP_{t-i} + \sum_{i=1}^{\rho-1} \beta_{13i} \Delta INT_{t-i} + \sum_{i=1}^{\rho-1} \beta_{14i} \Delta AEL_{t-i} + \sum_{i=1}^{\rho-1} \beta_{15i} \Delta NLF_{t-i} + \varepsilon_{1t} \quad (3)$$

$$\Delta GDP_t = \phi_2 + \alpha_{21} ECT_{t-1} + \sum_{i=1}^{\rho-1} \beta_{21i} \Delta SMPV_{t-i} + \sum_{i=1}^{\rho-1} \beta_{22i} \Delta GDP_{t-i} + \sum_{i=1}^{\rho-1} \beta_{23i} \Delta INT_{t-i} + \sum_{i=1}^{\rho-1} \beta_{24i} \Delta AEL_{t-i} + \sum_{i=1}^{\rho-1} \beta_{25i} \Delta NLF_{t-i} + \varepsilon_{2t} \quad (4)$$

$$\Delta INT_t = \phi_3 + \alpha_{31} ECT_{t-1} + \sum_{i=1}^{\rho-1} \beta_{32i} \Delta SMPV_{t-i} + \sum_{i=1}^{\rho-1} \beta_{33i} \Delta GDP_{t-i} + \sum_{i=1}^{\rho-1} \beta_{34i} \Delta INT_{t-i} + \sum_{i=1}^{\rho-1} \beta_{35i} \Delta AEL_{t-i} + \sum_{i=1}^{\rho-1} \beta_{36i} \Delta NLF_{t-i} + \varepsilon_{3t} \quad (5)$$

$$\Delta AEL_t = \phi_4 + \alpha_{41} ECT_{t-1} + \sum_{i=1}^{\rho-1} \beta_{41i} \Delta SMPV_{t-i} + \sum_{i=1}^{\rho-1} \beta_{42i} \Delta GDP_{t-i} + \sum_{i=1}^{\rho-1} \beta_{43i} \Delta INT_{t-i} + \sum_{i=1}^{\rho-1} \beta_{44i} \Delta AEL_{t-i} + \sum_{i=1}^{\rho-1} \beta_{45i} \Delta NLF_{t-i} + \varepsilon_{4t} \quad (6)$$

$$\Delta NLF_t = \phi_5 + \alpha_{51} ECT_{t-1} + \sum_{i=1}^{\rho-1} \beta_{51i} \Delta SMPV_{t-i} + \sum_{i=1}^{\rho-1} \beta_{52i} \Delta GDP_{t-i} + \sum_{i=1}^{\rho-1} \beta_{53i} \Delta INT_{t-i} + \sum_{i=1}^{\rho-1} \beta_{54i} \Delta AEL_{t-i} + \sum_{i=1}^{\rho-1} \beta_{55i} \Delta NLF_{t-i} + \varepsilon_{5t} \quad (7)$$

where: ϕ is the constant, β is the coefficient of the variables, Δ is the first difference of variables, ECT_{t-1} is the error correction term lagged one period. Other notations are as earlier defined. Impulse response function and variance decomposition were applied in order to examine the relationship among the variables

Empirical Results

In what follows, a descriptive statistics and correlation analysis of variables were discussed. This is immediately followed by the unit root, co-integration tests, and Granger causality test. The results are presented and discussed in the last section.

Descriptive Statistics

The descriptive statistics of the variables used in this study is presented in Table 1. The result indicates positive skewnesses for almost all the variables (GDP, INT, AEL and MIC) except SMV, NLF and RSE that are negatively skewed. The kurtosis value of all the variables shows that the data follows normal distribution as the kurtosis values are all greater than 3 except AEL, MIC and RSE that have kurtosis value less than 3. A look at the probability value for the Jacques Bera test confirm normality of more than half of the distribution with the exception of AEL, MIC and RSE.

Table 1. Descriptive Statistics

	GDP	SMV	INT	NLF	AEL	MIC	RSE
Mean	4.631304	0.181326	18.79291	5.13534	1.712091	0.708875	0.592258
Median	4.649226	0.21676	18.06625	5.231094	1.702759	0.687283	0.826982
Maximum	33.73578	0.690181	31.65	5.379897	1.860802	0.974013	3.424605
Minimum	-10.7517	-0.781015	9.433333	4.564348	1.549146	0.45225	-3.120488
Std. Dev.	7.152142	0.291842	4.276887	0.252365	0.07817	0.191423	2.303119
Skewness	1.683833	-0.989881	0.510516	-1.282025	0.318046	0.146459	-0.313007
Kurtosis	10.37623	5.024913	4.661031	3.25977	2.537393	1.526745	1.670069
Jarque-Bera	87.66668	10.69297	5.06871	8.85578	0.824823	3.008377	2.880812
Probability	0.000000	0.004765	0.079313	0.01194	0.662052	0.222198	0.236832
Observations	32	32	32	32	32	32	32

Source: Author's computation using EViews 9

Correlation Analysis

As a preface to the unit root and co-integration tests, the correlation among the variables in this study is examined. The results are highlighted in Table 2a and 2b below. From Table 2a, it was found that the problem of multicollinearity exists considering the correlation coefficient between RSE and NLF which was high with a value of 83.6 percent. Moreover, MIC and RSE include variables that are computed from other variables in the data set. For instance, capitalisation is used to compute both MIC and RSE. Also, GDP which is one of the macroeconomic variables is also included in the computation of RSE. It is thus advisable to drop the variables to avoid the problem of multicollinearity. After the variables were dropped, the correlation analysis was repeated and the result can be seen in Table 2b. Stock market price volatility (SMV) was found to be positively related to interest rate (INT) and average education level of investors (AEL) but negatively correlated with gross domestic product (GDP), and number of listed firms (NLF). The correlation between explanatory variables confirms that multicollinearity is not an issue.

Table 2a. Correlation Analysis

	SMV	GDP	INT	AEL	NLF	RSE	MIC
SMV	1						
GDP	-0.11481	1					
INT	0.351347	0.142634	1				
AEL	0.224743	0.274522	-0.07128	1			
NLF	-0.24915	0.325405	0.301241	0.194233	1		
RSE	-0.39896	0.281548	-0.09943	0.162284	0.835727	1	
MIC	0.105474	0.106257	0.52845	0.20568	0.508692	0.072029	1

Source: Author's computation using EViews 9

Table 2b. Correlation Analysis after dropped variables

	SMV	GDP	INT	AEL	NLF
SMV	1				
GDP	-0.11481	1			
INT	0.351347	0.142634	1		
AEL	0.224743	0.274522	-0.07128	1	
NLF	-0.24915	0.325405	0.301241	0.194233	1

Source: Author's computation using EViews 9

Unit Root Test

In order to formally test for the presence of unit roots in all the variables to be used in this study, the Phillips Perron (PP) test) was utilised. Though, there are numerous avenues of testing for unit root according to macroeconomic literature. According to Phillips Perron (1988), the PP test is sensitive to structural variation that occurs in the mean of a stationary variable which is not covered in the test and in order to escape the bias in the usual unit root test towards acceptance of null of unit root. From Table 3, the result of the unit root test revealed that after first difference of all the variables, they were found to be stationary. It is thus safe to conclude that the variables are integrated of order one I (1). The implication of the result is that a long term relationship could be

present between the variables as all of the variables have unit roots and required differencing in order to make them stationary. This calls for co-integration analysis to establish the existence of long term relationship between the variables.

Table 3. Unit root test at 5% level of significance with intercept and trend

Series	PP (levels)	Order of Integration	Remark	PP (First difference)	Order of Integration	Remark
GDP	-4.605	I(0)	Stationary	-24.69	I(1)	Stationary
SMV	-4.289	I(0)	Stationary	-12.58	I(1)	Stationary
INT	-3.113	I(0)	Non-stationary	-6.337	I(1)	Stationary
AEL	-2.937	I(0)	Non-stationary	-5.836	I(1)	Stationary
NLF	-0.165	I(0)	Non-stationary	-4.131	I(1)	Stationary
Critical Values	-3.56			-3.563		

Source: Author's computation using EViews 9

Co-integration test

The precondition of Johansen co-integration was fulfilled since the variables were found to be non-stationary at levels. The variables were only stationary after first difference. This calls for the establishment of the presence of a long run connection among the variables using the Johansen co-integration test. This test identifies the number of long run relationship in existence among the set of integrated variables.

The optimal lag length used for the co-integration test was based on the Akaike Information criterion (AIC). The optimal lag length of three was selected. The study found that the trace statistics had five co-integrating equations and three co-integrating equations for Max-eigenvalue test at 5% level of significance. The null hypothesis can therefore be rejected to accept the alternative hypothesis of the presence of co-integrating vectors. Thus, the presence of a long run relationship is confirmed among the variables. (see Table 4)

Table 4. Johansen Co-integration test

Hypothesized no of CE(s)	Eigenvalue (5%)	Trace Statistic (5%)	0.05 Critical Value	Eigenvalue (5%)	Max Eigen Statistic (5%)	0.05 Critical Value
None ^{*(**)}	0.952838	219.620700	69.818890	0.952838	85.516560	33.876870
At most 1 ^{*(**)}	0.932224	134.104200	47.856130	0.932224	75.363200	27.584340
At most 2 ^{*(**)}	0.761500	58.740960	29.797070	0.761500	40.134800	21.131620
At most 3 [*]	0.382427	18.606150	15.494710	0.382427	13.494840	14.264600
At most 4 ^{*(**)}	0.166854	5.111311	3.841466	0.166854	5.111311	3.841466
* denotes rejection of the hypothesis at the 5% level for Trace statistic						
(**) denotes rejection of hypothesis at 5% level of Max-eigen statistic						
Trace test indicates 5 co-integrating eq.(s) at the 0.05 level						
Max-eigenvalue test indicates 3 co-integrating eqn(s) at the 0.05 level						

Source: Author's computation using EViews 9

Granger Causality Test

In order to check for the presence of causality, the Granger causality was utilised and the test revealed a one-way causality from interest rate to stock market price volatility, Number of listed firms was also found to granger cause stock market price volatility. A unidirectional causality was also found from average educational level of investors to gross domestic product, see Table 5.

Table 5. Statistically significant result of Granger Causality Tests

Null Hypothesis	Obs	F-statistic	Prob.
INT does not Granger Cause SMV	28	2.41572	0.0846*
NLF does not Granger Cause SMV	28	2.42301	0.0839*
AEL does not Granger Cause GDP	28	2.43673	0.0826*

Note: * signifies 10% level of significance

Source: Authors computation using EViews 9

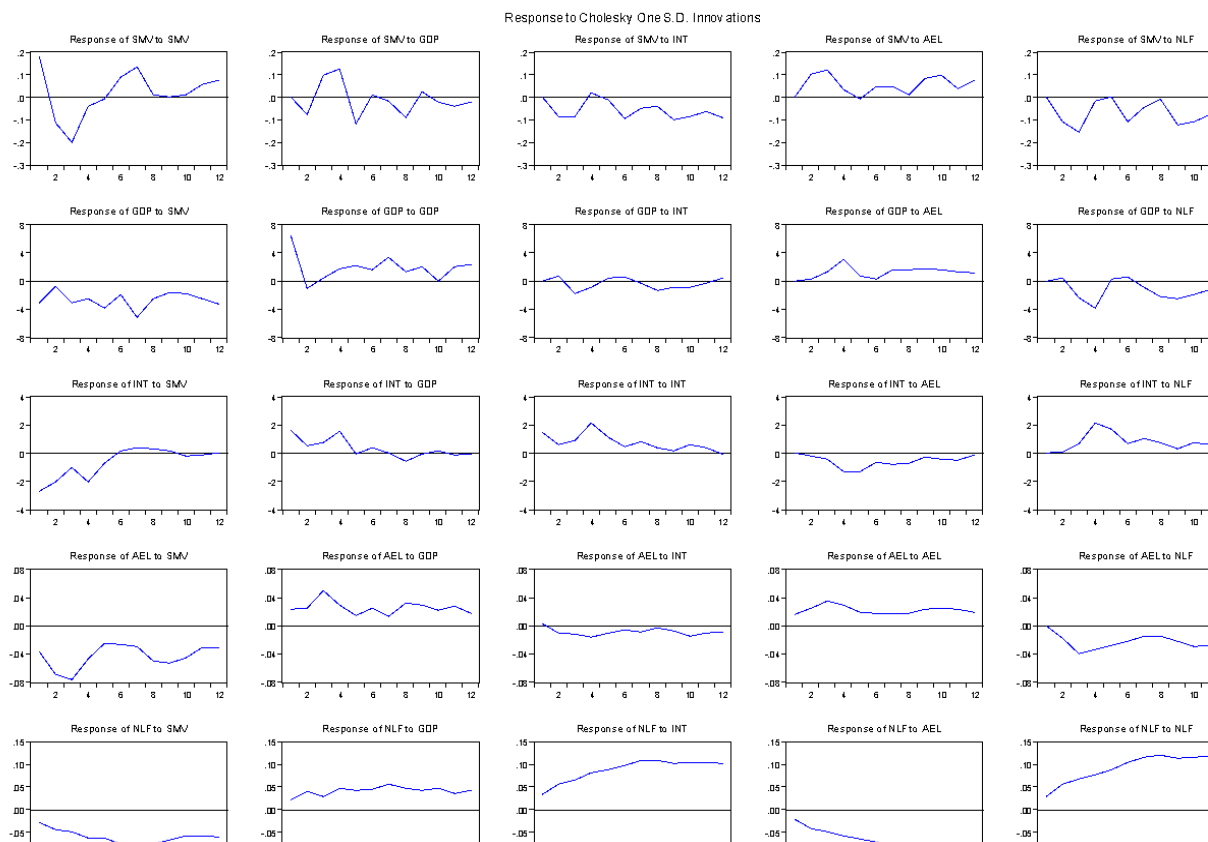
Presentation of Results from Vector Error Correction Model

Following the difficulty associated with interpreting the individual coefficients of the error correction model in the dynamic properties of the model are analysed through the examination of the impulse response functions (IRF) and the variance decompositions (VDs) as suggested by Sims (1980).

Impulse Response Function (IRF)

The IRF trace the dynamic response to the effect of shock in one variable upon itself and on all other variables. In what follows, the IRF is reported in graphic formats. Figure 1 reveals the results of the impulse responses of the variables to one standard deviation of shock to each of the variables in the system. In this study, the focus is on the response of stock market price volatility (SMV) to one standard deviation of shock to Gross domestic product (GDP), Interest rate (INT), Average education level of Investors (AEL), Number of listed firms and vice versa. From the first row of the impulse response shown in Figure 1, it was established that a one standard deviation shock applied to stock market price volatility results to positive response on stock market volatility in the 1st period which is immediately followed by a negative impact till the 5th period. The positive impact rose steadily and peaked in the 7th period but waned up till the 8th period with a steady positive movement till the 10th period. It then resumed a positive upward trend till the 12th period. Also, a one standard deviation shock applied to GDP produces a fluctuating positive and negative impact on stock market price volatility. The positive fluctuations peaked in the 4th, 6th and 9th period while the negative fluctuation were peaked in the 2nd, 5th, 8th, and 11th period. Interest rate has a fluctuating negative impact on stock market price volatility in almost all the periods except for a positive impact in the 4th period. Also, a one standard deviation shock applied to average education level of investors produces a positive fluctuating effect on the stock market price volatility in almost all the periods except for a negative drop in the 5th period. Finally, the numbers of listed firms have a negative fluctuating impact on stock market price volatility in all the periods.

Figure 1. Plot of Impulse Response function



Source: Author's computation using EViews 9

Variance Decompositions (VD)

The variance decomposition assesses the percentage of forecast error variance in one variable explained by shocks in itself and the other variables. Thus, in order to determine the magnitude of the effect, the variance decompositions (VD) was analysed. The result of the variance decomposition for stock market price volatility is presented in Table 6 below. It was found that shock to SMV explained about 55.8% of shocks to stock market volatility in the 1st period declining in effect to about 39% in the 6th period; it rose to 42% in the 7th period before it dropped to 31.6% in the 12th period. This can be regarded as own shock. The VD also revealed that a shock to GDP explained about 7.7% of shock to stock market price volatility in the 1st period with increasing effect to about 21.9% in the 5th period with rate interchanging between 19% and 17.97% from the 6th period to the 9th period. The variation dropped from 17.97% to 15% in the 12th period. The variation to interest rate caused a decreasing impact on stock market price volatility in the short run from 8.6% to 6.9% in the medium term but an increasing impact result in the medium from 9.7% to 14.7% in the long term. A shock to average education level of investors result to an increasing magnitude on the stock market price volatility in short run from 12.7% to 13.1%. The medium term recorded a decreasing marginal impact from 12.2% to 11.4% which was immediately preceded by an increasing effect on stock market volatility from 11% to 14%.

Table 6. Variance Decomposition

Variance Period	Decomposition S.E.	SMV	GDP	INT	AEL	NLF
1	0.17980	100.0000	0.00000	0.00000	0.00000	0.00000
2	0.28418	55.81119	7.70627	8.62290	12.74236	15.11728
3	0.42030	48.59483	8.85697	7.92236	13.87463	20.75121
4	0.44301	44.51957	16.22201	7.30968	13.12046	18.82828
5	0.45914	41.46002	21.91811	6.86001	12.23379	17.52807
6	0.49188	39.27192	19.14844	9.72031	11.53846	20.32087
7	0.51593	42.27207	17.49129	9.66883	11.41528	19.15253
8	0.52570	40.75448	19.85821	9.87424	11.03809	18.47499
9	0.55523	36.53574	17.97344	11.97615	12.19851	21.31616
10	0.58053	33.44401	16.58417	13.16663	13.91108	22.89410
11	0.59409	32.77078	16.29882	13.67838	13.74468	23.50733
12	0.61938	31.56665	15.12851	14.73687	14.01482	24.55316
Cholesky Ordering: SMV GDP INT AEL NLF						

Source: Authors computation using EViews 9

Discussion of Results

Following the analysis, the result shows that in the long run, average education level of investors is found to have a positive relationship with stock market price volatility. By implication, the more educated the investors in the market, the more volatile is the market. The average education level of investors can thus be seen as a vital non macroeconomic variable that influences stock market price volatility in Nigeria. This is however contrary to the work of Xing (2004) that reported a negative correlation. It was also established that in the long run, that number of listed firm has a negative impact on stock market price volatility. This denotes that the more the firms that are listed in the Nigerian stock market, the more diversification that is expected in the market which drives down the prices of stocks in the market. The more firms are listed in the stock market, more stability follows. This result agrees with the study carried out by Xing (2004).

The two macroeconomic factors, namely, interest rate and GDP have negative effect on stock market price volatility. The implication of the negative association between interest rate and stock market price volatility is that higher interest rate would directly impact on returns on stock prices, causing prices to drop as theory has stated. The negative connection between gross domestic product and stock market price volatility implies that increase in economic activity may not boost stock market activities in Nigeria. This may not come as a surprise as investors have lost confidence in the economy as a result of the Nigeria's exchange rate fluctuation. This is contrary to theoretical expectation and the empirical works of Akinlo (2013) that established a positive link between stock market development and economic growth.

Conclusion

The study empirically examined the non-macroeconomic factors that drive stock market volatility in the Nigerian economy. The study incorporated macroeconomic variable into the model and it was established that both non-

macroeconomic factors (Average Education Level of investors and number of listed) and macroeconomic factors (gross domestic product and interest rate) have long run impact on stock market price volatility. The results show that gross domestic product, interest rate, average education level of investors number of listed firms and stock market price volatility are co-integrated. Thus, stock market price volatility has long run relationship with both macroeconomic and non-macroeconomic variables. The result from Granger causality test show there is a unidirectional causality from interest rate to stock market price volatility. Also, a one-way causality from number of listed firms to stock market price volatility was found. Average education levels of investors also have a unidirectional causality with gross domestic product.

The IRFs show that average education level of investors increases steadily in the long run in response to a positive shock on stock market price volatility. However, Gross domestic product, interest rate, number of listed firms all decreased in response to positive shocks on stock market price volatility. In the long run, the VDs established that Interest rate had a positive impact on stock market volatility. Average education level of investors was also found to have an increasing effect on stock market price volatility. However, gross domestic product was confirmed to have a decreasing impact on stock market price volatility in the long run. The findings of this study are useful for policy makers especially in creating awareness about the crucial impact of non-macroeconomic factors on stock market volatility in the Nigerian economy. It is also recommended that financial literacy should be encouraged amongst investors as it could impact on the level of investment the investors in the stock market are involved in. Also, investors should be encouraged to get their businesses listed on the stock exchange thereby boosting diversification and stability in the stock market.

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Appendix. Return to Scale of CBs and IBs

Bank	RTS										Count bank (%)			Count bank (No.)		
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	CRS	IRS	DRS	CRS	IRS	DRS
Bank Dhofar SAOG	CRS	CRS	DRS	CRS	DRS	DRS	DRS	CRS	DRS	DRS	0.4	0	0.6	4	0	6
Bank Muscat SAOG	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
National Bank of Oman	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	CRS	CRS	0.3	0	0.7	3	0	7
Ahli Bank SAOG	CRS	CRS	CRS	IRS	IRS	IRS	CRS	CRS	IRS	IRS	0.5	0.5	0	5	5	0
HSBC Bank Oman SAOG	DRS	DRS	CRS	IRS	IRS	DRS	DRS	CRS	IRS	IRS	0.2	0.4	0.4	2	4	4
Ahli Bank QSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
Commercial Bank QSC	DRS	DRS	DRS	CRS	CRS	CRS	CRS	IRS	DRS	DRS	0.4	0.1	0.5	4	1	5
Doha Bank QSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Qatar National Bank SAQ	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Arab National Bank	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Riyad Bank SJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Samba Financial Group SJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Saudi British Bank SJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Banque Saudi Fransi SJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Saudi Investment Bank SJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
National Bank of Bahrain	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	IRS	IRS	0.1	0.2	0.7	1	2	7
BBK BSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
Al Ahli Bank of Kuwait	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
Burgan Bank SAKP	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Commercial Bank of Kuwait	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
National Bank of Kuwait	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Gulf Bank KSCP	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
Bank of Sharjah PJSC	IRS	IRS	IRS	IRS	DRS	DRS	DRS	IRS	IRS	IRS	0	0.7	0.3	0	7	3
Mashreqbank PSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10

Bank	RTS										Count bank (%)			Count bank (No.)		
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	CRS	IRS	DRS	CRS	IRS	DRS
National Bank of Fujair	DRS	DRS	CRS	IRS	DRS	DRS	DRS	IRS	IRS	IRS	0.1	0.4	0.5	1	4	5
National Bank of Abu Dhabi	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Union National Bank PJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	CRS	DRS	DRS	0.1	0	0.9	1	0	9
United Arab Bank PJSC	IRS	IRS	IRS	IRS	IRS	IRS	DRS	IRS	IRS	IRS	0	0.9	0.1	0	9	1
Abu Dhabi Commercial Bank	DRS	CRS	CRS	CRS	DRS	DRS	DRS	CRS	DRS	DRS	0.4	0	0.6	4	0	6
Emirates NBD Bank PJSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0	1	0	0	10
Invest Bank PSC	DRS	IRS	CRS	IRS	CRS	CRS	CRS	IRS	IRS	IRS	0.4	0.5	0.1	4	5	1
National Bank of Ras Al Khaimah	CRS	CRS	CRS	CRS	CRS	CRS	CRS	CRS	CRS	CRS	1	0	0	10	0	0
National Bank of Um Al Qaiwain	DRS	IRS	DRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	0	0.8	0.2	0	8	2
											0.14	.14	0.73	45	45	240
Masraf Al Rayan QSC	CRS	CRS	CRS	CRS	CRS	IRS	CRS	CRS	CRS	CRS	0.9	0.1	0	9	1	0
Qatar Islamic Bank SAQ	IRS	DRS	DRS	IRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0.2	0.8	0	2	8
Qatar International Islamic	DRS	IRS	IRS	IRS	CRS	IRS	CRS	CRS	IRS	IRS	0.3	0.6	0.1	3	6	1
Bank Albilad SJSC	DRS	DRS	DRS	IRS	IRS	IRS	CRS	CRS	CRS	IRS	0.3	0.4	0.3	3	4	3
Al Rajhi Banking & Inv.	CRS	DRS	CRS	CRS	CRS	CRS	DRS	CRS	CRS	DRS	0.7	0	0.3	7	0	3
Bank Aljazira JSC	CRS	DRS	IRS	IRS	IRS	IRS	IRS	CRS	IRS	CRS	0.3	0.6	0.1	3	6	1
Bahrain Islamic Bank BSC	IRS	CRS	CRS	CRS	CRS	CRS	CRS	IRS	CRS	IRS	0.7	0.3	0	7	3	0
Ithmaar Bank BSC	DRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	IRS	DRS	0	0.1	0.9	0	1	9
Khaleeji Commercial Bank	IRS	IRS	CRS	IRS	IRS	IRS	IRS	IRS	CRS	CRS	0.3	0.7	0	3	7	0
Al Salam Bank Bahrain BSC	IRS	CRS	IRS	CRS	CRS	CRS	CRS	CRS	CRS	CRS	0.8	0.2	0	8	2	0
Boubyan Bank KSCP	DRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	IRS	0	0.9	0.1	0	9	1
Kuwait Finance House KSCP	DRS	DRS	DRS	IRS	DRS	DRS	DRS	CRS	CRS	DRS	0.2	0.1	0.7	2	1	7
Kuwait International Bank	DRS	DRS	IRS	IRS	IRS	IRS	IRS	IRS	CRS	CRS	0.2	0.6	0.2	2	6	2
Abu Dhabi Islamic Bank	DRS	DRS	IRS	DRS	DRS	CRS	CRS	DRS	DRS	DRS	0.2	0.1	0.7	2	1	7
Dubai Islamic Bank PJSC	DRS	DRS	IRS	DRS	DRS	DRS	DRS	DRS	DRS	DRS	0	0.1	0.9	0	1	9
Sharjah Islamic Bank PJSC	DRS	DRS	IRS	IRS	IRS	CRS	CRS	CRS	CRS	DRS	0.4	0.3	0.3	4	3	3
											0.33	0.3	0.34	53	53	54

Notes: CRS: constant return to scale, IRS: increasing return to scale, DRS: decreasing return to scale

Behavioral Aspects in Calculating the Cost of Risk in the Russian Stock Market

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Abstract

The issues of including behavioral biases in the CAPM model were considered in this article. Two types of adjustments to the model were proposed: a premium for sentiment risk and a premium for subjective risk. A correlation model between the stock price, premium for the risk of investing in stocks, stock beta factor, risk-free interest rate, premium for liquidity risk, premium for corporate governance risk, premium for subjective risk and premium for sentiment risk were calculated for stocks of the company circulating in the Russian stock market. The resulting model revealed a linear relationship between the stock price and the premium for the risk of investing in stocks, the premium for corporate governance risk and the premium for sentiment risk. A quantitative interpretation of the investor's behavioral aspects was proposed; the presence of a statistically significant relationship between behavioral aspects and stock price was first tested. The impact of behavioral factors on the stock price was first calculated for a stock circulating in the Russian stock market.

Keywords: fundamental analysis; CAPM model; behavioral biases; sentiment risk; subjective risk

JEL Classification: H54; H59

Introduction

Traditional finance assumes that investors consider all available information to make rational investment decisions and are focused on choosing an efficient set of securities by maximizing the expected returns at a given level of risk. Behavioral finance studies the impact of psychological factors and risks on revenue. It is important to link the asset pricing models to investor preferences. High subjective risk is associated with negative affect, while low subjective risk is associated with positive affect. Investors prefer positive affect, and their preferences boost stock prices and reduce the expected revenue. Subjective risk significantly differs from objective risk. The hypothesis assumes that the more brokers recommend to buy a stock, the less expected return it will have per year. In other words, the more companies recommend to sell or downgrade a stock, the higher the expected return. As such, the classical CAPM model requires adjustments to behavioral factors. Foreign and domestic economists put forward and justified the need to adjust the investor's behavioral biases in the value of the company's capital. As part of building a fundamental model of the investment attractiveness of the company's stocks, it was proposed in the thesis to include a premium for sentiment risk and a premium for subjective risk in the calculation of the cost of equity in the CAPM model.

1. Discussion of the problem

Papers of scientists Kahneman and Tversky (1979) became the basis for a new paradigm in finance called behavioral finance in the 1970s. They showed in the paper "Prospect Theory: An Analysis of Decision under Risk" that losses were perceived by the investor much deeper than winnings. This behavior is called loss aversion. Rudyk (2004) also writes that managers "will demonstrate acceptance of risk only when alternatives are formulated in terms of "net" financial losses. Thaler, Richard (2005) believe that great investors are also subject to behavioral motives, but they understand the importance of emotions in trading and do not confuse emotions with decisions. These investors understand their emotional and psychological weaknesses and determine how much they were exposed to them in the past. Parikh (2011), Parag understand the irrational behavior of other market participants and take advantage of this. Fama (1998), Eugene revealed a difference between the three types of hypothesis of efficient markets. Not much attention is paid to the behavioral component in domestic literature on the assessment of financial assets. In particular, Kovalenko (2014), Hoffmann, Shefrin, and

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Pennings, (2010), Pompian (2006) proposed to add an assessment of the objective component to which investors were exposed when making decisions to the average return on assets. Solodukhina (2010) explored the possibilities of a behavioral paradigm in pricing modeling in the capital market and demonstrated a way to incorporate irrational expectations and investor decisions into the model. Grishina (2011) presented the importance of reviewing behavioral finance in the decision-making process and optimization of the securities portfolio management.

Statman (2008) proposed to include the behavioral aspects of investors in the CAPM model and developed a behavioral model of the capital markets (behavioral CAPM), which included not only objective factors like risk, but also subjective characteristics – for example, negative impact of tobacco, religious preferences, or positive impact of prestigious companies. Investors often have different attitude to the names of companies they hear before they see information on profits, multipliers and other indicators. Finucane, Peters, MacGregor (2003) described this feeling as something that occurs instantly and automatically, often irrationally. Zajonc (1980) described the importance of affect in the following example: "... we buy the cars we "like," choose the jobs and houses that we find "attractive," and then justify those choices by various reasons". Hsee (1996) presented the case on the importance of affect in asset pricing. The influence of emotions and reliance on them increases with the complexity of information and increased stress. Shiv, Fedorikhin (1999) described a case of how the predominance of emotional aspects over cognitive ones grew with increasing complexity of processed information.

Chandra (2008) explored the influence of investor's behavioral factors and psychology on decision-making and studied the relationship between the investor's attitude to risk and behavioral decision-making. According to the scientist, individual investors do not always make rational decisions. Behavioral factors must be taken into account when making decisions. Statman (2008) showed in his behavioral CAPM model that the expected returns were higher when both objective risk and subjective risk were high. High subjective risk is associated with negative affect; low subjective risk is associated with positive affect. This relationship can be traced by the following examples. Hong, Kacperczyk (2009), Waweru, Munyoki and Uliana (2008), Rozeff, and Kinney, (1976) studied the stocks of companies operating in the following areas: tobacco industry, alcohol industry and gaming industry. The negative affect associated with such companies has had a positive impact on the companies' returns. The obtained relationship indicates that the investor's risk assessment reflects subjective risk. As such, the objective risk is measured by a beta factor, while the subjective risk is measured by affect.

Price models of capital markets are versions of the demand and supply model, where prices are defined by the intersection of supply and demand. These functions reflect the preferences of consumers and sellers. As such, it is important to link asset pricing models to investor preferences. High subjective risk is associated with negative affect, while low subjective risk is associated with positive affect. Investors prefer positive affect, and their preferences boost stock prices and reduce expected return. Subjective risk differs significantly from objective risk.

2. Methods

The core goal of this study is to prove the existence of a statistically significant relationship between the investor's behavioral biases and stock price. A method for calculating premiums for the risk of sentiment and subjective risk was proposed. Aside from premiums for behavioral risk, other indicators were taken, mainly those included in the CAPM model. Since premiums for sentiment risk and subjective risk are in some way related to forecasts and changes from brokers and are sufficiently discrete, these variables will be a dummy variable.

Inclusion of these ratios in the model will allow to consider the behavioral aspect in investing in a particular company. First of all, another hypothesis was put forward about the existence of subjective risk in the Russian stock market. The hypothesis suggests that the more brokers recommend to buy a stock, the less expected return it will have per year. In other words, the more companies recommend to sell or downgrade a stock, the higher the expected return.

In our opinion, the behavioral CAPM model can be applied in the Russian stock market. The most liquid stocks of Russian issuers were analyzed to prove the existence and impact of subjective factors on the expected profitability of Russian issuers. Based on the forecast of the largest investment banks and brokers for early 2016, stocks of companies with the highest expected return and a recommendation to "buy" from companies were selected. Actual return by the end of the period under study was lower than expected at the beginning of the year in 11 out of 18 cases. This is explained by the fact that the presence of a recommendation to "buy" from brokers boosts the stock prices, thereby reducing the expected return for subsequent investors. When an investment bank or a broker raises the stock price and/or gives a recommendation to "buy", the stock is adjusted upwards in

a certain period after the recommendation and before the recommendation. In 60% of cases, actual return was lower than expected at the beginning of the year. One of the problems in predicting the presence of subjective risk is that not all companies in the Russian market are liquid and not all companies have recommendations from brokers and investment banks. As such, it can be argued as a result of the study that the premium for subjective risk exists in the Russian stock market.

The next step is to propose a method of calculating the premium for subjective risk (Table 1).

Table 1. Calculating the premium for subjective risk

	Buy	Neutral	Sell	TOTAL
Number of brokerage companies	0	5	1	6
Ratio	1	0	-1	
Composition	0	0	-1	-1
Weight	0.33	0.33	0.33	
Total ratio	-0.06			
Correction factor	0.94			

Source: calculations of the authors.

The method of estimating the premium for subjective risk is as follows: a table is compiled based on the recommendations of brokers, the number of brokers in the respective columns is defined.

$$SubjRP = 1 + (\sum_{i=1}^3 w_i * k_i * n_i) / N$$

where: *SubjRP* is the premium for subjective risk; w_i is weights assigned to brokerage companies according to their recommendations; n_i is the number of brokerage companies with the appropriate recommendation; N is the total number of companies covering this stock.

The brokers are assigned ratios depending on their recommendation (1 is a recommendation to "buy", 0 is to "hold", -1 is a recommendation to "sell"), and each type of recommendation is also assigned a certain weight. The correction factor is calculated as one plus weighted average of estimates divided by the total number of brokers.

As such, a method of adjusting the equity value received by the CAPM method by the amount of subjective risk is proposed. The more brokerage companies give recommendation to "buy", the higher is the premium for subjective risk, and, consequently, the lower is the expected return. Moreover, the more investment companies are studying a particular company, the more accurate the assessment will be. At the same time, the more brokerage companies recommend to "sell" a stock, the lower the premium for subjective risk, hence the higher the possible expected return. The next step is to propose a method for calculating the premium for sentiment risk (Table 2).

Table 2. Calculating the premium for sentiment risk

	Company 1	Company 2	Company 3
Target price of broker 1	8,907	760	914
Target price of broker 2	11,360	830	1,080
Target price of broker 3	8,031	650	1,200
Target price of broker 4	9,770	840	1,150
Target price of broker 5	11,440	780	
Target price of broker 6	11,867		
Sentiment risk	15.3%	9.8%	11.5%

Source: calculations of the authors

It was previously found that a wide range of target stock values from investment banks and brokerage companies influence the expected return on stock. The deviation was calculated as the variation for target stock prices calculated by brokerage companies and investment banks covering this company plus the calculated variation factor. The lower the variation factor is, the lower the premium for sentiment risk, and hence the higher the expected return on stock will be. Moreover, the more brokerage companies cover this company, the more accurate the assessment will be. If a company is covered by a small number of brokers, the volatility for this company is often higher and it is more likely to receive a lower expected return. Based on the obtained data, it was suggested to adjust the cost of capital calculated under the classical CAPM model by the sentiment risk.

$$SentRP = \frac{StDev(P_i)}{\mu} \quad (1)$$

where: $SentRP$ is the premium for sentiment risk; P_i is the target prices of brokerage companies for this stock; $StDev(P_i)$ is the standard deviation of target prices of brokerage companies; μ is the arithmetic average of target prices of broker companies.

Overall, following the results of empirical tests, improvements to the classical CAPM model were proposed. It was suggested to adjust the cost of equity by the following risks:

- Premium for subjective risk;
- Premium for sentiment risk.

The resulting formula can be as follows:

$$CoE = (r_f + \beta_L * ERP) * (1 + SubjRP) * (1 + SentRP) \tag{2}$$

where: CoE is the cost of equity; r_f is the risk-free interest rate; β_L is the leveraged beta of the company; ERP is the premium for risk of investing in stocks; SubjRP is the premium for subjective risk; SentRP is the premium for sentiment risk.

2. Results

Finding the links between the cost of equity and the company's stock price in the Russian stock market. Let's test the dependencies between the price of the company's stock and various indicators describing the CAPM model on historical data from January 1, 2015 to March 24, 2017.

The task was set in the thesis to conduct a correlation analysis of the dependence of various statistical indicators, namely: x1 - Quotes of the company's stocks; x2 - Premium for risk of investing in stocks; x3 - Beta factor of the company's stocks; x4 - Risk-free interest rate; x5 - Premium for liquidity risk; x6 - Premium for corporate governance risk; x7 - Premium for subjective risk; x8 - Premium for sentiment risk.

The adjusted calculations and estimates for each of the items considered earlier in the thesis were taken as the source material:

- Premium for risk of investing in stocks;
- Beta factor of the company's stocks;
- Risk-free interest rate;
- Premium for liquidity risk;
- Premium for corporate governance risk;
- Premium for subjective risk;
- Premium for sentiment risk.

1) Let's determine the estimates of the parameters of the eight-dimensional normal distribution law: vectors of mathematical expectations and standard deviations, matrix of pair correlation factors (Table 3).

Table 3. Estimation of expectation and the standard deviation of the factors under study

	x1	x2	x3	x4	x5	x6	x7	x8
E	69.030	8.960	1.59160	9.9530	5.51	2.89493	1.39903	1.63920
SD	9.963	2.073	2.85412	3.0015	4.96	1.87465	1.14310	1.47365

Source: calculations of the authors.

2) Let's obtain an estimate of the matrix of pair correlation factors (Table 4). To calculate this item, the Statgraphics Centurion statistical package is applied:

Table 4. Matrix of paired correlation factors

	X1	X2	X3	X4	X5	X6	X7	X8
X1		-0.551	0.5250	-0.5310	-0.2354	0.3981	0.5529	0.4561
p-value		0	0	0	0.0368	0.0003	0	0
X2	-0.5510		-0.2189	0.6518	0.1346	-0.0632	-0.1316	-0.0665
p-value	0		0.0526	0	0.2369	0.5799	0.2477	0.5601
X3	0.5250	-0.219		-0.3010	0.0361	0.5812	0.5138	0.6758
p-value	0	0.053		0.0070	0.7521	0	0	0
X4	-0.5310	0.652	-0.3013		-0.0848	-0.3107	-0.2937	-0.2840
p-value	0	0	0.0070		0.4575	0.0053	0.0086	0.0112
X5	-0.2350	0.135	0.0361	-0.0850		0.2838	0.0702	0.3103
p-value	0.0368	0.237	0.7521	0.4575		0.0113	0.5386	0.0054

	X1	X2	X3	X4	X5	X6	X7	X8
X6	0.3981	-0.063	0.5812	-0.3110	0.2838		0.6963	0.7271
p-value	0.0003	0.580	0	0.0053	0.0113		0	0
X7	0.5529	-0.132	0.5138	-0.2940	0.0702	0.6963		0.5137
p-value	0	0.248	0	0.0086	0.5386	0		0
X8	0.4561	-0.067	0.6758	-0.284	0.3103	0.7271	0.5137	
p-value	0	0.56	0	0.0112	0.0054	0	0	

Source: calculations of the authors.

Using the values of P-Value indicator in the table, the statistical significance of the expected correlation is tested. P-Value below 0.05 indicates statistically significant non-zero correlation factors at 95% confidence level. As can be seen from the table, not all paired correlation factors are statistically significant. The following are: X1 and X2; X1 and X3; X1 and X4; X1 and X5; X1 and X6; X1 and X7; X1 and X8; X2 and X4; X3 and X4; X3 and X6; X3 and X7; X3 and X8; X4 and X6; X4 and X7; X4 and X8; X5 and X6; X5 and X8; X6 and X7; X6 and X8.

3. Discussion

As such, a relationship was demonstrated between the change in stock prices and the change in the premium for risk of investing in stocks, the company's beta factor, risk-free interest rate, premium for liquidity risk, premium for corporate governance risk, premium for subjective risk and premium for sentiment risk. Meanwhile, the analysis of the matrix of paired correlation factors indicates that the relationship between the dynamics of stock prices and the premium for risk of investing in stocks is negative. In other words, the greater the premium for risk of investing in stocks, the lower the expected stock price, which corresponds to the CAPM model logic. The next significant relationship is observed between the company's beta factor and company stock prices. The relationship is positive: the larger the company's beta factor, the higher the company's stock price. As such, the higher the company's stock beta, the greater the stock volatility and the higher the probability of a stock change in any direction. Besides, a negative relationship was found between the change in the risk-free interest rate and the change in the company's stock price. Accordingly, the lower the risk-free interest rate, the lower the cost of capital for the company, and hence the higher the price of the company's stock. Further analysis of the matrix of paired correlation factors indicated a negative relationship between the premium for liquidity risk and the company's stock prices. The higher the premium for liquidity risk, the lower the company's stock price. The relationship between the premium for liquidity risk and the cost of equity and hence the cost of capital is direct. The less liquid a stock of a certain company, the higher the degree of its risk to the investor, and the lower the final stock price. A positive relationship was found between the premium for corporate governance risk and the company's stock price. According to the CAPM model logic, the cost of the company's capital will increase with an increase in the premium for corporate governance risk. This fact can be explained as follows: most liquid stocks for the Russian stock market are public or quasi-public. For such companies, there is a sustained premium for corporate risk in the market, while they are the most traded and popular with investors.

Therefore, there may be a positive relationship at certain time intervals between the premium for corporate governance risk and the company's stock price dynamics. There is also a positive relationship between the premium for sentiment risk and stock price dynamics. The premium for sentiment risk is calculated as the standard deviation of target prices from brokerage companies divided by the average of target prices. The resulting correction factor indicates that the lower the variation factor, the lower the premium for sentiment risk, and hence the higher the expected return on stock. The positive relationship between the variables can be explained by several reasons: given the fact that the premium for sentiment risk is high, it turns out that the spread of the target stock values is high enough, and either the company's stock has a high beta factor, or the company is covered by a small number of brokers. Indeed, this company has a high beta factor; the stock has rather high volatility. The same positive relationship exists between the premium for subjective risk and the stock price dynamics. Subjective risk reveals that the more brokerage companies give a recommendation to "buy", the higher the premium for subjective risk, and hence the lower the expected return. In this case, this relationship can be explained either by a small number of brokerage companies that gave a recommendation for this company or a short period of time the company is reviewed within.

The following other significant relationships between the variables under study can be identified. A positive relationship between the premium for risk of investing in stocks and the risk-free interest rate. This relationship is explained as follows: increase in these values results in increase in the cost of capital, which, in turn, reduces the value of the company's stock. Another positive relationship between the company's beta factor and the risk-free interest rate can be explained in a similar way. A positive relationship was also found between the premium for

liquidity risk and the premium for corporate governance risk. These indicators are indirectly interrelated through the similar impact on the final stock value. The company's stock price is declining with an increase in both the premium for liquidity risk and the premium for corporate governance risk. These results are insufficient to conclude which factors and relationships will be statistically significant. Further analysis is required – in particular, an estimation of the matrix of partial correlation factors.

3) Let's obtain an estimate of the matrix of partial correlation factors (Table 5). Let's test the significance and find interval estimates of the partial correlation factors. The Statgraphics Centurion statistical package is applied to calculate this item.

Table 5. The matrix of partial correlation factors

	X1	X2	X3	X4	X5	X6	X7	X8
X1		-0.1541	0.1302	-0.2009	-0.3478	-0.1954	0.2574	0.2985
p-value		0.2359	0.3174	0.1205	0.06	0.1313	0.0452	0.0194
X2	0.1541		0.0826	0.5931	0.0646	0.2163	-0.2870	-0.1304
p-value	0.2359		0.5267	0	0.6209	0.0941	0.0249	0.3163
X3	0.1302	0.0826		0.0339	-0.1147	-0.0351	0.2365	0.0670
p-value	0.3174	0.5267		0.7951	0.3787	0.7883	0.0665	0.6078
X4	-0.2009	0.5931	0.0339		-0.2541	-0.3417	0.1219	0.0506
p-value	0.1205	0	0.7951		0.0481	0.007	0.3493	0.6987
X5	-0.3478	0.0646	-0.1147	-0.2541		-0.1427	0.1430	-0.0143
p-value	0.0600	0.6209	0.3787	0.0481		0.2725	0.2716	0.9128
X6	-0.1954	0.2163	-0.0351	-0.3417	0.1427		0.2421	-0.0590
p-value	0.1313	0.0941	0.7883	0.0070	0.2725		0.0601	0.6516
X7	0.2574	-0.2870	0.2365	0.1219	0.1430	0.2421		-0.0930
p-value	0.0452	0.0249	0.0665	0.3493	0.2716	0.0601		0.4761
X8	0.2985	-0.1304	0.0670	0.0506	-0.0143	-0.0590	-0.0930	
p-value	0.0194	0.3163	0.6078	0.6987	0.9128	0.6516	0.4761	

Source: calculations of the authors.

The table tests the statistical significance of the expected correlation using the values of the P-Value indicator. P-Value below 0.05 indicates statistically significant non-zero correlation factors at 95% confidence level. As can be seen from the table, not all partial correlation factors are statistically significant. The following are: X1 and X5, X1 and X7, X1 and X8, X2 and X4, X2 and X7, X4 and X5, X4 and X6.

Thus, the following relationships from the partial correlation factors were statistically significant: negative relationship between the company's stock price dynamics and premium for liquidity risk, positive relationship between the company's stock price and the premium for subjective risk, positive relationship between the stock price and the premium for sentiment risk, positive relationship between the premium for the risk of investing in stocks and a risk-free interest rate and the premium for subjective risk; negative relationships between the risk-free interest rate and premiums for liquidity risk and corporate governance risk.

Let's use Fisher Z-transformation, having preliminarily established the interval estimate for Z, to obtain interval estimates for the partial correlation factors at level γ (Table 6):

$$Z' - t_{\gamma} \sqrt{\frac{1}{n-l-3}} \leq Z \leq Z' + t_{\gamma} \sqrt{\frac{1}{n-l-3}}$$

where t_{γ} is defined from the table of the Laplace integral function based on condition $\Phi(t_{\gamma})=\gamma$.

Table 6. Interval estimates of partial correlation factors

	Partial correlation	Z	Lower limit	Upper limit
X1 / X5	-0.3478	-0.3630	-0.609870	-0.116000
X1 / X7	0.2574	0.2633	0.016385	0.510259
X1 / X8	0.2985	0.3079	0.060930	0.554810
X2 / X4	0.5931	0.6824	0.435490	0.929370
X2 / X7	-0.2870	-0.2950	-0.542230	-0.048360
X4 / X5	-0.2541	-0.2600	-0.506720	-0.01285-
X4 / X6	-0.3417	-0.3560	-0.602950	-0.109070

Source: calculations of the author

4) Let's conduct a comparative analysis of matrices of paired and partial correlation factors. When comparing the partial correlation factors with paired ones, it is clear that impact of other factors on the tightness of the relationship between the factors under study is quite significant: partial correlation factors are much lower than paired ones. This indicates that the factors from this correlation model have not just direct, but also indirect influence on each other. This is why relationships cleared from the influence of the attendant factors turned out to be less tight. They may turn out to be closer in some cases, if the influence of factors that act in the opposite direction is excluded.

For this reason, not only the magnitude of the correlation factor can change, but also the direction of the relationship: the relationship can be direct in general, but inverse in its pure form, and vice versa. This is explained by the fact that when calculating the paired correlation factors, the relationship between the productive and factor indices is studied taking into account their interaction with other factors as well. As such, an idea of the degree of relationship between the phenomena under study in general and direct contact can be obtained through the use of paired and partial correlation factors.

5) Let's find estimations of twenty multiple correlation factors (Tables 7, 8). Let's test their significance for level $\alpha=0,05$. Let's calculate multiple correlation factors using the following formula:

$$r_{i/1,2,...,k} = r_i = \sqrt{1 - \frac{|R|}{M_{ii}}}$$

where: $|R|$ is the determinant of the matrix of partial correlations, and M_{ii} is the minor obtained by deleting the i -th column and the i -th row from matrix R .

Table 7. Determinants of the matrix of partial correlations

detX	4.66E-08	detX5	1.31E-07
detX1	1.81E-07	detX6	3.18E-07
detX2	2.98E-07	detX7	2.78E-07
detX3	1.45E-07	detX8	5.59E-08
detX4	1.65E-07		

Source: calculations of the authors.

Table 8. Multiple correlation and determination factors

	Multi Correl	Multi Determination
Rx1	0.862030	0.743096
Rx2	0.918490	0.843624
Rx3	0.824148	0.679220
Rx4	0.846652	0.716820
Rx5	0.803339	0.645354
Rx6	0.923925	0.853639
Rx7	0.912217	0.832141
Rx8	0.957420	0.916654

Source: calculations of the authors.

Statistical significance of the resulting factors will be tested using F-test. Multiple correlation factor is considered significant, i.e. there is a linear statistical dependence between X_i and other factors X_1, \dots, X_k , if: $\text{Fact.} > F_{kr.}(\alpha, m, n - m - 1)$, where:

$$Fa. = \frac{\frac{1}{m} r_i^2}{\frac{1}{n - m - 1} (1 - r_i^2)}$$

Actual values of F-test are presented in Table 9:

Table 9. Actual values of F-test

Fx1	8.966803
Fx2	16.724070
Fx3	6.563972
Fx4	7.847106
Fx5	5.641126
Fx6	18.080520
Fx7	15.367930
Fx8	34.094480

Source: calculations of the authors.

All multiple correlation factors are statistically significant.

6) Let's give an interpretation of the obtained results of the correlation analysis (Tables 10, 11).

Table 10. Paired correlation factors (significant)

X1 and X2	X1 and X5	X2 and X4	X5 and X6	X5 and X8
X1 and X3	X1 and X6	X3 and X4	X4 and X6	X6 and X7
X1 and X4	X1 and X7	X3 and X6	X4 and X7	X6 and X8
	X1 and X8	X3 and X8	X4 and X8	X7 and X8

Source: calculations of the authors

Table 11. Partial correlation factors (significant)

X1 and X5
X1 and X7
X1 and X8
X2 and X4
X2 and X7
X4 and X5

Source: calculations of the authors.

Let's describe the significant paired and partial correlation relationships. 25 pairs of relationships turned out to be significant. The first factor X1 – dynamics of the company's stock quotes – participates in 10 of them. In general, the relationship between the factors is rather weak. Direct relationship is present between stock prices and the premium for liquidity risk. In fact, the liquidity factor in the Russian stock market still plays a significant role in shaping the investment attractiveness of the issuer.

Negative relationship is observed between factors X2 and X3. The larger the company's beta factor for a stock, the lower the premium for risk. This fact can be explained by the presence of a high beta already compensating for a higher risk of investing in this company to some extent. The same relationships are between the premium for liquidity risk and the premium for a risk of investing in company's stocks. The logic remains unchanged: the existence of a greater premium for liquidity risk partially compensates for the premium for the risk of investing in company's stocks.

There is a negative relationship between the company's stock prices and the premium for corporate governance risk. The higher the corporate governance risk, the lower the company's stock price. This fact can be explained by a high risk of corporate governance being usually associated with state-owned companies, many of which can be traded at low multipliers for a long time.

It can be easily seen that there are no significant links in partial correlation for many patterns that have a significant paired correlation. This can be explained by the remaining patterns having a significant effect on the variety of factors under study. Since the factors of significant paired and partial correlations do not differ much, it can be concluded that there is a real connection between these factors.

Then an equation for the dependence of the factor with the largest multiple correlation factor with other variables needs to be built. However, in this case, the final prices for the company's stocks must be taken as a resulting indicator. Multiple correlation factors are all significant, which means that a linear dependence of some resulting pattern on factor attributes can be built.

7) Let's build the regression equation, choosing the resulting indicator as the one to which the greatest multiple correlation factor corresponds. As such, the largest multiple correlation factor in the sample is X1 – dynamics of the company's stock prices. This is why it is chosen as resulting, which corresponds to the logic of the model. The Statgraphics Centurion package is applied to build the regression equation.

Table 12. Estimation of the statistical significance of the factors in the basic model

Parameter	Estimate	Standard Error	T Statistic	P-Value
CONSTANT	-34258.300	10658.600	-3.214130	0.0021
Col_1	-9.8013400	15.551700	-0.630243	0.5310
Col_2	113.7380000	80.686300	1.409640	0.1639
Col_3	37.0168000	49.632600	0.745815	0.4587
Col_4	17.1046000	30.807000	0.555216	0.5808
Col_5	23.7613000	28.937600	0.821120	0.4149
Col_6	0.0055769	0.001575	3.540440	0.0008
Col_7	0.1603080	0.111835	1.433430	0.1570
Col_8	1.7170600	0.227554	7.545730	0.0000

Source: calculations of the authors

Table 13. F-test and analysis of the basic model variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	2.62424E9	19	1.38118E8	162.56	0.0000
Residual	5.01286E7	59	849637.		
Total (Corr.)	2.67437E9	78			

Source: calculations of the authors.

Note: R-squared = 48.1256%; R-squared (adjusted for d.f.) = 47.522%; Standard Error of Est. = 921.758; Mean absolute error = 657.475; Durbin-Watson statistic = 1.99609 (P=0.4035)

P-Value above 0.05 indicates statistically insignificant regression factors at 95% confidence level. As can be seen from Table 12 and Table 13, not all factors are statistically significant. As such, removing factors that have an insignificant effect on the result, one by one, the following result can be obtained (Table 14):

Table 14. Estimating statistical significance of the adjusted model

Parameter	Estimate	Standard Error	T Statistic	P-Value
CONSTANT	-9.4606	1115.68	-8.47969	0.0000
Col_2	116.434	36.5022	3.1898	0.0021
Col_6	0.00694537	0.00131304	5.28955	0.0000
Col_8	2.15289	0.150503	14.3046	0.0000

Source: calculations of the authors.

As such, the final results are obtained (Table 15).

Table 15. F-test and analysis of the adjusted model dispersion

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	2.60559E9	5	5.21118E3	553.07	0.0000
Residual	6.87823E7	73	942223.		
Total (Corr.)	2.67437E9	78			

Note: R-squared = 38.1232%; R-squared (adjusted for Df.) = 37.2519%; Standard Error of Est. = 970.682; Mean absolute error = 706.317; Durbin-Watson statistic = 1.73856 (P=0.1012); This selection of factors is also confirmed by a matrix of partial correlation factors.

Source: calculations of the authors.

The resulting regression equation is as follows:

$$X1 = -9.4606 + 116.434 \cdot X2 + 0.00694 \cdot X6 + 2.1589 \cdot X8$$

Signs of parameters that have significant partial correlation with the resultant pattern coincide in the regression equation. In other words, it can be concluded that the direct dependence of the company's stock quotes dynamics on the premium for risk of investing in stocks, premium for corporate governance risk and premium for sentiment risk can be confirmed. For example, an increase in the premium for corporate governance risk will lead to an increase in stock prices. At the same time, an increase in the premium for sentiment risk per unit will increase the stock price by a value twice as large. It should also be noted that the square of the multiple correlation factor almost completely coincides with the equation determination factor, which confirms the accuracy of calculations.

Conclusion

As a result of the static analysis between the company's stock price and various variables, a linear relationship has been established between the stock price and the risk for investing in stocks, premium for corporate governance risk and premium for sentiment risk. Calculations were made only with the data of one company circulating in the Russian stock market for a limited period of time. Future research is to analyse these relationships over longer periods of time and for more stocks in different markets, incl. developed. The issue related to the quantitative interpretation of the investor's behavioural aspects still remains to be disclosed in full.

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Hurst Parameter Estimation Methods: Comparative Study and Application

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Abstract:

Given the importance of Hurst exponent (H), the key parameter of fractional Brownian motion, several methods are developed to estimate it more efficiently. In this paper, we propose a comparative analysis of five estimation methods for H, namely the Standardized Range (R/S) method, the Detrended Moving Average algorithm (DMA), Generalized Quadratic Variation (GQV) Estimator, the log-Periodogram and the method based on the wavelet analysis. To realize this objective, independently of characteristics of the series, we proceed by simulation of several signals test of different sizes and of a known H values. For each method, we evaluate the estimator quality by measuring their bias and variance i.e. the mean square error. The most efficient method will be used to analyse an important economic series, relating to the behaviour of Moroccan exchange rate series vis-à-vis the Dollar and the Euro from December, 2000 to December, 2017.

Keywords: exchange rate; fractional Brownian motion; Hurst exponent; Hurst parameter estimators; mean square error

JEL Classification: C13; C15; C18; C60; G10

Introduction

Since the works of Mandelbrot and Van Ness (1968), the fractal models have long been used in traditional quantitative finance and many other scientific fields to model data that exhibit long-term dependency and scaling phenomena. As a result, a wide range of new models have been introduced, and their statistical studies and numerical simulation have been developed. The most famous example of the fractal type process is the fractional Brownian motion (fBm) which is characterized by a number $H \in [0, 1]$, called the Hurst index that can control these properties of autosimilarity and long range dependency. Let us recall that when $H=0.5$, the process is in fact a standard Brownian motion, if $H>0.5$, the increments of the process are positively correlated and when $H<0.5$, the process increments are negatively correlated. When applying the fBm model to a specific case, it is appropriate at the beginning to worry about the fractal character of experimental series. To do this, several methods appear in the literature to examine the adequacy of the fBm model and the measurement of the Hurst parameter on real data. It is crucial to estimate as precisely as possible this parameter.

In this context the objective of the work presented in this article is to study the methods of estimating the Hurst parameter of the fractional Brownian motion (fBm) mostly used in the treatment of the financial time series and to select those that are the most efficient. In order to determine the efficiency of each method independently of the characteristics of the generated series, trying to sweep several possible combinations of the values that

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can take H and those of length of the series. For each value of the Hurst exponent, we simulate 30 test signals from 0.1 to 0.9 with a step of 0.1, and for each length ranging from 500 to 10000 with a step of 150. Then, for each generated time series, estimates of H are calculated using the following methods: the Rescaled Range method (R/S), the DMA method, Generalized Quadratic Variation (GQV) Estimator, log-periodogram and method based on wavelets. Finally, the statistical characteristics of each estimator are compared namely bias and variance (Amar *et al.* 2016).

The rest of this article is as follows: Section 1 is devoted to the description of the different methods of estimating the Hurst parameter, section 2 aims to conduct a comparative analysis of five estimators of H , mostly used, and to assess experimentally, the quality of the different estimators. Section 3 focuses on examining and analyzing the evolution of the exchange rate series that have a significant impact on the Moroccan economy, namely Euro/MAD and Dollar/MAD, by calculating their Hurst parameter.

1. Estimate of the Hurst exponent

Rescaled range analysis: R/S method

Hurst (1965) has proposed a method called Standardized Range analysis, to model the time series of the height of the Nile. According to this method, a chaotic series can be characterized by an exponent (noted H), which represents the probability that an event is followed by a similar event (persistence phenomenon). The method is to estimate, for a given effective interval, the ration of the range R of the centered and integrated series, and the standard deviation S of the original series. In other words, the series is considered as the "cause" of moving a particle. We are interested in the difference between the minimum and maximum displacement limits, within a certain time interval, standardized by the standard deviation of the cause that generated the displacement (Delignières 2001).

Let $X(t)$ a time series of Length N . A series of independent subdivisions (under intervals), of length practically, we start from series of 10, then 11, 12, 13, up to the highest numbers to distinguish two subdivisions ($N/2$ or $N/2-1$). For each subdivision considered, the average of the τ data is:

$$\langle X \rangle_{\tau} = \frac{1}{\tau} \sum_{t=1}^{\tau} X(t) \quad (1)$$

For each subdivision, the data is centralized by subtracting the local average. Then a set of accumulated values is established within each period: the sum of the centered values before it is added to each data:

$$X(t, \tau) = \sum_{u=1}^t \{X(u) - \langle X \rangle_{\tau}\} \quad (2)$$

The range R is then calculated as the difference between the minimum and the maximum of $X(t, \tau)$:

$$R = \max_{1 \leq t \leq \tau} X(t, \tau) - \min_{1 \leq t \leq \tau} X(t, \tau) \quad (3)$$

This range is then rescaled, while dividing by the local standard deviation ($S(t, \tau)$). Finally, we proceed to the average, by level of effective of the rescaled range R/S . Hurst shows that the rescaled range R/S where S is the standard deviation of the $x(t)$ series, is linked to the length of the interval considered by the following relation:

$$R = \max_{1 \leq t \leq \tau} X(t, \tau) - \min_{1 \leq t \leq \tau} X(t, \tau) \quad (4)$$

where a is a constant and H is the Hurst exponent. H can be estimated as the slope of the *log* regression line of R/S on τ

Method of the Aggregated Variance

Let $X_k^{(m)}$ the time series aggregated, defined by:

$$X_k^{(m)} = \frac{1}{m} \sum_{1+m(k-1)}^{km} X(t) \quad (5)$$

where m is the length of a block.

The procedure is thus consist in dividing the series into $\frac{T}{m}$ blocks of length m , where T is the number of observations, and then calculating the aggregate series $X_k^{(m)}$ for $k = 1, 2, \dots, \frac{T}{m}$. The variance of $X_k^{(m)}$ to the inside of each block is then calculated

$$V(X_k^{(m)}) = \frac{1}{T/m} \sum_{k=1}^{T/m} [X_k^{(m)}]^2 - \left[\frac{1}{T/m} \sum_{k=1}^{T/m} [X_k^{(m)}] \right]^2 \quad (6)$$

This procedure is then repeated for successive values of m . We obtain:

$$V(X_k^{(m)}) \sim C \cdot m^{2H-2} \quad (7)$$

An estimator of H is then deducted from the linear regression of $\{\log(V(X_k^{(m)}))\}$ on $\{\log(m)\}$ (Beran 1994).

Spectral method (LOG-periodogram)

This method (Beran 1994) is based, on the one hand, on the spectral density of a fractional gaussian noise, is proportional to $|\lambda|^{1-2H}$ i.e. $f(\lambda) \sim c_f |\lambda|^{1-2H}$, When $|\lambda| \rightarrow 0$ and on the other hand, on the fact that the periodogram, defined by

$$I_N(\lambda) = \frac{1}{2\pi N} \left| \sum_{t=0}^{N-1} X(t) e^{-it\lambda} \right|^2, \quad \lambda = \lambda_{k,N} = \frac{2\pi k}{N} \quad (8)$$

is an asymptotically unbiased estimator of spectral density.

The method is to perform a regression of the logarithm of the periodogram around the low frequencies:

$$\log(I_N(\lambda)) \simeq \log c_f + (1 - 2H) \log(|\lambda|) \quad (9)$$

Therefore, a regression of the logarithm of the periodogram on the logarithm of the frequency provides a line of slope $1-2H$.

Time-scale method: Decomposition in wavelets

Let $\{\psi_{j,k}(t) = 2^{-j}\psi(2^{-j}t - k), j = 1, 2, \dots, J, k \in \mathbb{Z}\}$ the family of Wavelet, generated from a mother wavelet ψ , associated with a scale function ϕ and are $d_{B_H}(j, k) = \langle B_H(t), \psi_{j,k}(t) \rangle$, the coefficients of the decomposition of the wavelet process, i.e.

$$d_{B_H}(j, k) = 2^{-j/2} \int_{-\infty}^{+\infty} B_H(t) \psi(2^{-j}t - k) dt, k \in \mathbb{Z} \quad (10)$$

The mother wavelet ψ must satisfy the following condition

$$\int_{-\infty}^{+\infty} \psi(t) dt = 0 \quad (11)$$

Then for a given resolution 2^j , we have:

$$B_H(t) = \sum_{j=-\infty}^j \sum_{k \in \mathbb{Z}} d_{j,k} \psi_{j,k} + \sum_{k \in \mathbb{Z}} c_{j,k} \phi_{j,k} \quad (12)$$

$$B_H(t) = \sum_{j=-\infty}^j 2^{-j/2} \sum_{k \in \mathbb{Z}} d_{B_H}(j, k) \psi(2^{-j}t - k) + 2^{-j/2} \sum_{k \in \mathbb{Z}} c_{B_H}(j, k) \phi(2^{-j}t - k) \quad (13)$$

with $c_{B_H}(j, k) = 2^{-j/2} \int_{-\infty}^{+\infty} B_H(t) \phi(2^{-j}t - k) dt, k \in \mathbb{Z}$.

Flandrin (1994) has shown that:

$$\text{var}(d_{B_H}(j, k)) = \frac{\sigma^2}{2} V_\psi(H) (2^j)^{2H+1} \quad (14)$$

with $V_\psi(H)$ is a constant that depends on the choice of the wavelet and the coefficient H , it is defines:

$$V_\psi(H) = \int_{-\infty}^{+\infty} \gamma_\psi(\tau) |\tau|^{2H} d\tau \quad (15)$$

Such as: $\gamma_\psi(\tau) = \int_{-\infty}^{+\infty} \psi(t) \psi(t - \tau) dt$

Thus, we note the linearity in H of $\log_2(\text{var}(d_{B_H}(j, k)))$. The following equation represents the estimate of the Hurst exponent using decomposition in wavelets:

$$\log_2 \left(\text{var} \left(d_{B_H}(j, k) \right) \right) = j(2H + 1) + \text{constante} \quad (16)$$

It is then sufficient to estimate $\text{var}(d_{B_H}(j, k))$ using the empirical moment of second order and then deduce an estimator of H regressing of $\left\{ \log_2 \left(\text{var}(d_{B_H}(j, k)) \right) \right\}_{j_1 \leq j \leq j_2}$ on $\{j\}_{j_1 \leq j \leq j_2}$, where $[j_1, j_2]$ represents the range of resolutions used (Coeurjolly 2000, Veitch and Abry 1999).

Detrended Moving Average (DMA) algorithm

In this paragraph, an algorithm is presented called "Detrending Moving Average (DMA)" (Alessio *et al.* 2002, Carbone *et al.* 2004), to estimate the Hurst exponent. Let the function:

$$\sigma_{DMA}^2 = \frac{1}{N_{max}-n} \sum_{t=n}^{N_{max}} [X(t) - \tilde{X}_n(t)]^2 \quad (17)$$

where: $X(t)$ is the value of the time series (process) on the date t ; $\tilde{X}_n(t)$ is the moving average of order n defined by:

$$\tilde{X}_n(t) = \frac{1}{n} \sum_{k=0}^n X(t - k) \quad (18)$$

where: n is the order of the moving average; N_{max} is the length of the series.

In order to calculate the Hurst exponent of the series, the DMA algorithm operates as follows; the moving average $\tilde{X}_n(t)$ is calculated for different values of n , where $2 \leq n \leq N_{max}$. The value of σ_{DMA} , defined above, is then calculated for all $2 \leq n \leq N_{max}$. Then, the value of σ_{DMA} , corresponding to each $\tilde{X}_n(t)$ is plotted according to n on log-log axes. Based on the following relation of dependency in a power-law: $\sigma_{DMA} \approx n^H$, the curve obtained is a straight line whose slope is the Hurst exponent.

Generalized Quadratic variation (GQV) Estimator

Let's consider one path of the process X at N regularly spaced times $\frac{k}{N}$ or $K = 0, \dots, N - 1$. For convenience, we assume that N is even.

It is known that the Hurst index corresponds to the roughness of the path, a first idea is to measure it through quadratic variation (Bertrand *et al.* 2010).

$$V_N^{(1)} = \sum_{k=1}^N |X - X(\frac{k}{N})|^2 \quad (19)$$

$$\text{That means } \mathbb{E} \left(\left| X \left(\frac{k+1}{N} \right) - X \left(\frac{k}{N} \right) \right|^2 \right) = C * \left(\frac{1}{N} \right)^{2H} \quad (20)$$

The mean quadratic variation corresponds to the empirical variance of the increments and by using stationarity of the increments, one can deduce that $V_N^{(1)}$ is equivalent to $C * (1/N)^{2H-1}$ when N goes to infinity. And after that the estimator \hat{H}_N defined by

$$\hat{H}_N = \frac{1}{2} \left(1 + \log_2 \frac{V_N^{(1)}}{V_N^{(1/2)}} \right) \quad (21)$$

Converges a.s. to H (Benassi *et al.* 1998). Moreover when $H \in [0, \frac{3}{4}]$, the quadratic variation satisfies a Central Limit Theorem (CLT) with rate of convergence $N^{-\frac{1}{2}}$ (Guyon and Leon 1989) and after \hat{H}_N with the same rate of convergence (Coeurjolly 2005). When $H \in [\frac{3}{4}, 1]$, the quadratic variation does no more satisfy CLT (Guyon and Leon 1989). For this reason, it has been replaced by the generalized quadratic variations (GQV):

$$V_N^{(2)} = \sum_{k=1}^N \left| X \left(\frac{k+1}{N} \right) - 2X \left(\frac{k}{N} \right) + X \left(\frac{k-1}{N} \right) \right|^2 \quad (22)$$

which satisfies CLT with rate $N^{-\frac{1}{2}}$ (Istas and Lang 1997) like the estimator \hat{H}_N given by (22) after having replaced quadratic variation by generalized quadratic variation.

2. Comparative study of the methods of calculation of the Hurst exponent

The evaluation of the Hurst parameter, the numerical characteristic of self-similarity and of long-term dependence of stochastic processes is necessary. Thus, several techniques are proposed to estimate the most exact value of H . Indeed, the objective of this part is to conduct a comparative analysis of five H estimators, mostly used.

Thus, in order to evaluate, experimentally, the quality of the different estimators, they must be applied to the self-similar stochastic process of known H value. To do this, fractional Brownian motions are generated using the method proposed by Abry and Sellan (Abry and Sellan 1996). This method is based on the fact that an fBm is derived by fractional integration of a Gaussian white noise, the idea is then to start from the decomposition of a white noise on a multi-resolution analysis. Thus, Abry and Sellan have asserted that this method of fBm synthesis ensures, by construction, the theoretical properties of a fractional Brownian motion (Gaussianity, self-similarity, correlation structure, etc.). In addition, the multi-resolution analysis that underlies this technique leads to a fast and efficient implementation algorithm.

The five H estimators considered in this section belong to three main classes of H estimation techniques: Techniques based on data analysis in the time domain, techniques based on data analysis in the frequency domain and techniques based on the transformed into wavelets.

3. Comparison Criteria

As part of this study, two criteria were taken into account to quantify the performance of the estimators provided by each of the methods listed below. It is bias and variance.

Bias of an estimator

Definition: Bias of an estimator is called $\hat{\theta}$ of a parameter θ the number $\theta - \mathbb{E}(\hat{\theta})$. It is said that the estimator $\hat{\theta}$ of θ is without bias if and only if its bias is zero.

Variance of an estimator

Definition: The variance of an estimator $\hat{\theta}$ of a parameter θ measures the random fluctuation of $\hat{\theta}$ around its average.

Thus, a good estimator must be precise, it is all the more so as its bias (in absolute value) and its variance are the lowest possible, it is also said that its quadratic error defines by $E \left[\left(\hat{\theta} - \theta \right)^2 \right] = V(\hat{\theta}) + \left(\theta - E(\hat{\theta}) \right)^2$ is as small as possible. The following tables give the values of $|\mathbb{E}(\hat{H}) - H|$ and the variance $V(\hat{H})$ for the different H estimators. The signals test lengths are grouped into the following classes: series where the length varies from: 500 to 2750; 2900 to 5150; 5300 to 7550; 7700 to 9950.

The results of Table 1, shows the biases and the variances of the different Hurst exponent estimators (H ranging from 0.1 to 0.9 with a step of 0.1) of a synthetic fBm in which the number of observations is relatively small, i.e. the length N of the series belongs to [500, 2750]. It is clear that the estimation given by the method based on wavelet, as well as the GQV Estimator and the DMA method give good results for this class. That is, these three estimators have the smallest biases and variances compared to the other estimators, while those provided by the R/S method and the GPH method are the most biased.

Table 1. Bias and variance of the H estimators for series with lengths between 500 and 2750

H	Wavelet		DMA		R/S		GPH		GQV	
	$ \mathbb{E}(\hat{H}) - H $	$\text{Var}(\hat{H})$	$ \mathbb{E}(\hat{H}) - H $	$\text{Var}(\hat{H})$	$ \mathbb{E}(\hat{H}) - H $	$\text{Var}(\hat{H})$	$ \mathbb{E}(\hat{H}) - H $	$\text{Var}(\hat{H})$	$ \mathbb{E}(\hat{H}) - H $	$\text{Var}(\hat{H})$
0.2	0.0454	0.0009	0.0441	0.0011	0.8592	0.0684	0.5262	0.0207	0.0467	0.0011
0.3	0.0319	0.0007	0.0480	0.0013	0.8185	0.0770	0.5485	0.0362	0.0326	0.0008
0.4	0.0292	0.0006	0.0529	0.0015	0.7543	0.0693	0.6017	0.0870	0.0289	0.0005
0.5	0.0303	0.0006	0.0588	0.0019	0.6912	0.0703	0.6322	0.0974	0.0284	0.0005
0.6	0.0312	0.0006	0.0574	0.0018	0.5925	0.0562	0.6032	0.0893	0.0291	0.0005
0.7	0.0325	0.0006	0.0600	0.0021	0.4943	0.0550	0.5395	0.0783	0.0267	0.0004
0.8	0.0343	0.0008	0.0615	0.0027	0.4365	0.0698	0.4889	0.0761	0.0271	0.0005
0.9	0.0328	0.0008	0.0581	0.0023	0.3263	0.0642	0.4167	0.0755	0.0250	0.0004

Source: Author's calculation.

To test the quality of this family of the Hurst index estimators according to the length of the fBm, the bias and the variance of each H estimator of series which length varies between 2900 and 5150 observations are represented in Table 2. Thus, it is always noted that the GQV method and that based on the wavelets give the best results and this for all the values of H . The DMA method also provides a good estimator for the short

memory series, *i.e.* which the Hurst exponent value is less than 0.5. These three estimators also have a low variance, which confirms their performance. However, the estimation of H by the GPH method gives bad results, with an average bias of 0.55, which remains somewhat large considering that H is between 0 and 1.

Table 2. Bias and variance of the H estimators for series with lengths between 2900 and 5150

H	Wavelet		DMA		R/S		GPH		GQV	
	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$
0.2	0.0410	0.0004	0.0367	0.0008	0.8828	0.0620	0.5299	0.0097	0.0419	0.0004
0.3	0.0244	0.0003	0.0422	0.0010	0.8129	0.0652	0.5305	0.0128	0.0245	0.0003
0.4	0.0190	0.0002	0.0533	0.0017	0.7362	0.0703	0.5931	0.0621	0.0195	0.0002
0.5	0.0186	0.0002	0.0576	0.0020	0.6680	0.0586	0.6372	0.0868	0.0180	0.0002
0.6	0.0190	0.0002	0.0559	0.0019	0.6009	0.0669	0.6447	0.0936	0.0170	0.0002
0.7	0.0190	0.0002	0.0595	0.0022	0.4991	0.0643	0.5654	0.0732	0.0162	0.0001
0.8	0.0199	0.0002	0.0610	0.0025	0.4518	0.0812	0.4983	0.0633	0.0158	0.0001
0.9	0.0205	0.0002	0.0682	0.0031	0.3678	0.0971	0.4343	0.0777	0.0146	0.0001

Source: Author's calculation.

In order to push the comparative analysis of H estimation methods, Table 3 shows the quality of the estimate for larger synthetic series. Thus, for fractional Brownian motion with the number of observations between 5300 and 7750, it is always observed that the method based on the Wavelet and the GQV method, are the best methods for estimating the Hurst exponent. For series with a value of H less than 0.5, comparing the mean quadratic error of each method, it is concluded that the method based on the wavelets provides a slightly better estimator than GQV estimator. However, for less erratic series, *i.e.* the value of H is greater than 0.5, it is noted that the GQV estimator is more efficient than that obtained by the wavelets method.

Table 3. Bias and variance of H estimators for series with lengths between 5300 and 7550

H	Wavelet		DMA		R/S		GPH		GQV	
	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$
0.2	0.0405	0.0002	0.0339	0.0007	0.8668	0.0837	0.5295	0.0073	0.0408	0.0003
0.3	0.0214	0.0002	0.0444	0.0013	0.8037	0.0667	0.5474	0.0151	0.0228	0.0002
0.4	0.0154	0.0001	0.0514	0.0016	0.7338	0.0626	0.5748	0.0479	0.0159	0.0001
0.5	0.0141	0.0001	0.0539	0.0016	0.6569	0.0590	0.6771	0.0957	0.0130	0.0001
0.6	0.0147	0.0001	0.0620	0.0022	0.5818	0.0607	0.6333	0.0767	0.0127	0.0001
0.7	0.0162	0.0001	0.0580	0.0020	0.4926	0.0549	0.5682	0.0720	0.0139	0.0001
0.8	0.0159	0.0001	0.0607	0.0024	0.4273	0.0793	0.4965	0.0667	0.0133	0.0001
0.9	0.0160	0.0002	0.0811	0.0039	0.3473	0.0859	0.4298	0.0776	0.0122	0.0001

Source: Author's calculation.

The results are confirmed for series ranging in size from 7700 and 9950 observations. Thus, we note that the estimator based on the multi resolution analysis (the method based on the wavelets) and the GQV method are the best. Both methods provide estimators with minimum bias and variance values. However, the R/S method is the one that gives the less precise estimate.

Table 4. Bias and variance of H estimators for series with lengths are between 7700 and 9950

H	Wavelet		DMA		R/S		GPH		GQV	
	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$	$ E(\hat{H}) - H $	$Var(\hat{H})$
0.2	0.0405	0.0002	0.0364	0.0008	0.8790	0.0779	0.5390	0.0070	0.0410	0.0003
0.3	0.0203	0.0002	0.0424	0.0011	0.8105	0.0739	0.5432	0.0180	0.0205	0.0002
0.4	0.0135	0.0001	0.0464	0.0014	0.7599	0.0667	0.5895	0.0493	0.0139	0.0001
0.5	0.0112	0.0001	0.0510	0.0018	0.6666	0.0662	0.6713	0.0941	0.0105	0.0001
0.6	0.0116	0.0001	0.0529	0.0016	0.5952	0.0672	0.6681	0.0837	0.0106	0.0001
0.7	0.0128	0.0001	0.0579	0.0020	0.4941	0.0687	0.5684	0.0590	0.0109	0.0001
0.8	0.0136	0.0001	0.0557	0.0022	0.4372	0.0834	0.5113	0.0686	0.0114	0.0001
0.9	0.0136	0.0001	0.0763	0.0031	0.3832	0.1015	0.4428	0.0741	0.0106	0.0001

Source: Author's calculation.

By calculating the mean quadratic error for all sizes simulated series, the following table confirms the momentum of the two methods, the GQV and the method based on the wavelets analysis compared to the other methods estimating Hurst parameter.

Table 5. Mean quadratic error of the Estimators

H	Wavelet	DMA	R/S	GPH	GQV	minimum
0.2	0.0018	0.0021172	0.8505	0.2975276	0.0019	Wavelet
0.3	0.00057	0.0029137	0.7308	0.3130112	0.0059	Wavelet
0.4	0.00028	0.0035495	0.6441	0.3968198	0.0029	Wavelet
0.5	0.00020	0.0043575	0.5106	0.5446546	0.0019	GQV
0.6	0.00022	0.0044292	0.4215	0.5300844	0.0018	GQV
0.7	0.00027	0.0053388	0.3128	0.3821193	0.0019	GQV
0.8	0.0003	0.0053033	0.2746	0.3300534	0.0002	GQV
0.9	0.0003	0.0089149	0.2484	0.2701849	0.0002	GQV

Source: Author's calculation.

Tables 1, 2, 3 and 4 show that the Estimator obtained by the wavelets method and that provided by the Generalized Quadratic Variations method (GQV) give more accurate value for H, for the different sizes of the series with Hurst exponent varies between 0.2 and 0.9.

On the other hand, and based on the work of Bertrand *et al.* (2010) whose objective was to compare the performance of several estimators of the Hurst index for the multifractional Brownian motion (mBm), namely the Generalized Quadratic Variation estimator, the wavelet estimator and the log-regression estimator of the GQV and which showed that the wavelets estimator provides more accurate numerical results than those obtained by GQV. Therefore, we opt in the following for the wavelets method to calculate the Hurst exponent H.

4. Application

The main objective of this section is to analyse the evolution of the exchange rate series of the Moroccan Dirham vis-a-vis the US Dollar and the Euro, by calculating their Hurst exponents.

4.1. The exchange rate

The exchange rate is one of the most important instruments of the economic policy of an open country on the outside. In fact, it is today considered both a means of monetary regulation and a tool of external competitiveness of a country.

The nominal exchange rate represents the value of the country's national currency in relation to another currency. Thus, the need to follow the evolution of the exchange rate vis-a-vis the currencies of all the main partner countries and competitors is necessary, since the change in the exchange rate of a currency in respect to a single foreign currency remains of limited significance and scope, to the extent that the variation relative to other currencies could be different.

The nominal effective exchange rate does not, in isolation, reflect the evolution of an economy's competitiveness since an increase in domestic prices, which is more important relative to the partner and competitor countries, is not taken into account by this index. Changes in domestic prices relative to those of trading partners or competitors have the same effects as a change in the nominal exchange rate. Hence the interest of designing the real effective exchange rate index, defined as the nominal effective exchange rate index of a currency adjusted by a price index, or costs, relative to the main partner and competitor countries (Hidane 2003).

Thus, the weighting system used by Morocco takes into account its trade and competitive relation with the partner countries. The import weight of each country corresponds to its share in the total Moroccan imports. Exports are double weighting in order to take into account the share of each country in our exports and the competition suffered by the Moroccan exporters in foreign markets from local producers and exporters from third countries (Hidane 2003).

It should be noted that, since 2001 and following the depreciation of the Moroccan Dirham 4.1% in real terms compared to 2000, Morocco has adopted the principle of the anchoring of the Dirham to a basket of currencies, consisting mainly and only of the euro and the dollar by giving more importance to the euro at the expense of the dollar, in order to better reflect the country's anchoring in the euro area. In other words, the weakening of price competitiveness and the increase in the external debt service has led the authorities to readjust the weights of the reference currencies (Esmak 2016).

4.2. The data

The figure below shows that the Dirham's behavior vis-a-vis the US Dollar and the Euro has mixed effects. Overall, the Dollar/Dirham exchange rate has an erratic behaviour, unlike that of the Dirham compared to the Euro, which remains relatively stable.

To satisfy theoretical requirements, the estimation of the Hurst exponent requires that the series analysed be stationary in order to avoid that a high value of H being due to a possible non stationarity of the series. Thus and referring to the work of (Guasoni *et al.* 2008) and (Black and Scholes 1973), it is shown that prices can be described as exponential the sum of a regular process and a stochastic process (because they are not negative).

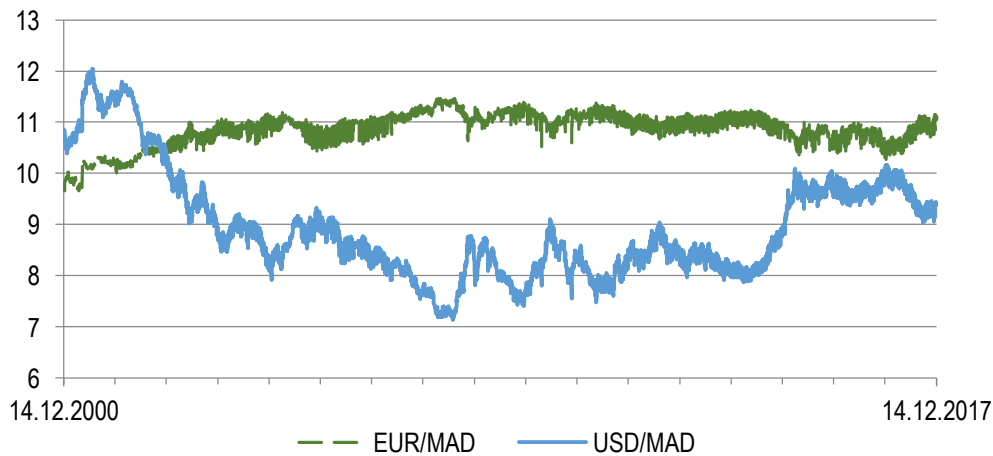
$$X(t) = \exp(f(t) + Y(t)) \tag{23}$$

which is:

$$\log(X(t)) = f(t) + Y(t) \tag{24}$$

where: X(t) - the series of price (exchange rate); F(T) - corresponds to the regular part; Y(t) = log(x(t)) - f(t) - the Stochastic part.

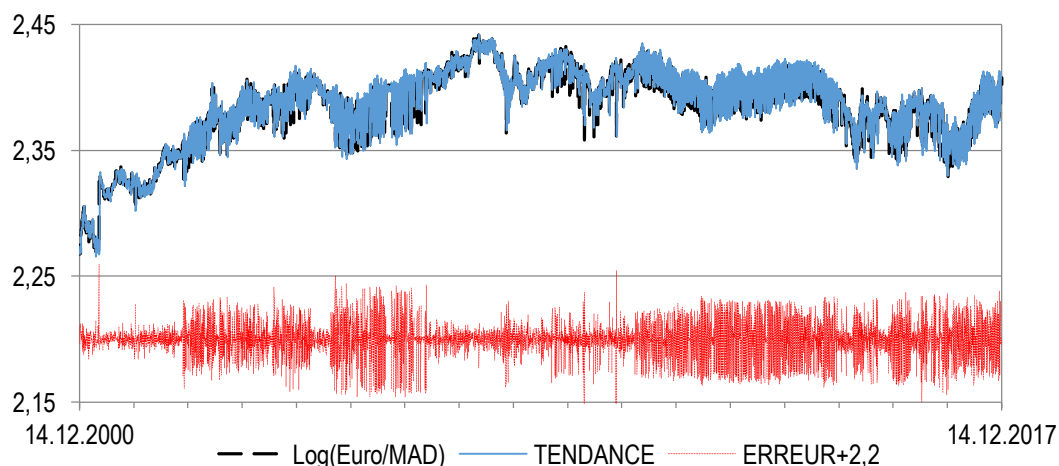
Figure 1. Daily evolution of the exchange rate series (Euro/MAD) and (USD/MAD)



Source: OANDA (www.oanda.com)

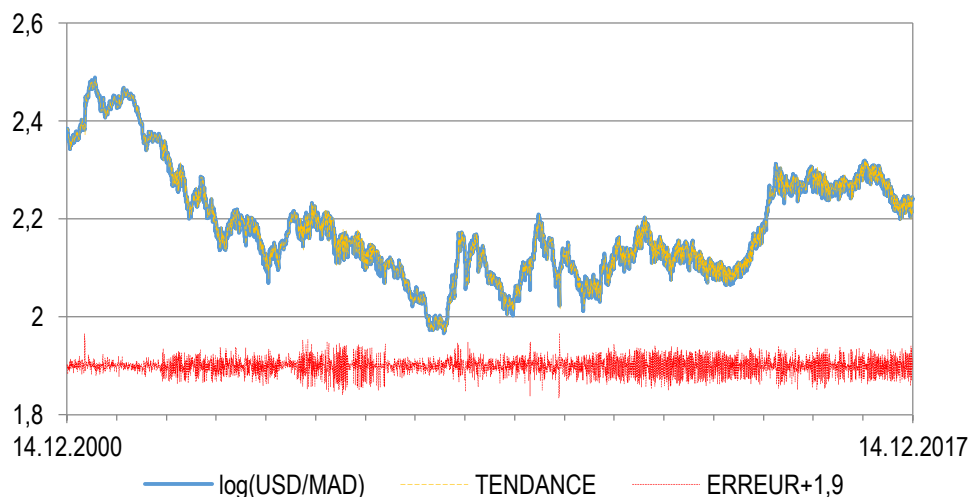
First, it can be noted that subtracting the regular part $f(t)$ has no effect on the value of the Hurst exponent (Bertrand *et al.* 2010). Indeed, this is because the Hurst exponent measures the roughness of the series and the addition or subtraction of a regular function does not affect this characteristic.

Figure 2. Logarithm of daily series of the exchange rate "Euro / MAD", the trend and the residue



Source: Author's calculation.

Figure 3. Logarithm of daily series of the exchange rate "USD/MAD", the trend and the residue



Source: Author's calculation.

Discussion and Conclusion

The Hurst exponent is linked to the dependency structure of the process increments. If $H=0.5$, the increments are independent. Otherwise, when $H<0.5$, the increments are strongly correlated and when $H>0.5$ we are talking about the anti-persistence.

The results of our study show that the Hurst exponent for $\text{LOG}(\text{USD}/\text{MAD})$ and $\text{LOG}(\text{Euro}/\text{MAD})$ are 0.5273 and 0.4786 respectively. These H values indicate that the exchange rates USD/MAD and Euro/MAD have a persistence (anti-persistence) low enough, as H is only very slightly higher (less) than 0.5.

Consequently, the exchange rate series considered are a random process, which means that there is no correlation between the present and future values of the said series.

However, we can conclude that the "USD/MAD" exchange rate has more erratic behaviour than that of the "Euro/MAD" exchange rate. This can be explained by the monetary policies adopted by Morocco regarding the choice of exchange rate regime, which is characterized by a fixed regime rather than a flexible system.

The characteristic demonstrated in this paper, with regard to the behaviour of exchange rates, can negatively impact the competitiveness of the Moroccan economy. Indeed, Ezzahid and Maouhoub (2014) have shown that the flexible regime is an optimal choice in the exchange policy. Indeed, the flexibility of the exchange rate allows improving the competitiveness of the country's foreign economy.

In the same context, the long-memory dependency of the exchange rate series has been the subject of several studies. Indeed, Booth, Kaen and Koveos (1982) have found that in fixed exchange, the exchange rate of the US Dollar compared to the German marks, pound sterling and French Franc are characterized by a phenomenon of anti-persistence whereas in floating exchange regimes, they exhibit a positive long-term memory. It should be noted that, the presence of the long memory phenomenon in this type of series does not allow performing good forecasts. In fact, Cheung (1993) has shown that the ARFIMA models do not allow better forecast out of sample than the simple random walk model (Lardic and Mignon 1999).

In this article, we have presented a modelling, based on the static estimate of the Hurst parameter H , which allows taking into account the properties related to the long memory of economic and financial series. However, the multifractal modelling offers a new framework for the study of time series and allows for a better understanding of the evolution and behavior of the series.

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Interpolating Construction Projects Escalations from Egwunatum's Time-Cost Equilibril

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Abstract

This paper identified the limitations of time-cost escalation measurements in reputable literature to be para-subjective in their analytic forms, and may not necessarily give credence to a potential claim situation. Motivated by the above gap, a conceptual theory was built on the congruency of jump functions with time-cost escalation. The theory moved from a novel definition of time-cost escalation as an arbitrary step-wise movement of time and cost in opposite axis and drew a construct of their discontinuities from an ordered process as a jump. Identifying the jump region using mind's eye and thought experiment required that a performance and progress measurements of an ordered process are interfaced. The intercept of the interface showed an Egwunatum time-cost equilibril which portends a region for escalation. A distribution function for the jump region was theorized from Kelzon jump determination and Kvernadze trigonometric interpolation and its measurability proved on the basis of Schmuland and Saz's proposition. The paper concluded that the measuring points of time-cost escalations are by interpolation at points $(T_{f1} - T_{g1}) (T_{f2} - T_{g2}) (C_{f1} - C_{g1})$ and $(C_{f2} - C_{g2}) (T_{f1} - T_{g1}) (T_{f2} - T_{g2}) (C_{f1} - C_{g1})$ and $(C_{f2} - C_{g2})$.

Keywords: jump functions; time-cost escalations; Egwunatum equilibril; performance curve; progress curve; contingency

JEL Code: C62

Introduction

In recent times, claims within the construction industry are frequently resonating in losses related to cost and time, to the point that such clauses are becoming necessary and sufficient conditions for project delivery (Chang 2002, Callahan 1998, and Semple *et al.* 1994). Learned societies in the construction industry and the academia have confronted this claim parameter by research efforts in different dimensions as cost overturns effects, impacts, assessment, evaluation *etc.* on construction projects and ditto delay claims for time overruns (Arditie *et al.* 1985). While both parameters have been treated as independent or joint variables during investigation, the remote identification of both parameters as construction project escalation basis is far from parametric evaluations (Flyvbjerg 2002 and Condon and Harman 2004).

More, so, there seems to be a literature gap within the construction industry as to the actual definition of construction project escalation. Basically, it is the arbitrary stepwise movement of cost and time elements of construction projects which impacts on the overall performance of the project value. The inability of the industry to have a standardized framework for the parametric prediction of cost and time escalations in construction projects in spite of various control and planning/scheduling tools leaves more to be desired in an attempt to combat escalations and its associated claims, in construction projects (Gideon and Wasek 2015). On the basis of this, a theoretical attempt in this paper is contemplated on a construct of mathematical jump function to confront the indeterminacy of time/cost escalations prediction in construction projects.

1. Research Background

Construction project Time-cost escalations have attracted plethora of research output on causes/factors responsible for its occurrence in construction projects. Shane, Mojkenaar, Anderson and Schexnayder (2009) took the investigation from symptom identification level to cause and management assessment. They carried out an anthological and categorization study of identifying individual cost increase factors responsible for escalation and categorized them into 18 primary factors that impact cost of all types of construction projects. Beside the 18 primary factors, the key drivers to escalations were identified to be scope change, schedule change, unforeseen site conditions and inflation.

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Before the Shane *et al.* (2009) study, Flyvbjerg, Holm and Buhl (2002) out rightly attributed cost increases and by extension time/cost escalation in construction projects to be responsible by cost underestimation which it claimed that 9 out of every 10 transportation projects around the world have been impacted with cost escalation. Flyvbjerg *et al.* (2002) position that transportation infrastructure construction cost worldwide are on average of 20% higher than their initial estimated cost is shown in the narration of the table below:

Table 1. Inaccurate cost estimates of transportation projects

Project type	All projects		Europe		North America	
	Number of case	Average cost escalation (%)	Number of case	Average cost escalation (%)	Number of case	Average cost escalation (%)
Rail	58	44.7	23	34.2	19	40.8
Bridge	33	33.8	15	43.4	18	25.7
Road	167	20.4	143	22.4	24	8.4
All projects	258	27.6	181	28.7	61	23.6

Source: Flyvbjerg, Holm and Buhl (2002)

Investigations on the factors responsible for construction project escalation pre-dates the Shane *et al.* (2009) study. The credit to the Shane *et al.* (2009) study is in the harmonious categorization of all factors into 18 and sublimation into internal and external factors with the demarcation that owner's/owner's agents' factors responsible for cost escalation are internal, while factors outside the direct control of the owner/agent are external. See narrations and earlier investigation in Table 2 below:

Table 2. Cost escalation factors by cause agent and project development phase

No	Source	Cost escalation factor	Investigation and research findings credit
1	Internal factors: factors that contribute to escalations but in their nature are controllable by the owner/agents	* Bias	Akinci and Fischer (1998); Bruzelius <i>et al.</i> (1998); Condon and Harman (2004); Flyvbjerg <i>et al.</i> (2002); Hufschmidt and Gerin (1970) Pickrell (1992)
		* Delivery/ Procurement approach	Harbuck (2004); NJDoT (1999); Parsons Brinkerhoff Quade & Douglas; Inc (2002); Science Applications Internationals Corporation (2002); Weiss (2000)
		* Project schedule change	Board on Infrastructure and the Constructed Environment (2003), Booz Allen & Hamilton Inc. and DRI/McGraw-Hill (1995); Callahan (1998); Chang (2002); Hufschmidt and Gerin (1970); Mackie and Preston (1998); GAO (1998); Merrow (1998); Semple <i>et al.</i> (1994) Touran <i>et al.</i> (1994)
		* Scope creep	Akinci and Fisher (1998), Board on Infrastructure and the Constructed Environment (2003), Booz Allen & Hamilton Inc. and DRI/McGraw-Hill (1995); Callahan (1998); Chang (2002); Harbuck (2004); Hufschmidt and Gerin (1970); Mackie and Preston (1998); GAO (1998); Merrow (1998); Semple <i>et al.</i> (1994) Touran <i>et al.</i> (1994)
		* Inconsistent application of contingencies	Nor and Tichacek (2004); Ripley (2004)
		* Faulty execution	Touran <i>et al.</i> (1994); Chang (2002); Board on Infrastructure and the Constructed Environment (2003)
		* Ambiguous contract provisions	Mackie and Preston (1998); Touran <i>et al.</i> (1994); Harbuck (2004)
		* Contract documents	Chang (2002); Touran <i>et al.</i> (1994); Mackie and Preston (1998)
2.	External factors that causes escalation in projects that are majorly contractor based but outside the direct control of the owner/agent	* Local concerns and requirements	Board on Infrastructure and the Constructed Environment (2003), Daniels (1998), Hudachko (2004); Chang (2002); Touran <i>et al.</i> (1994); Mackie and Preston (1998); GAO (1998); Merrow (1998); DRI/McGraw-Hill (1995)
		* Inflationary effects	Marrow (1988), Booz Allen & Hamilton and DRI/McGraw-Hill (1995), Hufschmidt and Gerin (1970); Pickrell (1992)
		* Unforeseen conditions	Ardit <i>et al.</i> (1985); Touran <i>et al.</i> (1994), Semple <i>et al.</i> (1994), Akinci and Fischer (1998), Callahan (1998)
		* Market conditions	Callahan (1998); GAO (1999); Chang (2002); Board on Infrastructure and the Constructed Environment (2003), Marrow (1988); Pearl (1994)

No	Source	Cost escalation factor	Investigation and research findings credit
		* Scope changes	Semple <i>et al.</i> (1994); Callahan (1998); Hartbuck (2004); Board on Infrastructure and the Constructed Environment (2003), Marrow (1988); GAO (1999)
		* Scope creep	Callahan (1998); Hufschmidt and Gerin (1970); Mackie and Preston (1998); GAO (1999); Chang (2002); Harbuck (2004); Akinci and Fischer (1998); Board on Infrastructure and the Constructed Environment (2003)
		* Unforeseen events	Arditi <i>et al.</i> (1985); Callahan (1998); Chang (2002); Marrow (1988); Akinci and Fischer (1998); Hufschmidt and Gerin (1970)

Source: Review on Shane *et al.* Escalation factors classification (2009)

The Shane *et al.* (2009) study averted that the immediate consequence of their study was to show the probable 18 factors responsible for construction projects cost escalation, which in turn should arm estimators, clients/agents and contractors of their fore-knowledge towards mitigating its occurrence. The study as a qualitative note was not claim sensitive with recourse to escalation measurements and quantification for the purpose damage/impact payments.

Attempts towards, measurement and tracking of cost escalation was reported in the literature of Morris and Wilson (2016) using cost indexes that are deterministic in nature but are not actually predictive on the basis of the method of the data collected for such measurement see Table 3 below and Moris and Wilson (2006) for elaboration.

Table 3. Indexes used for Measuring Cost Escalation

No	Genre	Method
1.	Basket of Goods (small)	Relies on surveying suppliers of a small range of strategies materials and labour < 10 items
2.	Basket of Goods (large)	Relies on surveying suppliers of a large range of strategies materials and labour < 40 items
3.	Project specific Basket of Goods	The index is iterated from the project estimate with escalation factors being applied to the primary trades
4.	“Feels like” surveys	Relies on surveys of 10 to 20 contractors and sub contractors opinions on cost trends
5.	Tender price	Statistical in nature by the analysis of bid projects by type. It relies on consistent data collection for 10 to 20 projects per type for analysis.
6.	Bid price	

Source: Extract of Review on the work of Moris and Wilson (2006)

The caveat given by Moris and Wilson (2006) on the use of these indexes for measuring actual escalations scorn to justify the fact that index numbers are actually para-subjective measurements with epistemic attribute and therefore requires a thorough evaluation to determine which provides the clearest for use and most consistent. In support of the proviso, the weaknesses of these index numbers are reinforced in their inability to pass the consistency and reliability test when subjected to the following tests:

- Unit test of index numbers;
- Time Reversal Test;
- Fischer Factor Reversal Test and
- Westergarrd Circular Test.

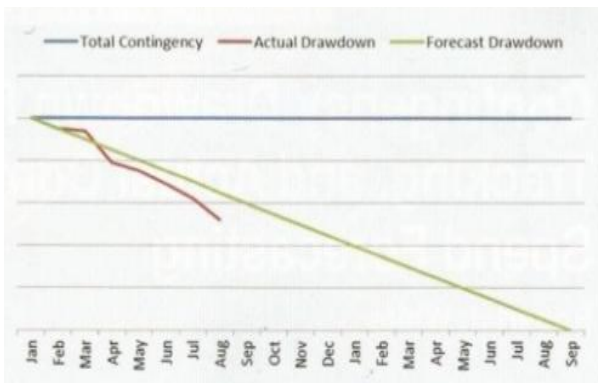
Escalation measurement indexes provided in Moris and Wilson (2006) shows semblance with routine index number measurements which are though important tools for analysing economic and business situations, but which according to Gupta (2008), their interpretation must as a consequence of their limitations listed below be used with caution:

- not showing exact changes in the relative level of the measurement in question, been only approximate indicators;
- likelihood of error introduction at each stage of the construction of the index numbers;
- requiring that items and their qualities should remain the same over period of time which supposedly may not be able to keep pace with the changes in the nature and quality of items and hence may not really be representative;
- by suitable choice of the base time in question, items price and quantity quotations makes index numbers to be liable to manipulation by interest to obtain desired results.

An investigation conducted by Dugan, Ewing and Thomson (2016) on the dynamics of new building construction cost and its implication for forecasting escalation allowances, reinforces the critique against the use of indexes to measure to the nearest accuracy level the value of escalations which in their own findings showed that indexes are non-stationary estimators, lacking generalization and qualities of an exact or laboratory science.

In recent times, the construction industry witnessed a flurry of literature (Egwinatum and Oboreh 2015 on orthogonal function method) to indicate that the application of contingency cost to rescue construction project escalation cost and by extension time has been unsuccessful. White (2016) in support of this stance, revealed that project deterministic cost ends with the algebraic summation of identified scope cost and allowances, less contingency. This implies that contingency is actually provided to bring the project to actual funded level as an extra provision in spite of estimates tolerance for allowances (AACE 2015), (Kerzner 2009). Yet, contingency application has failed to rescue escalation with the notion premised by White (2016) that even at funded level, contingency cost continues to fluctuate between forecast and tracked contingency drawn down and actual contingency spend forecasting as graphically illustrated below:

Figure 1a. Typical Contingency Control Draw Down Chart



Source: White (2016) AACE

Figure 1b. Project Spend Forecast Curve

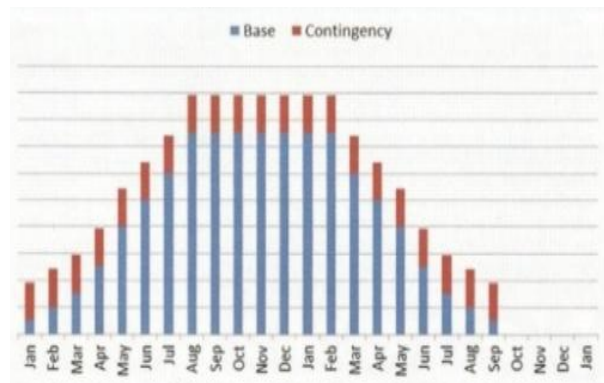


Figure 1c. Spreading Contingency Forecast Based on Base Cost Timing

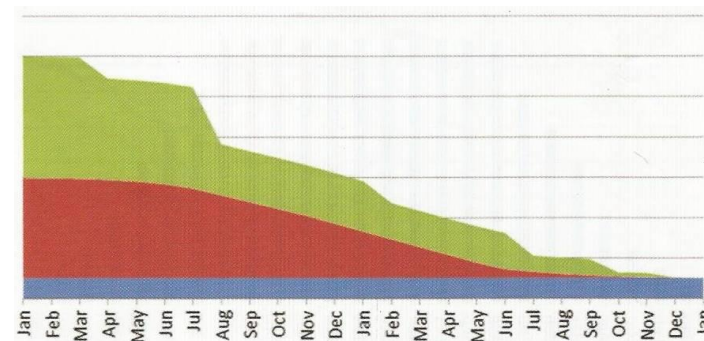


Source: White (2016) AACE

Figure 1d. How Contingency is usually spent

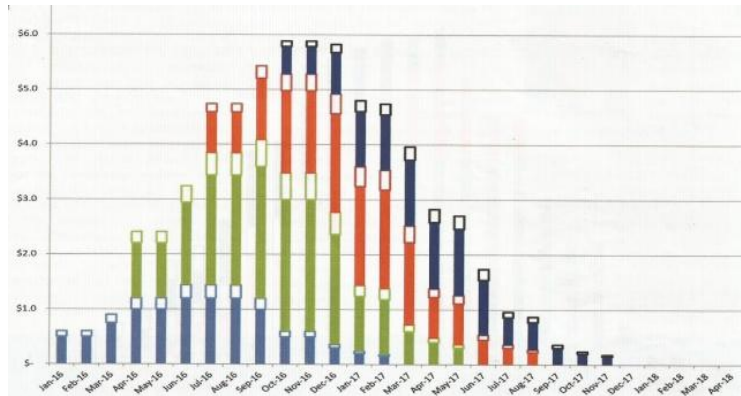


Figure 1e. Layered approach to Drawdown Curves



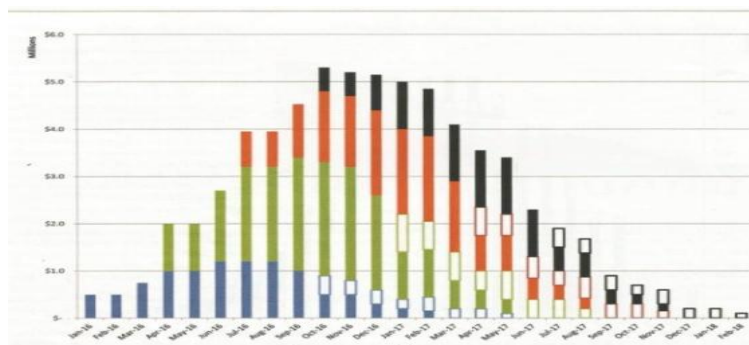
Source: White (2016) AACE

Figure 1f. Four Project Portfolio with Even Contingency Spend



Source: White (2016) AACE

Figure 1g. Realistic Contingency Spend Forecast – Portfolio View



Source: White (2016) AACE

Whereas, a reciprocal relationship should exist between construction project time and contingency cost application. White (2016) paper demonstrated a negation of that position that contingency cost application and construction project time, though at different axes, moves in the same direction with simultaneity properties on the bases of portfolio. The reasons for such simultaneous behaviour of construction project time and contingency cost use movement is not far from the obvious that the project gradually witnesses escalation.

Algebraic investigation of time/cost behavior in construction projects in terms of their orthogonal properties *i.e.* dilation/vanishing properties have been theorized and given exclusive narrations in Egwunatum and Oboreh (2015). The vanishing properties of time/cost value in construction projects is reflected in the dilation of the two elements as the project progresses. This suffices in the zeroing from the upper limit of the construction projects budgeted cost and time to zero in terms of funds and time utilization to completion.

The pecuniary influence of escalation factors on these indexes highlighted in Table 3 for measuring escalations were undermined as it has been shown in the accompanying figures overleaf that construction project cost loses time-cost value due to gravitating drift by resultant escalation factors weight. The narration that follows is that when two variables of projected and actual performances or progression are correlated interfaced by their trigonometric bounds, we can show clear jumps as escalation impact on the project by a gravitating drift or centrifuge potentiation.

Table 4. Hypothetical project scope, size specification, functionality and location distribution

Project	Cost of project at time of offer	Location	Functionality	Scope	Project size	Project specification	Cost of project at completion	Time of completion
A	\$10m	-	Standard	Standard	Standard	Standard	$10m < x < 20$	6
B	\$30m	Same as A	Same as A	Same as A	Same as A	Same as A	$30m < x < 40$	8
C	\$40m	Same as A	Same as A	Same as A	Same as A	Same as A	$40m < x < 50$	10
D	\$50m	Same as A	Same as A	Same as A	Same as A	Same as A	$50m < x < \text{ith value}$	12

Note: $x = c_c$ = construction cost

Hypothetically, projects A, B, C and D are equivalent projects in terms of scope, size, specification, functionality and location constructed at different times. Escalation in terms of cost and time is visibly reported from the graphical representation over 'n' years in terms of reproduction of project A. progressively, time dilates from 0 to 6 months for project A for example when the cost hunches above the budgeted \$10m when also the budgeted cost vanishes from \$10m to zero (0) at completion. From Table 4, the drift in Figure 1h is potentially drifted by escalation factor weights which in effect time/cost escalations are consequences of the escalation force even when all the projects (A-D) have the same probability attributes in terms of condition for execution.

Table 4a. Project A awarded at the cost of \$10m with Actual and Projected cost performance distribution

Project	Project Bid Cost (\$m)	Valuation period (days)	Projected Performance Cost (\$m)	Actual Performance Cost (\$m)	Force of decrement on projected Perf. Cost (\$m) Projected	Force of decrement on actual Perf. Cost (\$m) Actual
A	10m	0	-	-	10.00	10.00
Escalation value = \$10.11m		30	0.77	0.77	10.00	20.11
% of escalation of project cost = 101.1%		60	0.89	0.89	9.23	19.34
		90	1.00	2.00	8.34	18.45
		120	1.06	2.71	7.34	16.48
		150	1.11	2.00	6.28	13.74
		180	0.89	1.89	4.28	9.85
		210	0.23	0.23	4.05	9.62
		240	0.46	0.46	3.59	9.16
	270	0.52	1.71	3.07	7.45	
	300	1.02	2.61	2.05	4.84	
	330	1.00	2.33	1.05	2.51	
	360	1.05	2.51	0	0	
	390	-	-	-	-	
			10.00	20.11		

Table 4b. Project B awarded at the cost of \$30m with Actual and Projected cost performance distribution

Project	Project Bid Cost (\$m)	Valuation period (days)	Projected Performance Cost (\$m)	Actual Performance Cost (\$m)	Force of decrement on projected Perf. Cost (\$m) Projected	Force of decrement on actual Perf. Cost (\$m) Actual
B	30m	0	-	-	30.00	30.00
Escalation value = \$7.60m		30	4.10	3.60	25.90	37.60
% of escalation of project cost = 25.33%		60	2.60	2.60	23.30	34.00
		90	2.22	2.98	21.08	31.40
		120	2.41	2.86	18.67	28.42
		150	2.31	4.31	16.36	25.56
		180	2.09	3.44	14.27	21.25
		210	1.87	3.09	12.40	17.81
		240	1.50	2.00	10.90	14.72
	270	1.50	2.41	9.40	12.72	
	300	2.60	2.60	6.80	10.31	
	330	3.30	3.11	3.50	7.71	
	360	3.50	4.60	0	4.60	
	390	-	-	-	-	
			30.00	37.60		

Table 4c. Project C awarded at the cost of \$40m with Actual and Projected cost performance distribution

Project	Project Bid Cost (\$m)	Valuation period (days)	Projected Performance Cost (\$m)	Actual Performance Cost (\$m)	Force of decrement on projected Perf. Cost (\$m) Projected	Force of decrement on actual Perf. Cost (\$m) Actual
C	40m	0	-	-	40.00	40.00
Escalation value = \$7.60m % of escalation of project cost = 19%		30	1.87	2.14	38.18	47.60
		60	3.11	3.11	35.02	45.46
		90	2.90	2.90	32.12	42.35
		120	3.42	4.23	28.70	39.45
		150	4.01	5.61	24.69	35.22
		180	3.33	5.00	21.36	29.61
		210	3.50	4.80	17.86	24.61
		240	4.77	4.77	13.09	19.81
		270	3.08	3.48	10.01	15.04
		300	2.46	2.46	7.55	11.61
	330	3.97	5.11	3.58	9.15	
	360	3.58	4.04	0.00	4.04	
	390	-	-	-	-	
			40.00	47.60		

Table 4d. Project D awarded at the cost of \$50m with Actual and Projected cost performance distribution

Project	Project Bid Cost (\$m)	Valuation period (days)	Projected Performance Cost (\$m)	Actual Performance Cost (\$m)	Force of decrement on projected Perf. Cost (\$m) Projected	Force of decrement on actual Perf. Cost (\$m) Actual
D	50m	0	-	-	50.00	50.00
Escalation value = \$6.20m % of escalation of project cost = 12.4%		30	2.00	2.20	48.00	56.20
		60	4.00	4.80	44.00	54.00
		90	3.00	3.40	41.00	49.20
		120	6.00	6.00	35.00	45.80
		150	2.00	2.10	33.00	39.80
		180	5.00	5.20	28.00	37.740
		210	7.00	7.20	21.00	32.50
		240	7.00	7.20	14.00	25.30
		270	4.00	4.30	10.00	18.10
		300	3.00	3.30	7.00	13.80
	330	5.00	5.30	2.00	10.50	
	360	2.00	5.20	0.00	5.20	
	390	-	-	-	0.00	
			50.00	56.20		

Figure 1h(a). Jump drifting effects of escalation factor weight on projects A-D from projected performance to actual performance

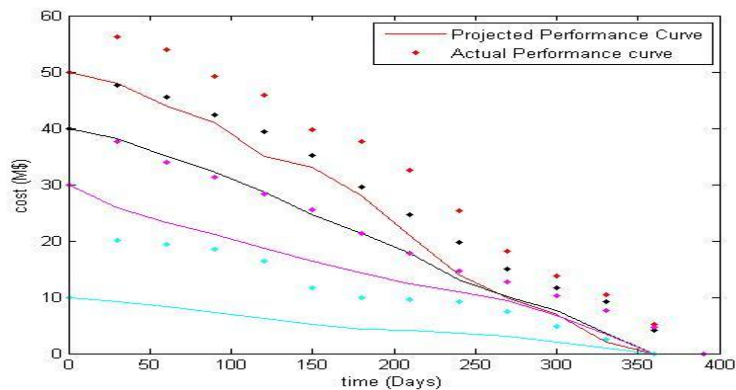


Figure 1h(b). Actual performance of projects A-D on subjection to escalation factors

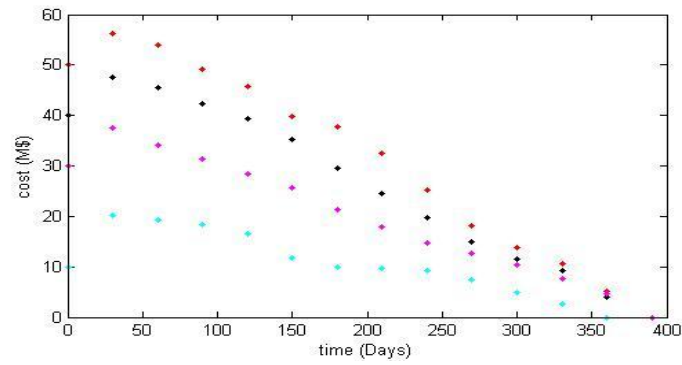


Figure 1h(c): Hunch spot on actual performance metrics of project A showing arbitrary jump away from projected performance

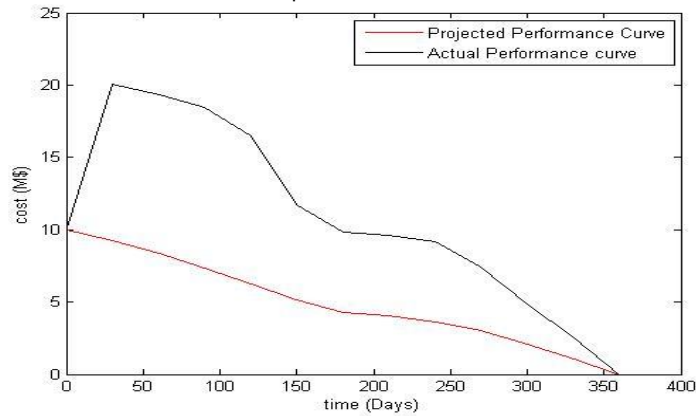


Figure 1h(d). Isolated actual performance metrics showing escalation by hunch spot jump for Project A

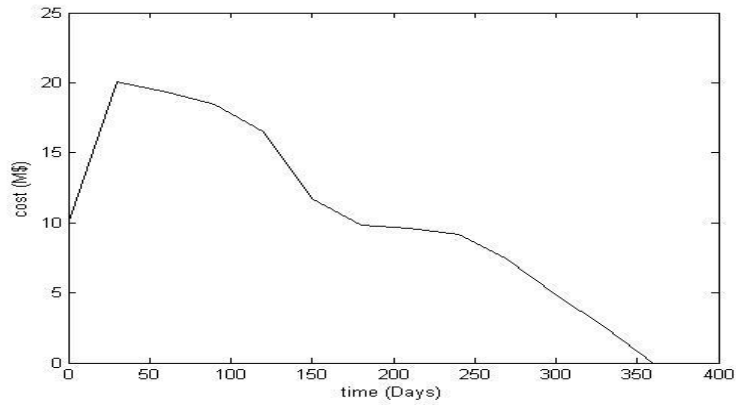


Figure 1h(e). Isolated projected performance metrics with smooth dilation on behaviour and unaffected by escalation factors for Project A

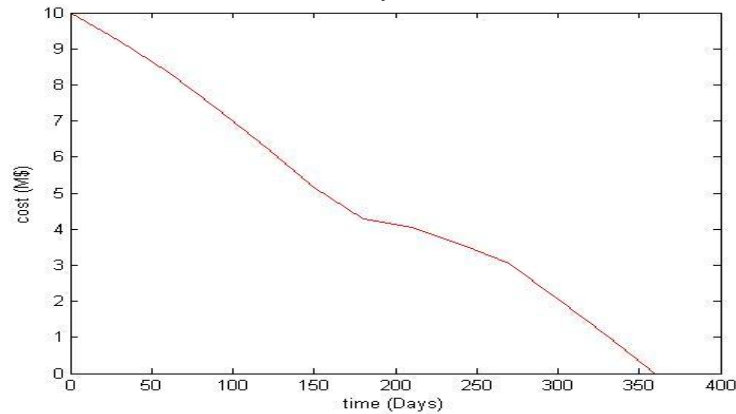


Figure 1h(f). Hunch sport with arbitrary jump drift on actual performance metrics of Project B away from projected performance

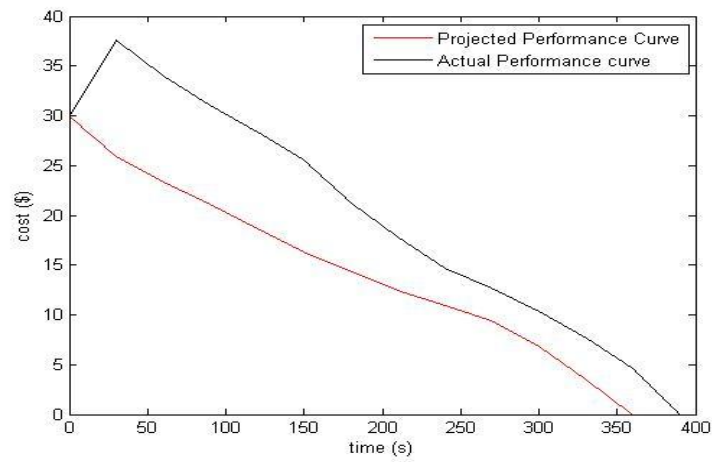


Figure 1h (g). Isolated performance metrics with smooth dilation behaviour on Project B without escalation impact

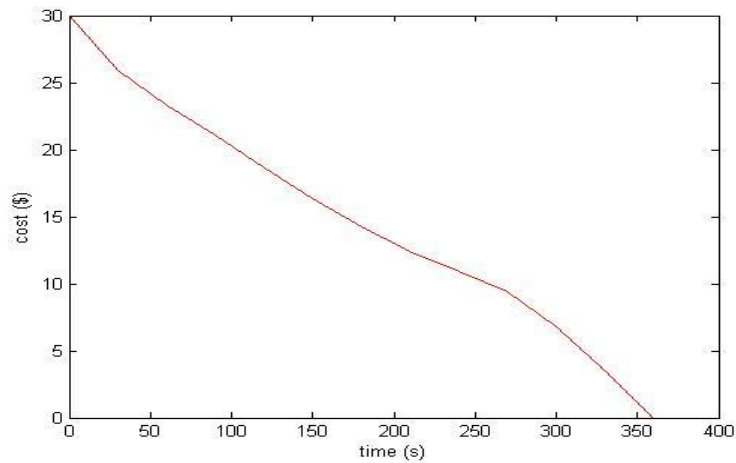


Figure 1h (h). Isolated actual performance metrics showing escalation by hunch spot jump for Project B

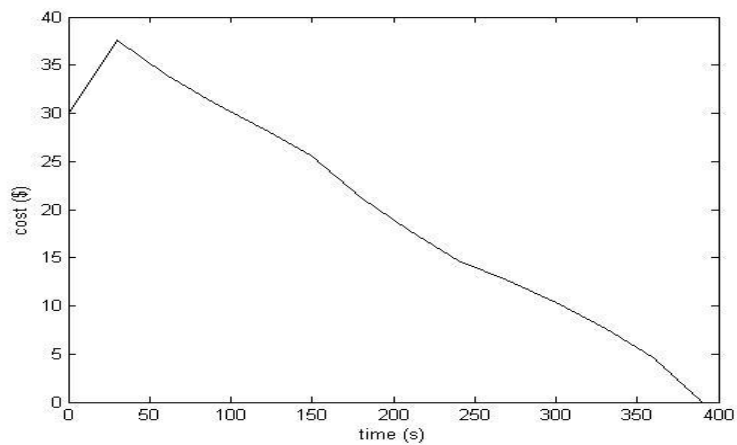


Figure 1h(i). Hunch spot on actual performance metrics of Project C showing arbitrary jump away from projected performance

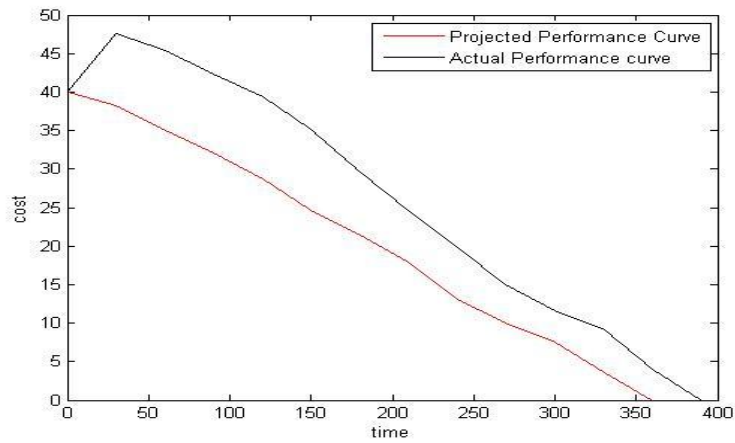


Figure 1h (j). Isolated actual performance metrics showing escalation by hunch spot jump for Project C

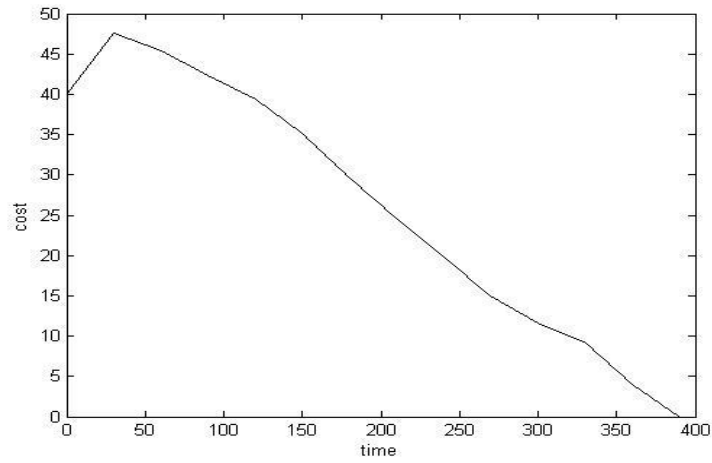


Figure 1h (k). Hunch spot on actual performance metrics of Project D showing arbitrary jump away from projected performance

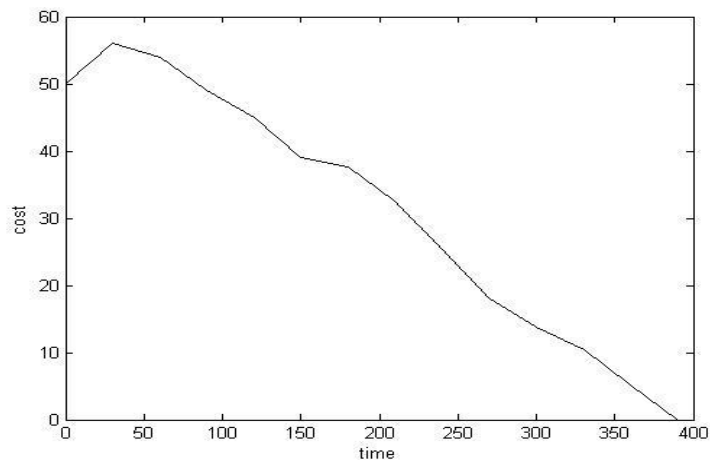


Figure 1h(l). Isolated actual performance metrics showing escalation by hunch spot jump for Project D

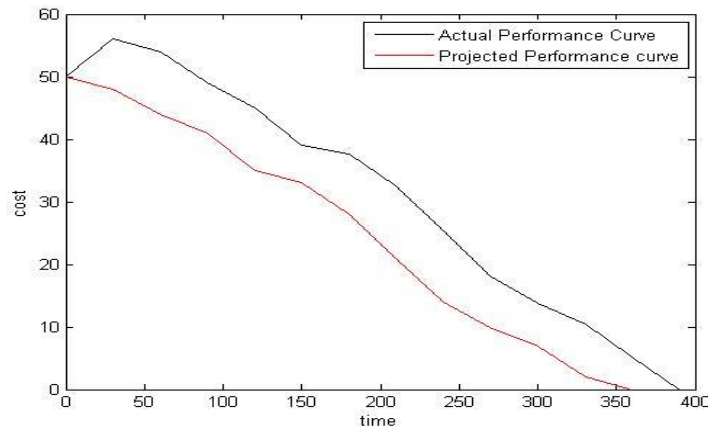
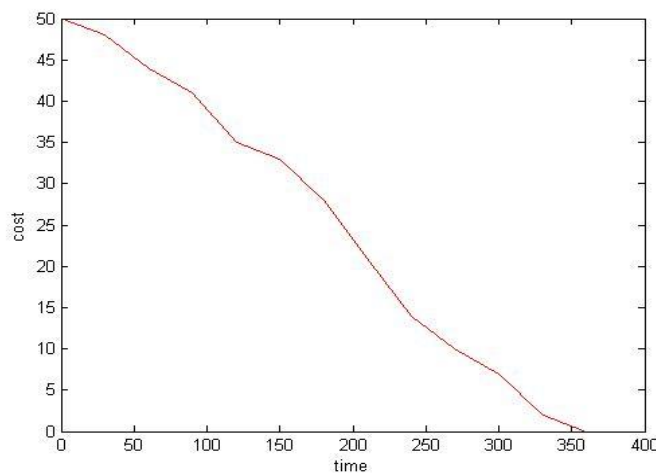


Figure 1h (m)



The arbitrary stepwise movement governing the escalation of time and cost at the hunch spots in Figure 1h above is in this paper inductively to be shown as an algebraic semblance of jump discontinuity function with orthogonal properties. Determination of such escalations values in construction projects requires that a progress and performance measurement of the project is interfaced.

An augmented scenario suffices in a construction contract project awarded by the terms of costs and time at \$600m for 21 months and naturally undergoes a mortal force of decrement like a decay function running the cost progressively from start up construction cost of \$1 to \$600m at completion. More so, time from mobilization to site at day 1 to 21 months for completion. This progress measurement views may seem to be econometrically and diametrically opposed to performance measurement estimation/view of the project that seem to be characterized by a zero (0) sum convergence or vanishing behaviour of cost and time at completion. The peak values shown in the various projects (A-D) in Figure 1h (a-m) above, occasioned by the impact of escalation vectors is for emphasis isolated for analysis in Figure 2 (a-c) wherein value of the project is deduced from the combat face-off of progress measurement and performance measurement that are often frictioned by the causes of escalation.

Table 5. Progress and Performance Value Analysis

Time (months)	Bimonthly valuation cost (\$m)	Progress measurement cost (\$m)	Performance measurement cost (\$m)
0	-	0	600
2	20	20	580
4	43	63	537
6	65	128	472
8	73	201	399
10	100	301	299
12	85	386	214

Time (months)	Bimonthly valuation cost (\$m)	Progress measurement cost (\$m)	Performance measurement cost (\$m)
14	35	421	179
16	105	526	74
18	41	567	33
20	33	600	0
22	0	-	-

Figure 2a.

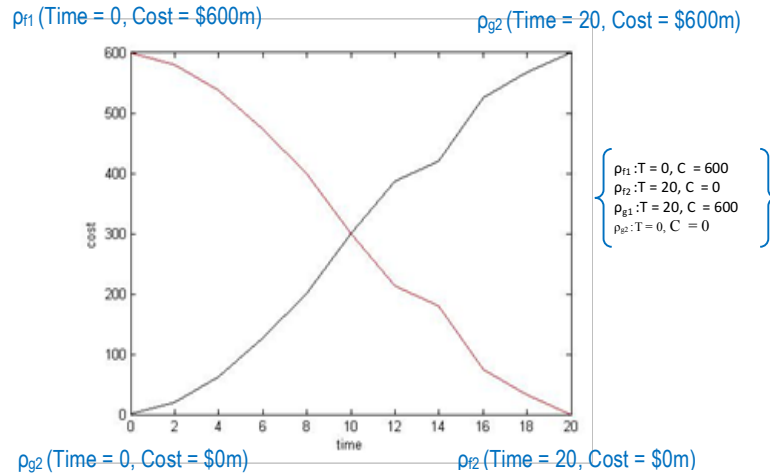


Figure 2b. Performance curve

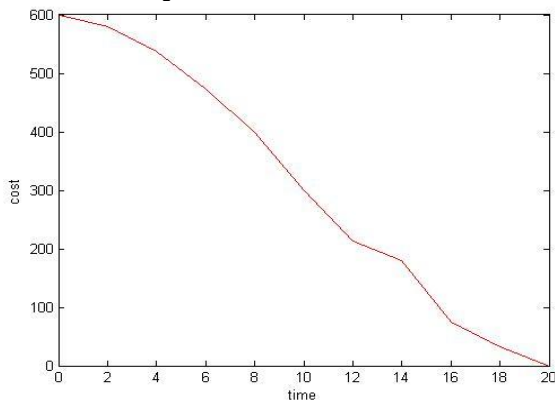


Figure 2c. Progress curve



2. Theoretical Foundation

Performance curve is a parabolic decelerating Time-cost construction project curve used to show the relationship between the amounts of useful work accomplished requiring an input of cost compared to the time resources used. An efficient construction project is a project with high accomplishment with shorter time and/or deployment of less cost. An escalation infested project is an otherwise. Measuring construction projects' performance requires that a certain inputted variable, say cost (c) is compared to its time utilization. Consequently, construction project performance can be estimated as:

$$p_f = \frac{\text{inputted cost variable}}{\text{time spent}} = \frac{(C_f)}{(t)}$$

Progress curve on the other hand is a parabolic accelerating Time-cost construction project curve used to show the relationship between the forward movement of a spent resource, requiring an output cost to be compared to the time resource used. An efficient construction project is a project with steady output cost and/or little time spent. Measuring construction projects' progress requires that a certain output variable, cost (c) is compared to the time spent to achieving the output:

$$p_g = \frac{\text{outputed cost variable}}{\text{time spent}} = \frac{(c_g)}{(t)}$$

when $\frac{\text{Input Cost}}{\text{Time}} = \frac{\text{Output cost}}{\text{Time}}$ with time annulling itself, then equilibrium point is attained at the point when input cost is equal to output costs, i.e. $\frac{c_f}{t} = \frac{c_g}{t}, c_f = c_g$.

Both variables as time dependent estimates can experience shock discontinuities as jumps from an ordered process and consequently not all functions are continuous in mathematics. When a process function is not continuous in its domain, it is said to be discontinuous at such points (Wikipedia 2017). Most construction projects costs hardly go smoothly as priced at award stage to completion without arbitrary step increases in time and cost. Such arbitrary behaviour of time and cost in construction projects are likened to discontinuities against the smooth proposed schedule at the point of award. In this paper, the arbitrary stepwise movement of time and cost discontinuities will be treated as jumps of escalations in mathematical sense. The originating theory starts from the fact that periodic or time bounded functions with period 2π and their co-fourier series:

$$\sum_{n=1}^{\infty} (b_n \cos \eta_x) - a_n \sin \eta_x = \sum_{n=1}^{\infty} B_n(x)$$

have been shown to be integrable in an L-integrable space, such that $\psi(t) = \psi_x(t) = f(x + t) - f(x - t) - l(x)$

Particularly within the oscillatory domain characterized by the bound $0 \leq x \leq 2\pi$. Mohanty and Nanda (1954) proved that:

If $\psi(t) = o[\log(1/t)]^{-1}$ and $a_n = O(\eta^{-\delta}), b_n = O(\eta^{-\delta}), 0 < \delta < 1$, then the sequence $\{\eta B_n(x)\}$, is sumable, (c, 1) to the value $l(x)/\pi$.

There on, Yano (1956) proved complementarily that:

If $\psi(t)$ satisfy the conditions $\int_0^t \psi(u)du = o(t)$ and (d) then $\bar{\sigma}_{2n}(x) - \bar{\sigma}_n(x) = \frac{l(x)}{\pi} \log 2 + o(1)$ as $n \rightarrow \infty$. Yano (1956) recall, showed that the convergence of the sequence is on the premise that:

$$\rho_n = \frac{1}{\eta} \int_{k_n}^{\pi} \frac{1\psi(t) - \psi(t+\eta)}{t^2} dt = o(1) \tag{1}$$

as $n \rightarrow \infty$, where $\eta = \frac{\pi}{n}$ and $\{k_n\}$ is a positive sequence such that $k_n \rightarrow \infty$ as $n \rightarrow \infty$ sufficiently slowly. Then we wrote:

$$\psi(t) = \int_{\eta}^t \frac{1\psi(u) - \psi(u+\eta)}{u} du \tag{2}$$

then integrating by parts resulted to:

$$\begin{aligned} \rho_n &= \frac{1}{\eta} \left[\frac{1}{t} \psi(t) \right]_{k_n}^{\pi} + \frac{1}{\eta} \int_{k_n}^{\pi} \frac{1}{t^2} \psi(t) dt = O\left(\frac{1}{k_n} \log(2k_n)\right) + O\left(\frac{1}{\eta} \int_{k_n}^{\pi} \frac{1}{t^2} \log(2k_n) dt\right) \\ &= O((\log 2k_n)/k_n) = o(1) \end{aligned} \tag{3}$$

as $n \rightarrow \infty$.

That a series probably oscillate within a bound must as a condition for continuity be under certain restriction by a factor say m and n for variations bounded in $(o, \neq m/n \rightarrow 1)$ and $m - n \rightarrow \infty$. Yano (1956) had no difficulty in showing this by letting:

$$[\bar{S}_m(x) - \bar{S}_n(x)] / (\log m - \log n) = \frac{l(x)}{\pi} + o(1) \tag{4}$$

If $\int_0^{\pi} k_n^{\alpha}(t) dt = \lambda(\alpha, n) + \log 2 + o(1)$ as $n \rightarrow \infty$ where, $\lambda(\alpha, n) = \frac{1}{\alpha+1} + \frac{1}{\alpha+2} + \dots + \frac{1}{\alpha+n}$

Specifically, and by addition rule we have:

$$\int_0^{\pi} k_n^{\alpha}(t) dt = \frac{1}{A_{n-1}^{\alpha}} \sum_{n-v}^{\alpha} A_{n-1}^{\alpha} \frac{1}{v} - \frac{1}{A_{n-1}^{\alpha}} \sum_{v-1}^{n-1} A_{n-1-v}^{\alpha} \frac{(-1)^{v-1}}{v} = \rho_n + Q_n$$

then,

$$\rho_n - \rho_{n-1} = \frac{1}{A_{n-1}^\alpha} \sum_{n-v}^\alpha A_{n-1}^\alpha \frac{1}{v} - \frac{1}{A_{n-1}^\alpha} \sum_{v-1}^{n-1} A_{n-1-v}^\alpha \frac{1}{v}$$

$$\frac{1}{A_{n-1}^\alpha} \frac{1}{n} + \sum_{v-1}^{n-1} \frac{1}{v} \left(\frac{A_{n-v}^\alpha}{A_n^\alpha} - \frac{A_{n-1-v}^\alpha}{A_n^\alpha} \right) = \frac{1}{(\alpha+n)A_{n-1}^\alpha} \sum_{v-1}^n A_{n-1}^{\alpha-1} = \frac{1}{\alpha+n}$$

With $\rho_1 = \frac{1}{(\alpha+n)A_{n-1}^\alpha}$, we have: $\rho_n = \frac{1}{\alpha+1} + \frac{1}{\alpha+2} + \dots + \frac{1}{\alpha+n} = \lambda(\alpha, n)$

Recalling that Q_n is the n -th (c, α) mean of convergent series $0 + 1 + \frac{1}{2} + \frac{1}{3} - \dots$ been summable $(c, -1 + \delta)$ for every $\delta > 0$ since n -th term $(-1)^{n-1}/n$ is $O(1/n)$ and so $Q_n = \log 2 + o(1)$ as $n \rightarrow \infty$ for every $\alpha > -1$. Then returning to (4), we have:

$$\int_0^\pi \bar{D}_n(t) dt = \log n + l_0 + \log 2 + o\left(\frac{1}{n}\right) \quad (5)$$

In line with Mohanty and Nanda preposition for the definition of: $\psi(t) \rightarrow \bar{\sigma}_n^\alpha(x) = \frac{l(x)}{\pi} \int_0^\pi k_n^\alpha(t) dt = \frac{1}{\pi} \int_0^\pi k_n^\alpha(t) dt$ (5) becomes $\pi \bar{S}_n(x) = \int_0^\pi \psi(t) \bar{D}_n(t) dt + l(x) \int_0^\pi \bar{D}_n(t) dt$.

Therefore, $\pi[\bar{S}_m(x) - \bar{S}_n(x)] = \int_0^\pi \psi(t)[\bar{D}_m(t) - \bar{D}_n(t)] dt + \log m - \log n + o\left(\frac{1}{n}\right)$

Appropriately written in the form: $\int_0^\pi \psi(t)[\bar{D}_m(t) - \bar{D}_n(t)] dt = \int_0^\delta + \int_0^\pi = I_1 + I_2$. For brief due to Yano,

$$I_1 \leq V(\delta) \cdot \sup_{0 < t \leq \delta} \left| \int_t^0 [\sin(n+1)u + \dots + \sin mu] du \right| < V(\delta) \cdot 4 \binom{m-n}{n}$$

and

$$|I_2| = \left| \int_\delta^\pi \psi(t) \frac{\cos\left(m+\frac{1}{2}\right)t - \cos\left(n+\frac{1}{2}\right)t}{2 \sin\left(\frac{t}{2}\right)} dt \right| < \frac{v(\pi)}{2 \sin\left(\frac{\delta}{2}\right)} \cdot \frac{4}{n}$$

Assuredly, $\frac{m-n}{n} \sim \log m - \log n$ and $\frac{1}{n} = O(\log m - \log n)$ within the restriction concerning 'm' and 'n'. Quickly following the establishment of such bounded variation restriction within the interval $(0, 2\pi)$, (3) becomes:

$$\int_\delta^\pi \psi(t) \frac{\cos\left(n+\frac{1}{2}\right)t}{2 \sin\left(\frac{t}{2}\right)} dt = o \quad (6)$$

Clearly, 6 is an establishment of the existence of jump behaviours of function within L-integrable spaces for the range value of $(0, 2\pi)$. Literature in support of such jump properties predates the works of Yano (1956). What remain indeterminate within the mathematical field was by how much (value) were these jumps. Approaches to such jump determination has over the years been narrowed to yardsticks of Kelzon (2004) by the derivatives of a trigonometric interpolation polynomials and Kvernadze (1997) by its Fourier series. The Kelzon (2004) point of view continues to attract the fancy of many scholars in mathematical sciences and recursive applications in Economics. However, Kvernadze (1998) jump determination method by their Fourier series continues to secure a space in some mechanical reciprocating systems and telecommunication engineering applications.

Successfully, Kelzon (2004) obtained some formulas for determining the value of Jumps of bounded periodic functions by the derivatives of their odd order Lagrangian trigonometric interpolation with equidistant nodes specifically to 2π periodic functions. In doing so, the paper claimed that there is no method of determining the jump of an arbitrary 2π periodic function to wit: $f \in HVBV [0, 2\pi]$ at the point 'x' from the sequence $\left\{ L_{n,x-\pi}^{(2r)}(f; x) \right\}, n = 0, 1, \dots$

Firstly, Kelzon (2004) stated the obvious that a 2π - periodic bounded function $f \in HVBV [a, b]$ continues at point $\pi E(a, b)$ is given to the reason that $\lim_{n \rightarrow \infty} \frac{L_n^{(2r+1)}(F; \pi)}{n^{2r+1}} = 0, r = 0, .1, \dots$ and consequently obtained $L_n^{(2r+1)}(F; \pi) = A_n + B_n + E_n + G_n$. That if F is bounded then A_n of the series above and ditto others can be written as:

$$A_n = \frac{1}{2\pi+1} \sum_{j=1}^{n-s} F(x_{j,n}) d_j = O(n^{2r}), n \rightarrow \infty \quad (7)$$

Be the distribution function with the graph of the j^v . $d.f$ as a triangle with peak value at $j^v = C_0$. The associated m.g.f of the jump value distribution function ($j^v df$) of triangle ($T_{g_1} - T_{f_2}$) variate with peak at $j^v = C_0$ is:

$$M_x(t) \int_{T_{g_1}}^{T_{f_2}} e^{ij^v} f(j^v) dj^v = \left(\int_{T_{g_1}}^{C_0} + \int_{C_0}^{T_{f_2}} \right) e^{ij^v} f(j^v) dj^v$$

$$= \frac{2}{(T_{f_2}-T_{g_1})(C_0-T_{g_1})} \int_{T_{g_1}}^{C_0} + e^{ij^v} (j^v - T_{g_1}) dj^v + \frac{2}{(T_{f_2}-T_{g_1})(T_{f_2}-C_0)} \int_{C_0}^{T_{f_2}} + e^{ij^v} (T_{f_2} - j^v) dj^v$$

On integration by part;

$$\frac{2}{t^2} \left\{ \frac{e^{T_{g_1}.t}}{(T_{g_1}-T_{f_2})(T_{g_1}-C_0)} + \frac{e^{C_0.t}}{(C_0-T_{g_1})(C_0-T_{f_2})} + \frac{e^{T_{f_2}.t}}{(T_{f_2}-T_{g_1})(T_{f_2}-C_0)} \right\} T_{g_1} < C_0 < T_{f_2} \quad (11)$$

In particular taking $T_{g_1} = 0$, $C_0 = 1$ and $T_{f_2} = 2$, the jump distribution function of triangle (0, 2) variate with peak at $j^v = C_0$ is given by:

$$f(j^v) = \begin{cases} j^v; 0 \leq j^v \leq 1 \\ 2 - j^v; 1 \leq j^v \leq 2 \\ 0; \text{otherwise} \end{cases} \text{ and its m.g.f is: } M_x(t) = (e^t - 1)/t^2 \quad (12)$$

In particular, replacing T_{g_1} by $-2T_{g_1}$, T_{f_2} by $2T_{f_2}$ and $j^v = C_0$ by 0, the p.d.f of the jump value distribution on the interval:

$-2T_{g_1}, 2T_{f_2}$ with peak at C_0 is given by:

$$f(j^v) = \begin{cases} (2T_{g_1} + j^v)/4T_{g_1}^2; 0 - 2T_{g_1} < j^v < 1 \\ (2T_{g_1} + j^v)/4T_{g_1}^2; 0 < j^v; 1 < 2T_{g_1} \end{cases} \quad (13)$$

Then the m.g.f. becomes:

$$M_x(t) \int_{-2T_{g_1}}^{2T_{g_1}} e^{ij^v} f(j^v) dj^v = \frac{1}{4T_{g_1}^2} \left(\int_{-2T_{g_1}}^{C_0} e^{ij^v} (2T_{g_1} + j^v) dj^v + \int_0^{2T_{g_1}} e^{ij^v} (2T_{g_1} - j^v) dj^v \right)$$

$$= \frac{1}{4T_{g_1}^2} \left[e^{tj^v} \left\{ \frac{2T_{g_1} + j^v}{t} - \frac{1}{t^2} \right\} \right]_{-2T_{g_1}}^0 + \frac{1}{4T_{g_1}^2} \left[e^{ij^v} \left\{ \frac{2T_{g_1} - j^v}{t} + \frac{1}{t^2} \right\} \right]_0^{2T_{g_1}}$$

$$\text{On integration by part} = \frac{1}{4T_{g_1}^2} \left[\frac{-2}{t^2} + \frac{1}{t^2} \{ e^{2T_{g_1}.t} + e^{-2T_{g_1}.t} \} \right] = \frac{1}{4T_{g_1}^2 t} \{ e^{2T_{g_1}.t} + e^{-2T_{g_1}.t} - 2 \}$$

So that:

$$M_x(t) = \left\{ \frac{1}{2T_{g_1}.t} (e^{T_{g_1}.t} + e^{-T_{g_1}.t}) \right\}^2 \quad (14)$$

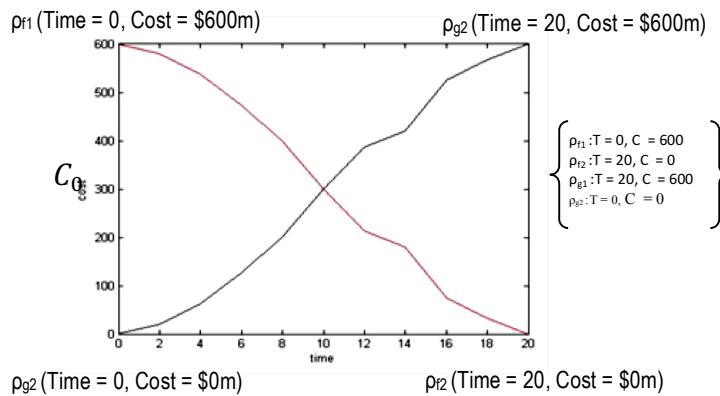
Conclusively, a deliberate attempt in this paper has been made to identify the major and recurrent causes of escalations in wider literates. A conjecture was built on the semblance of escalations as arbitrary stepwise movement of cost and time value in construction projects as opposed to the estimate or bid value. The existence of the measurement/quantification of such escalation values by index numbers was opposed to, for lack of empiricism and consistency having no proof of validation of successful index number tests. A confrontation to existing methods was in this paper theorized on the conjecture of a jump function as a seeming congruency to escalation behaviours depicted in Figure 1h and analysed in Figure 2. Literatures in support of the determination of such jump values were unanimous, basically by Fourier series (Kvernadze 1998) and by trigonometric derivatives (Kelzon 2004). In the light of the above, a novel method of predicting such escalation in construction projects is in the foregoing derivative proposed.

4. Jump Estimation of Time-Cost Escalation

Unem Chan (2015) validated the problem of the measurability of jump functions posed by Stein and Shakarachi (2013). The measure of such jump values were independently proved by Byron Schmuland (2015) and Saz (2015). As a consequence of this paper's investigation, and for brevity, we shall analogously as a conjecture adopt the context of Schmuland (2015) to the measurement of time-cost escalation estimation in construction

projects. Measurement of construction projects escalations lies in the jump escalation from the exponential progress and performance measurement curves.

Evidences of time-cost exponential behaviour need not rehearsed here as they are well validated in the research report of Ogunsemi and Jagboro (2006), Ojo (2009) with varying degrees of predictive abilities. For the jump to exist, the time-cost equilibril point must exist at such a point where the performance time measurement value (ρ_{f_t}) and progress time measurement value (ρ_{g_t}) must equal performance cost measurement value (ρ_{f_c}) and progress cost measurement value (ρ_{g_c}). This intersecting point houses the escalation trace curve within the space $[0, \pi$ With a trigonometric interpolating identity from eq. (10) showing the jump outline from the steady state or natural locus of the performance and progress measurement parabolic segment curve. Consequently, the nexus point connecting the (ρ_{g_t}), (ρ_{f_t}) (ρ_{g_c}) and (ρ_{f_c}) as shown below:



Naturally defines the Egwunatum Time-Cost Equilibril, given by: $\mathbb{E}(\rightleftharpoons) = \partial^{jv} e^{|\rho_{f_t} - \rho_{g_t}|} - \partial^{jv} e^{|\rho_{f_c} - \rho_{g_c}|} = 0$. $\{\partial^{jv}$ shows that the modulus are the absolute difference jump value function from an exponential trace properties of time and cost.

5. Remark

As a property of the curve, we resort to remarking that the progress measurement function grows with limit exponentially, while performance measurement function decays exponentially with limit of a mortal force of decrement been as a natural consequence of phenomenal resistance to escalation. Conceptually, we refer to the illustrations of Figure 4 and Figure 1h to show this. Figure 1h is a conceptually reference. Having established the jump value probability density function and the associated moment generating function, by virtue of eq. (10) and eq. (14), we shall move ahead to obtain a formula for the measurement of time-cost escalation value by its associated jump. In doing so, we propose that the measurement of construction project escalation lies in the intersect of progress and performance curve. Such point in this study is identified as the Time-Cost equilibria which houses the escalation trace curve with a space of $0, \pi$, on a trigonometric outline which is the jump from the natural performance function loci.

6. Potential Theory

The estimation of construction project time cost escalation is measurable by its jump from any arbitrary point in the locus of progress and performance curve.

Proof:

In the ensuring proof, we resort to the geometric fixtures of figures 3 and 4 conceptually idealized from Figure 1h to interpolate an algebraic estimation for jumps within the performance and progress curve housing the time-cost escalation. Building on the supposition that:

If j_n^v is a progressive function, such that for any fixed:

$$h = \frac{2}{T_{f_2} - T_{g_1}} \neq 0, \tag{15}$$

and if $q_n \rightarrow h$ with $|q_n| \geq |h|$ then,

$$\lim_n \frac{j^v[(T_{f_2} - T_{g_1}) + q_n] - j^v(T_{f_2} - T_{g_1})}{q_n} \geq \frac{j^v[(T_{f_2} - T_{g_1}) + h] - j^v(T_{f_2} - T_{g_1})}{h} \geq 0 \tag{16}$$

analogously, due to Schmuland (2015) for $m \geq 1$, if modulus values are neglected, eq. (16) becomes:

$$q \in \mathbb{Q}, 0 < |q| < \frac{1}{m} \stackrel{sup}{=} \frac{j^v[(T_{f_2}-T_{g_1})+q_n]-j^v(T_{f_2}-T_{g_1})}{q_n} = 0 < |h| < \frac{1}{m} \stackrel{sup}{=} \frac{j^v[(T_{f_2}-T_{g_1})+h]-j^v(T_{f_2}-T_{g_1})}{h}$$

with \mathbb{Q} been the set of rational numbers. Since \mathbb{Q} is countable, the $\limsup_{h \rightarrow 0} \frac{j^v[(T_{f_2}-T_{g_1})+h]-j^v(T_{f_2}-T_{g_1})}{h} > \in$

show that $\Psi_m(T_{f_2} - T_{g_1}) := \sup_{0 < |h| < \frac{1}{m}} \frac{j^v[(T_{f_2}-T_{g_1})+h]-j^v(T_{f_2}-T_{g_1})}{h}$ is a measurable map into $[0, \infty]$.

Therefore,

$$\limsup_{h \rightarrow 0} \frac{j^v[(T_{f_2}-T_{g_1})+h]-j^v(T_{f_2}-T_{g_1})}{h} = \infimum_{m \geq 1} \Psi_m(T_{f_2} - T_{g_1}) \quad (17)$$

is also measurable into $[0, \infty]$. Consequently, estimation of time-cost escalation of construction project becomes measurable by virtue of eq. (17) as:

$$j^v = \limsup_{h \rightarrow 0} \frac{j^v[(T_{f_2}-T_{g_1})+h]-j^v(T_{f_2}-T_{g_1})}{h} = \Delta[(T_{f_2} - T_{g_1}), h_n] \quad h := \frac{2}{T_{f_2}-T_{g_1}} \neq 0 \quad (18)$$

where T_f and T_g take intermittent values in $[0, \infty]$ and j^v in $[0, 1]$.

Interpretation and Conclusion

The existing methods of index numbers for quantifying time-cost escalations in literatures annotated in table 3 have been shown to be indeterminate measurements with varying degrees of subjective interpretation to escalation situations. The jump value method expressed in eq. (18) is a consequence of the theoretical establishment of existence of integrability of L – space periodic function. Figure 3 that has its origin in Figure 2 was in this paper identified and shown to be congruent to the absolute space of a triangular jump with π – periodic function. The arguments of the measurability of such jump was laid to rest in the proof of Schmuland (2015) and Saz (2015). A recall of eq. (18) formula agrees that arbitrarily jumps within the neighbourhood of 2π periods are determinable. Figure 3 became a sub manifold of 2π period, which are also measurable within the limit of π at the range of $[0, \infty]$: $\rightarrow (T_{f_2} - T_{g_1})$, made estimable by Eq (18).

Accordingly, the $[0, \infty]$: $\rightarrow (T_{f_2} - T_{g_1})$ is a consequence of trigonometric interpolation proposed by Yano (1956) of mapping jump values within the trigonometric space $[0, \infty]$ to the appropriate interpolating polynomial which in this case Eqn (10) of the form below is soothed.

$$f(j^v) = \left\{ \frac{2(j^v-T_{g_1})}{(T_{f_2}-T_{g_1})(C_0-T_{f_2})}, C_0 \leq j^v \leq T_{f_2} \right\} \text{ within the limit of } (T_{f_2} - T_{g_1}).$$

The solutions of eq. (18) gives values on the interval (0,1) to show severity of escalations whereas the time-cost value/impact is interpolated at any given T_{f_2}, T_{g_1} point moving on the locus of Figure 5 with j^v as jump value function.

On a numerical scale, zero (0) value jump maps to a corresponding zero percent escalation cost and time of the original bid cost and time value of the project. Whereas a one (1) value jump corresponds in mapping to a 100% escalation of the original bid value of the cost and time. In between 0 and 100% a flurry of several jump/escalation values exist with appropriate interpolation points at $(T_{f_1} - T_{g_1}), (T_{f_2} - T_{g_2}), (C_{f_1} - C_{g_1})$ and $(C_{f_2} - C_{g_2})$ values as referred to in Figure 3.

Recommendations

This paper was aimed at deriving a generalized formula for measuring time-cost escalations in construction projects. By virtue of Eq. (18) this was deduced. It is expected that the cost control and scheduling planning departments of organizations analytically deduce time-cost escalations by appropriately interpolating from the trigonometric points given above. Totally, the overall project performance, less quality measurement can be ascertained by the jump severity value.

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International Positioning Strategy of Ukrainian Advertising Service Companies on European Media Market

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Abstract:

In the article the importance of international positioning strategy of Ukrainian advertising service companies on European media market is considered. The major tendencies of the development of the television advertising market in European countries are analyzed. The strengths of Ukrainian companies providing television advertising services are defined. Methodological approach to develop the international positioning strategy of goods/services is developed. The model of developing the strategy was implemented on the example of advertising industry. Marketing activity of Ukrainian companies providing television advertising services on European media market was researched and the international positioning strategy was developed.

Keywords: positioning; strategy; company; marketing activity; advertising industry; services; media market

JEL Classification: F23; L82; M21

Introduction

The current formation of the European information space takes place in the context of the active internationalization of markets of services and the strengthening of the transformational changes in the management of companies. Eastern European countries are countries of the socialist industrialization of the market. The limited and unstructured demand on these markets forces local television advertising companies to look for new markets by accumulating certain management experience in the national business environment.

However, the development of the world market of television advertising services is characterized by dynamic competition, steady increase in the number of new players which offer customers a wide range of high-quality and high-tech services, striving to satisfy their requirements to the highest standards and achieve high standards of consumer loyalty. These trends demand from companies seeking to expand geographic boundaries of market activity and development of new market segments, in the course of international activities, to reorient from passive adaptation to the external environment, the development of perspective directions and the formation of a range of services in accordance with the requirements of the target customers.

In such a way issues of increasing the marketing component in the strategic planning of international companies' activities and the formation of effective strategies for the competitive positioning of advertising services in the European media market are becoming more popular.

1. Literature Review

A significant number of publications of a scientific and journalistic nature are devoted to the problems of strategic marketing planning, in particular the question of the competitive positioning of goods/services. Among such scientific developments are works of such well-known foreign scientists as D. Aaker, T. Ambler, M. Blades, B. Gunter, M. Cladwell, P. Kotler, J.-J. Lambin, G. Minzberg, D. Ogilvi, K. Oats, M. Porter, E. Rays, G. Traut, F. Webster, J. Wind, O. Walker, G. Huley *etc.* The authors view the essence of positioning and the mechanism of forming of positioning strategy. But at the same time, they do not consider the peculiarities of this strategy while penetrating international markets and the implementation of an international marketing activity. Almost all

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researchers are unanimous in the fact that the concept of positioning determines the image of a particular product or brand, which the company is trying to form in the consciousness of the target segment of consumers. The image must have a clear position over the main competing products and a special value for the target consumer.

The development of the positioning strategy demands forming the general concept of market positioning, which affects the development of the product strategy of the enterprise, namely - underlies the development of functional marketing strategies. It explains the significance of definition of the direction of the competitive position of an enterprise.

The American Scientists Cravens and Piercy (2012) state that the positioning strategy brings together the elements of the marketing program in the course of the action plan, aimed at reaching the goal of mutual interest. The development of the strategy of the subrogation will provide for the following actions, such as the filling of the list of the marketing communications and the development of the goals for each element of the marketing program (the structure of the project, the development, the implementation and the pricing).

At the same time, scientists do not have a single approach to a process of developing «unique image» of the product in consumers' minds. An overview of the scientific literature on this problem gives us the opportunity to identify two main groups of scientists who offer to use certain marketing tools in the process of definition of the product positioning strategy. The first group of scientists, among which are Aaker D.A., Trout J., Kotler F., and Cravens D. stress the necessity of market segmentation, the target customers' selection, developing of proper marketing communication. The second group of scientists (Ambler T., Dol P. Kappferer J.-N.) focuses on the distinctive features of the product, its market advantages, which will give the opportunity to form a "unique image" of the product. In our opinion, all three of these components are important elements in positioning process. Motivational segmentation of the market, selection of target segments and further effective communication in order to inform about the market benefits of goods are the basis on which an effective strategy of competitive positioning may be developed.

2. Methodology

The aim of research is to determine the directions of strengthening the competitive positions of Ukrainian companies on the markets of advertising services of Central Europe and to work out recommendations concerning the formation of a strategy of competitive positioning of advertising services in the international media market.

To achieve this goal there have been developed the following exploratory questions:

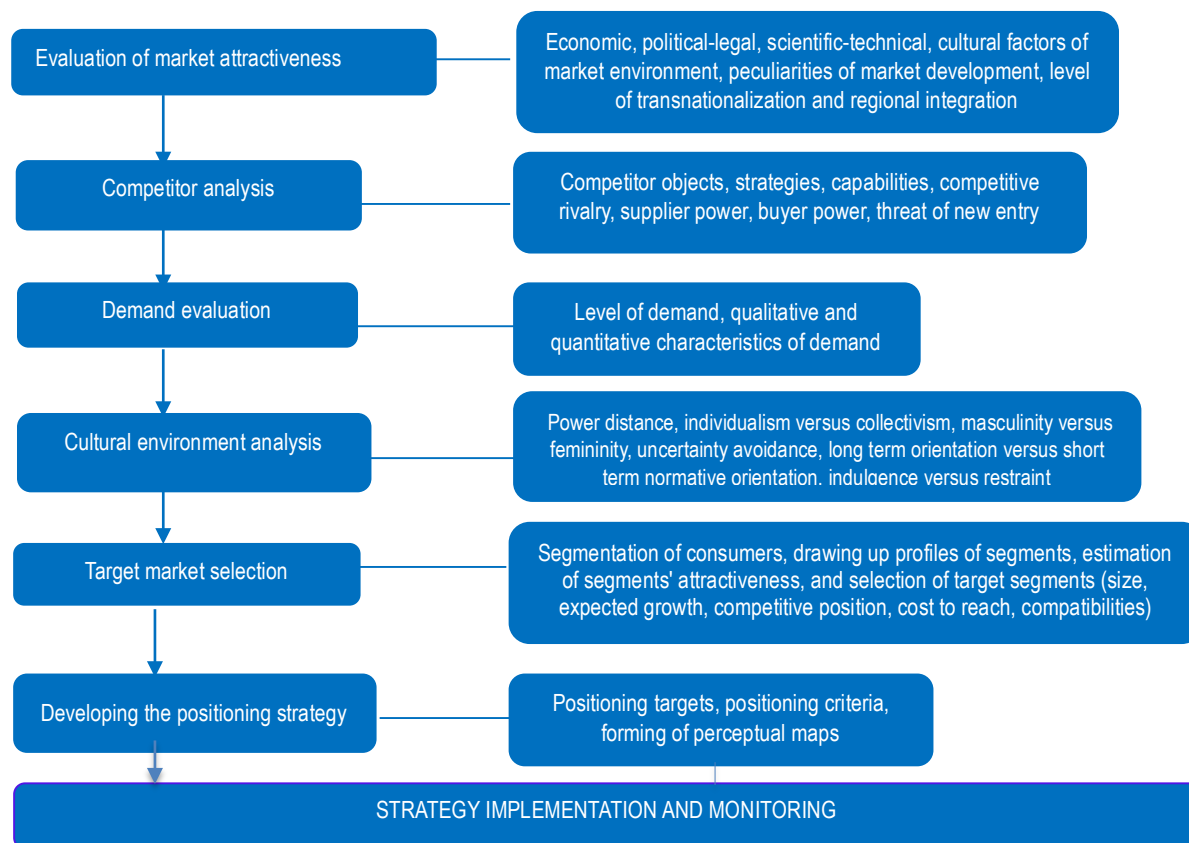
- to consider the major tendencies of the development of the television advertising market in European countries;
- to analyse the process of choice of a market coverage strategy, which involves choosing the level of its segmentation, *i.e.* to define segments of the customers of TV advertising services;
- to define factors of the choice of advertising agency;
- to define the strengths of the Ukrainian companies providing television advertising services;
- to develop the positioning strategy of the Ukrainian companies-providers of television advertising services.

The object of the research is marketing activity of Ukrainian companies providing television advertising services on European media market. Subject of research is the competitive positioning strategy of advertising services companies in the European media market.

The information base for current research is the results of motivational studies of target consumers. It is important to understand the motivation of the customer when choosing an advertising agency, the level of satisfaction with the available services and the level of competition in the market of television advertising services. Therefore, marketing research of short-term demand and motivation of consumers in the European market of television advertising services was conducted. For further study, the markets of Poland and Hungary were chosen. During the research, a qualitative method of collecting primary marketing information was used, which involved expert surveys. The total number of respondents was 20: 10 person - experts in the market of television advertising services in Poland and 10 person - experts in the market in Hungary were interviewed. The process of expert observation was based on the standard procedure for questioning participants using prepared questionnaires. Media directors were included in the sample.

After processing of the responses received, recommendations concerning the competitive positioning strategy of advertising services companies in the European media market were provided. On the basis of previous studies, based on international leading practices the model of formation of an international positioning strategy for the company was proposed (Figure 1).

Figure 1. The model of developing the international positioning strategy of goods/services



Source: compiled by the authors

The model of developing the international positioning strategy of goods/services consists of seven major stages.

The first stage involves evaluation of market attractiveness. Attractiveness analysis of a market is usually connected with market environment analysis of an enterprise, which is planning foreign markets' penetration. The analysis of international business environment is based on the analysis of macro- and micro factors of international market environment and the factors of international environment, which cause direct or indirect effect on the enterprise economic activity and counteract or contribute to accomplishment of its economic interests. Therefore, political-legal, economic, socio-cultural, scientific-technical factors of market environment, peculiarities of market development, the level of transnationalization and regional integration, factors of transnational, international regulation of economic relations should be analysed (Starostina 2012).

Let's consider basic instruments for determination of attractive market. The effective instrument of estimation of qualitative factors are the expert evaluation and estimation (scale of marks must make from 1 to 10). This evaluation must be conducted for each country which is selected for the analysis. In the Table 1 the scheme of registration of this market information is viewed (Prygara 2006).

Table 1. Evaluation of factors of market availability – potential market threats and possibilities

Factor of market threat	Meaningfulness index, a(i), (0..1)	The possibility of factor realization, h (i), (0..1)	Score evaluation of the factor , b(i), (0..10)	Total score of factor influence, Ft (i)
1.				
...				
n				
Total index of market threats, It				$\sum Ft (i)$
1.				
...				
N				
Total index of market possibilities, Ip				$\sum Fp (i)$

Source: compiled by the authors

Thus, the total score, that characterize the influence of a certain factor is the result of three factors – the importance of the factor, the possibility of factor realization and its score evaluation and may be calculated by the following formula:

$$F_t(i) = \alpha(i) \cdot h(i) \cdot b(i), i = 1 \dots n, \quad (1.1)$$

$$F_p(i) = \alpha(i) \cdot h(i) \cdot b(i), i = 1 \dots n, \quad (1.2)$$

where: $F_t(i)$, $[F_p(i)]$ – total score of influence of threat [possibility] factor (i); $\alpha(i)$ – meaningfulness index of a factor; $h(i)$ – possibility of factor realization; $b(i)$ – score evaluation of the factor; n – the quantity of factors.

Total score of total evaluation of influence of factors make total index of potential threats or possibilities – I_t or I_p :

$$I_t = \sum F_t(i); i = 1, n \quad (1.3)$$

$$I_p = \sum F_p(i); i = 1, n \quad (1.4)$$

where: I_t – total index of potential market threats; I_p – total index of potential market possibilities.

Market attractiveness should be characterized by integrated index:

$$I_{at} = I_p / I_t; \quad (1.5)$$

where: I_{at} – integrated index of market attractiveness.

The higher index is, the higher market possibilities are, and market is more attractive.

The second stage is devoted to competitor analysis. Competitive rivalry, current competitors' profiles, their strengths, weaknesses, strategies should be identified. The company also should analyse potential competitors, supplier power, buyer power, threat of substitution (Porter 1979). Barriers to market entry are patents, market saturation, high start-up costs, the need for significant expertise, or manufacturing and engineering difficulties. Comparative analysis of strengths and weaknesses of a company and major competitors should be done.

The third stage is focused on demand evaluation. Market research project should be conducted to identify qualitative and quantitative characteristics of demand. Customers' motivations concerning product should be analyzed.

The fourth stage involves cultural environment analysis. Cultural peculiarities of countries may be analyzing by the model of national culture by Geert Hofstede. The model consists of the following dimensions - power distance (PDI), individualism versus collectivism (IDV), masculinity versus femininity (MAS), uncertainty avoidance (UAI), long term orientation versus short term normative orientation (LTO) (Hofstede 2001, Hoop 2004.)

The fifth stage is focused on target market selection. This stage involves segmentation of consumers, drawing up profiles of segments, estimation of segments' attractiveness, selection of target segments. There are 5 criteria that indicate whether selected a viable target market: size, expected growth, competitive position, cost to reach and compatibility.

The sixth stage involves developing the positioning strategy. This stage includes forming positioning targets, choice of positioning criteria, forming of competitive product positioning map. Product positioning refers to perceptions of a product's attributes uses, quality and advantages and disadvantages relative to competing brands (Boone *et al.* 2012). To understand current market position, a simple market research project should be conducted to identify which product-class attributes are most important, which brands are perceived to best deliver each attribute, and where product improvements need to be made to improve customer satisfaction. Positioning maps show where existing products and services are positioned in the market so that the firm can decide where they would like to place (position) their product. The position decision also involves selection of the desired position of its implementation.

The seventh stage involves strategy implementation and monitoring. Once a company has chosen its position, it must take appropriate measures to deliver and communicate the desired position to the target market. The positioning strategy must be supported by company's marketing mix efforts. Besides, the strategy should be monitored and the position should be adopted over time to match changes in consumer needs and competitors' strategies.

3. Case studies

Let's show practical implementation of the proposed model on the example of the marketing activity of Ukrainian advertising service companies on European markets. First of all, let's evaluate market attractiveness of European Countries for Ukrainian companies. The main factors under analysis were: political and legal factors, economic indicators, market size, quantity of population, peculiarities of media market development.

Considering the markets of Central and Eastern European Countries, major factors were revealed:

- according to population, leaders in Central and Eastern Europe are Ukraine, Poland, Romania and Hungary (more than 10 million people). The smallest in the region are Latvia, Estonia and Slovenia – less than 2.1 million people;
- in terms of GDP per capita, Slovakia - 18.6 thousand dollars, Romania is 9,5 thousand dollars US. In Poland and Hungary, this indicator is almost the same;
- the most popular TV ads is in Romania, Russia, Moldova and Belarus (over 60% of all costs);
- the most advanced Internet technologies are in Slovakia (73% of the Internet's distribution), Hungary and Poland (over 68%) and Romania (56%). The spread of Internet communication is one of the main factors in the development of advertising, since it allows to use advertising not only on television, thus increasing the reach of viewers.

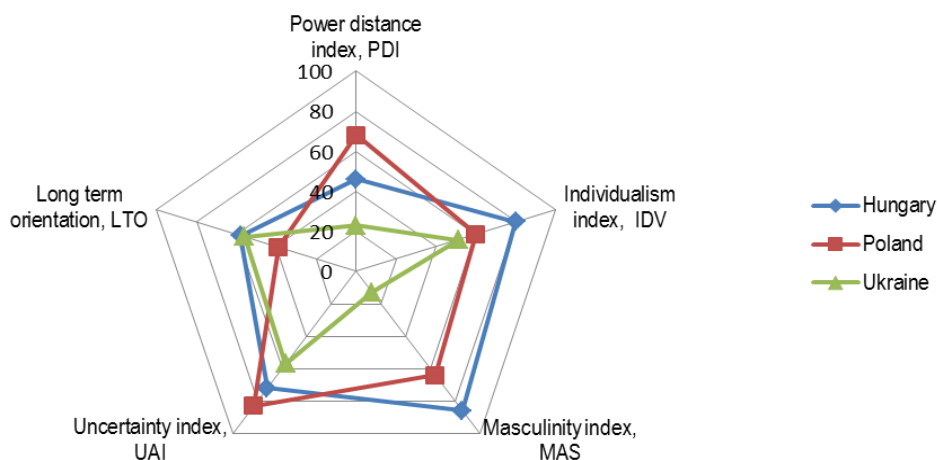
Thus, the most attractive countries of the Central Europe are Slovakia, Hungary, Poland and Romania. Let's move on to the choice of the country for market penetration of Ukrainian TV advertising companies, which is the most popular among customers. Let's consider the comparison of the most attractive markets for Ukrainian companies (Table 2).

Table 2. Choice of a country to enter the market of Television advertising services

Factor (meaningfulness of factor)	Poland	Romania	Slovakia	Hungary
Political situation (0,25)	6	6	4	8
Market development (0,25)	8	7	4	10
Competitive environment (0,15)	6	5	4	8
Information about the market (0,20)	10	7	4	7
Necessary volume of market research (0,15)	6	5	4	8
Total score by country	7,3	6,2	4	8,3
Filters for market choice	Stable Attractive Zone	Attractive Zone	Unattractive Zone	Stable Attractive Zone

Table shows that, according to expert surveys, total score of market attractiveness in Hungary is 8,3, Poland – 7,3, Romania – 6,2, Slovakia – 4. So markets of Poland and Hungary are attractive markets for Ukrainian media companies. Figure 2 shows cultural dimensions of Hungary, Poland and Ukraine.

Figure 2. Diagram of cultural dimensions of Hungary, Poland and Ukraine



Source: compiled by the authors

Let's consider cultural dimensions of Hungary, Poland and Ukraine according to Geert Hofstede model (Comparison of Countries by G. Hofstede). Poland is characterized as hierarchical society, estimation of parameter «distance of power» make score 68. It means that people accept a hierarchical order, support a

hierarchical structure in society. In Hungary this index is lower and make score 46, that means that people in a less measure elect a hierarchical order and meaningfulness of social role in the system of social relations is lower. Poland society is mostly an individualistic one, estimation of a proper parameter makes 60 points. It testifies to predominance of interests of separate individual above collective, solidarity of social structure in a country is not strong, mostly people care of themselves, relatives and friends. This index in Hungary makes up 80 points, so independence, autonomy and possibility to limit are key lines of society of this country.

Next parameter – a «masculinity» illustrates an orientation to achievement of goals at any price; such cultures are oriented on achievements, growths, rivalry, purposefulness, achievement of financial values. Feminine cultures are characterized by honouring of mutual relations in society, cultural values, anxiety about quality of life and social sphere, predominance of moral and ethics aspects. This index in Hungary makes 86 points, Poland - 64 points. Consequently, in the system of values of business cultures of both countries "masculine" orientation prevails: the desire to be selected, the desire to make career, provide financial welfare; in these countries people "live, to work". A leader is usually respected for his speed of decisions, scale of approaches, inflexibility.

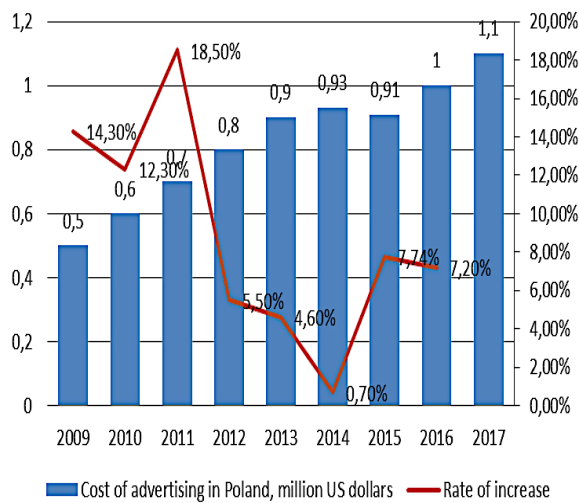
Index of uncertainty avoidance is a parameter, which characterizes attitude of members of society toward stability and risk, determines readiness to changes and innovations. People from cultures with the low level of avoidance of vagueness fully comfortably feel in the poorly structured situations, they aim to minimize the amount of rules, norms and laws which limit the scopes of situation. Cultures with the high level of uncertainty avoidance aspire clear rules to establishment, in order to avoid emotional discomfort, connected with a vagueness and stress situation that arose up. The index of «uncertainty avoidance» is high in both countries, in Hungary it makes 72 points, in Poland – 83. Thus, in both countries there is an urgent requirement in set rules, people have strong desire to be busy and work hard, exactness and punctuality is a norm, safety and stability are important elements in individual motivation.

Long-term orientation index illustrates an attitude toward the future and persistence concerning achievement of the set purpose, strategic and long-term aims. For the culture of countries with short-term orientation devotion to implementation of social norms are important. LTO index in Poland makes 29 points, in Hungary - 58 points, that testifies to pragmatism of the Hungarian population, inclination to propensity to the economies on the future and concentration on achievement of long-term results.

The analysis of descriptions of culture shows that market of Hungary is more attractive for Ukrainian companies. There are only two similar points in cultures of Ukraine and Poland (indexes «individualism» and «uncertainty avoidance» make in both countries more than 50 marks), but from the point of view of existence of demand, concentration of users and competitors, potential profitability, the Polish market has certain advantages in comparison with market of Hungary. So we leave it for the further analysis.

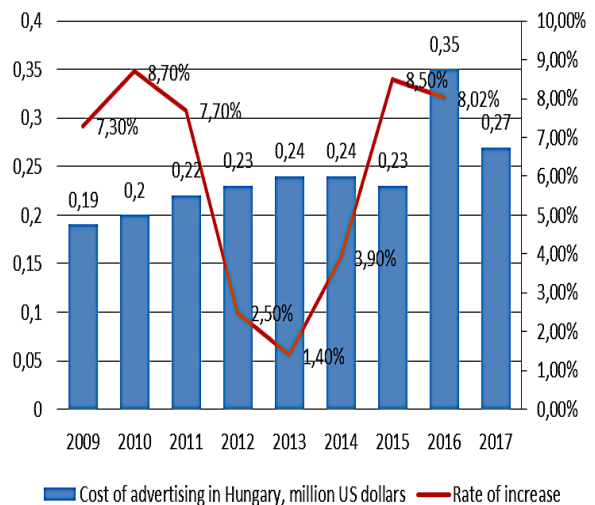
Considering the specifics of the development of the television advertising (TV advertising) market in Poland and Hungary, first of all, we will examine the size of the cost of TV advertising in these countries. In Poland, TV advertising market has been developing rapidly in the period up to 2012, that is, before the switch to digital television, which is paid. The main reason for the decrease in the cost of television advertising is the fact that consumers have to pay for television. Appearance of "Smart TV" technology enables the integration of Internet technology and digital interactive service into modern television systems and digital TV receivers, the consumer became more demanding to selecting channels and programs. The cost of TV advertising in the country in 2015 was \$ 0.92 billion. According to the forecast of McKinsey & Company in 2017 it will reach \$ 1.06 billion (Figure 3) (Global Media Report 2015, 2016). In Hungary, the growth of spending on TV advertising is almost the same. The reason lies also in the spreading of digital TV in the country. Expenditures in 2015 accounted to \$ 0.23 billion. According to McKinsey & Company forecast it will reach \$ 0.27 billion (Figure 4) (Global Media Report 2015, 2016). So the main barriers to the growth of the TV advertising market are the lack of cable operators' network, thus they cannot involve a significant audience to viewing and appearance of innovative technologies that provide high-quality viewing and provide freedom of choice for the consumer.

Figure 3. The dynamics of cost of television advertising in Poland



Source: compiled by the authors

Figure 4. The dynamics of cost of television advertising in Hungary



The European advertising market is unstable concerning the positions of leading companies and companies in the top ten by market share. According to Forbes magazine, which ranked 10 top advertising agencies, in 2013, 2014, and 2015, the position of leader and the second leading position in this rating occupied different companies. In 2013 compared to 2012, the top 10 included three new companies, and in 2014 compared to 2013, it included eight new companies. On one hand, it indicates the attractiveness of this sphere for new players, high profitability of the industry, and low barriers to entry and, accordingly, the existence of opportunities for rapid market development. On the other hand – high intensity of competition in the investigated sphere, high importance of the technological component in ensuring the competitiveness of advertising companies, the variety of techniques for creating the visual material and audio of the commercials.

Based on the results of expert surveys and the analysis of sources of secondary marketing information the following trends in the European advertising markets can be distinguished:

- TV advertising continues to dominate by the share of expenses of customers' (its share is on average 38.5% among other types of advertising);
- there is a dynamic development of digital advertising, which includes Internet advertising, contextual advertising in mobile phones and messages delivered through email, *etc.*;
- intensive development of advertising in social networks Facebook, Twitter, Instagram, *etc.*;
- volume of advertising in printed magazines and newspapers decreases (an average of 1.75% annually);
- cross-border movement of services of advertising agencies and satisfaction of consumers with different cultural peculiarities;
- intensification of competition in the media sphere and the complexity of forms of competitive struggle;
- concentration of advertising business and distribution of a significant part of advertising market among large advertising companies that promote the globalization of advertising activities.

Among characteristic features of modern European television development, we should point out the commercialization and decentralization of television in accordance with the territory. Decentralization occurs directly through programs that are broadcast (and sold to the audience) on other territory, and indirectly, by localization of standard formats. The processes of active commercialization lead to the fact that most European pay-TV companies are not interested in the production of original content, mainly they mobilize their resources to adapt American content to European perception. However, there are consumers (audiences) who are dissatisfied with the content offered, which in turn creates additional potential for market expansion and the development of this niche.

The development of a positioning strategy is directly related to the implementation of a market coverage strategy, which involves choosing the level of its segmentation. Based on Shapiro-Bonoma's nesting approach, we identified five main segments of the customers of TV advertising services in the markets of Poland and

Hungary: enterprises of various industries, which order advertising for further placement on television, regional TV channels; large media companies, which prefer cooperation with professional advertising agencies; channels with specific content; cable television operators. In order to identify attractive segments, they were evaluated by market experts. The results are presented in Table 3.

Table 3. Estimation of the attractiveness of market segments in Poland and Hungary

Factors	Poland			Hungary		
	RC	CA	MP	RC	CA	MP
	Score					
<i>Quantitative and qualitative market/demand characteristics:</i> Evaluation factors: market capacity, market growth, demand stability, access to the target market, market power of customers, the influence of buyers on the formation of market prices	49	29	41	25	37	45
<i>Industry/market structure and profitability:</i> Evaluation factors: profitability, intensity of competition, the presence of a market leader, the possibility of new competitors entry, the availability of distribution channels, geographical branching of activity	45	28	43	24	36	44
<i>Competitiveness of the company:</i> Evaluation factors: production capacity, company image, media partnership, efficiency of the promotion system, the possibility to reduce price	31	27	41	25	37	38
TOTAL	172	126	161	111	150	166

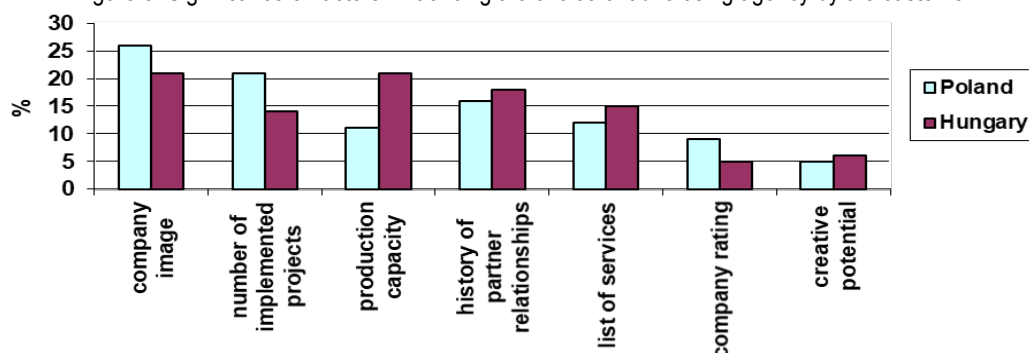
Note: * RC – regional channels; CA – corporate advertising; MP – media players.

Source: compiled by the authors according to the survey result

Thus, according to the evaluation, the most attractive for advertising companies is a segment of regional television channels in Poland and a segment of large media players in Hungary. The main feature of both markets is the significant influence of large media players on demand in the market. Although in Poland over the last 5 -10 years the share of regional TV channels has increased by four times, while in Hungary, on the contrary, media groups have only increased presence and strengthened market activity.

Let's consider results obtained during marketing research more in detail. Some of the data presented reflects general information on the markets under investigation, and some data relates to the defined target customer segments. The results of the research showed that the main factors of the choice of an advertising agency include: company image, quantity of implemented projects, production capacities, history of partnership relations, list of services, company rating, creative level. Figure 5 shows that the importance of factors for customers from different countries is different. In Poland, the main factors of choice are image of advertising agency, quantity of implemented projects and the history of partner relations. Such factors as production capacity of the agency, image, history of partner relations are dominating in Hungary. It is interesting that such factors as image of advertising agency and its creative potential have low significance for the customers of both countries. Thus, companies select agency mostly by rational criterias.

Figure 5. Significance of factors influencing the choice of advertising agency by the customer



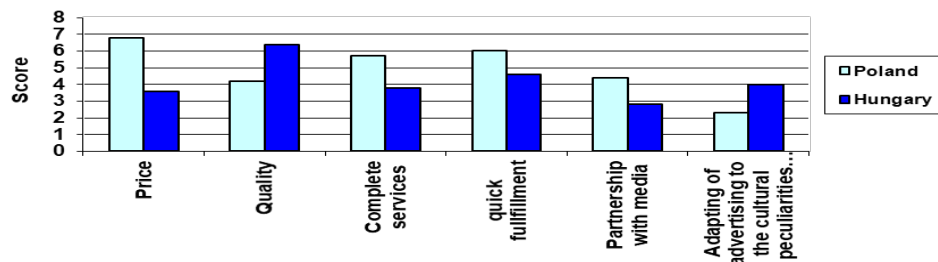
Source: compiled by the authors according to the survey result

The results of the survey showed that Polish representatives of the regional TV channels in the process of selection and evaluation of advertising agency choose companies offering attractive prices, complexity of services, fast fulfilment of orders and have a partnership with media. In Hungary, the segment of large TVs primarily focuses on the quality of services, the speed of fulfilment of orders and requires from the company the availability of skills and experience in adapting advertising/advertising message to the cultural peculiarities of the

country. For regional TV channels, the price is important because they have a limited budget; in Hungary, the budgets of large TV companies are significant, therefore, the most relevant criteria are the quality and efficiency of providing services (Figure 4). It should be noted that the criterion of "quality of advertising services" from customers' point of view is a complex parameter, which includes the quality of visualization of the idea, the quality of the graphic design and image quality.

It is determined that the main reasons for dissatisfaction with the services of advertising agencies among the regional TV channels of Poland are low quality and high price. While in Hungary among large media players this reason is the lack of national agencies to take into account cultural features when creating promotional messages.

Figure 6. Results of the survey of the customers' preferences concerning advertising services in Poland and Hungary

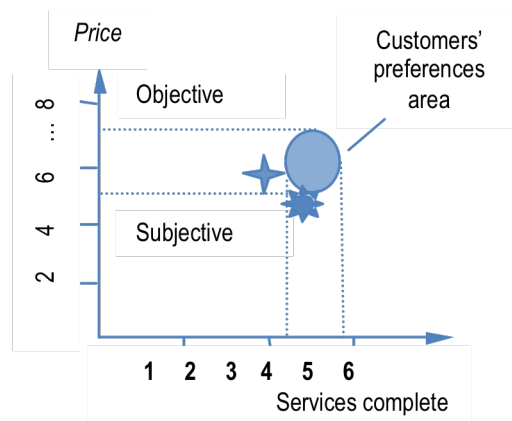


Source: compiled by the authors

According to the results of the analysis, the main strengths of the Ukrainian TV advertising companies on the Polish market are: a wide range of services; advantages in time of orders fulfilment; variety of services offered depending on the preferences of the customer. Commercials in Ukraine are created not only using computer graphics and shot movies, but also cartoon or animation movies. Most of the commercials in Poland are performed on average in 1-2 weeks and in Ukraine for 1 week. The competitiveness of Ukrainian advertising agencies in the Hungarian media market provides a wide range of services, the complexity of orders fulfilment, the flexibility of Ukrainian companies in fulfilling specific orders and offering combined advertising options, as well as the ability to adapt promotional messages to the cultural characteristics of the target audience.

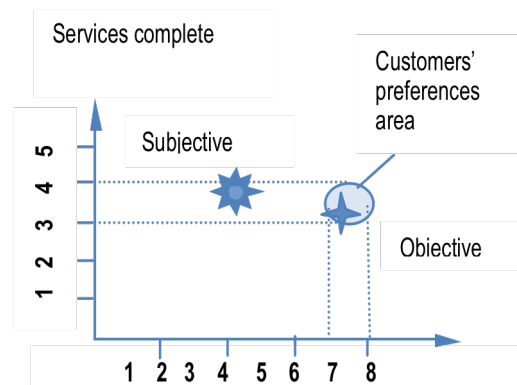
Consequently, according to the results of marketing research in the Polish market, it was discovered that the main motivation of RC representatives in the selection of media groups is the competitive prices, complexity of services, the fast orders performance, and partnerships in the media. Therefore, we'll consider possibilities of positioning advertising services of Ukrainian companies in this target segment according to the criteria of complexity of services / price and speed of orders fulfilment/partnership in mass media and to choose the most effective variant. Accordingly, we have built two variants of positioning schemes for TV advertising services in the segment of regional television channels in Poland (Figures 7 and 8).

Figure 7. Variant 1. Positioning map of services on segment of regional channels, Poland



Source: compiled by the author

Figure 8. Variant 2. Positioning map of services on segment of regional channels, Poland

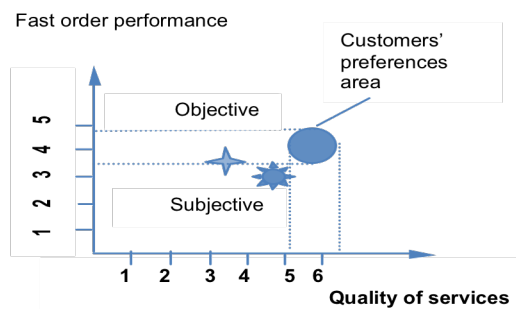


Source: compiled by the authors

Figure 7 shows that the subjective assessment in this system is closer to the area of consumer preferences than objective. This means that according to experts' opinion, the company should ensure the complexity of advertising services in order to be competitive, and end consumers have no doubt about the provision of this component, but are not fully confident in the pricing policy of the company. The priority of this positioning strategy should be to move the objective assessment into the area of consumer preferences, namely, to ensure the complexity of the services as the parameter "price" corresponds to market requirements. If we consider Option 2 (Figure 8) the positioning of services on the segment of regional TV channels in Poland, then there is a similar situation - the subjective assessment is closer to the zone of advantage than objective. According to the company's surveyed experts, it is necessary to improve the partnership's presence in order to increase the competitiveness and awareness of consumers, while the end consumers have doubts about the existence of such a partnership, but are satisfied with the ability of the company to execute orders promptly. The direction of implementation of the positioning strategy in this option should be to move the objective assessment into a zone of consumer preferences for a partnership with the media. Consequently, based on the results of constructing and analyzing two options for positioning advertising services on the segment of regional TV channels in Poland, one should choose the first option and carry out positioning for the price and complexity of the offered services.

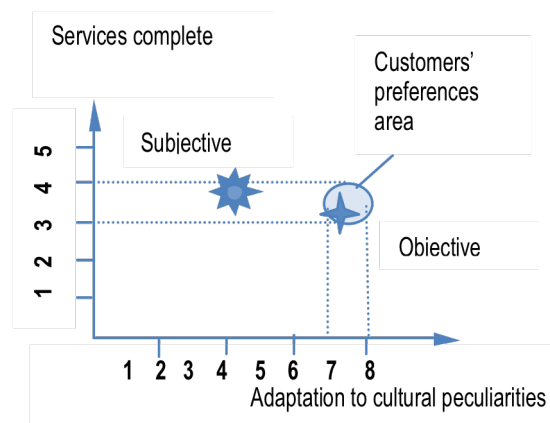
Data from the Hungarian marketing survey showed that the main motivation of the representatives of the big television companies segment when choosing an advertising agency is the quality of services, the fast orders performance and the ability of the company to adapt the advertisement to the cultural characteristics of the advertising audience. We have built the positioning schemes in the specified target segment according to the criteria of the speed of execution of the order/quality of services (option 1, Figure 9) and adaptation of advertising/complexity of services (option 2, Figure 10). As we see, subjective assessment in this system is closer to the area of consumer preferences. This indicates that potential customers are not confident in the quality of advertising services offered by Ukrainian companies, and also have some doubts about their ability to ensure the prompt execution of orders. In order to ensure competitiveness of Ukrainian agencies, the quality of advertising messages should be improved and the priority of the positioning strategy in this variant of the applied criteria should be to move the objective and subjective assessment into the area of consumer preferences.

Figure 9. Variant 1. Positioning map of services on segment of media players, Hungary



Source: compiled by the authors

Figure 10. Variant 2. Positioning map of services on segment of media players, Hungary



Source: compiled by the authors

In option 2 (Figure 10), the objective assessment falls entirely into the area of consumer preferences, the subjective assessment enters the zone only by the criterion of complexity of services. Therefore, the priority of implementing this positioning option should be to convince target customers of the ability of the Ukrainian company to adapt advertising messages in accordance with the cultural characteristics of the audience in Hungary. In our view, the second option of positioning services on the segment of large TV companies is the most attractive and will ensure the effectiveness of the market activity of the company.

Conclusion

The proposed model of developing the international positioning strategy of goods/services consists of 7 stages, these are: evaluation of market attractiveness, competitor analysis, demand evaluation, cultural environment analysis, target market selection, developing the positioning strategy, strategy implementation and monitoring. Implementation of this model allowed forming international positioning strategy of Ukrainian advertising service companies on European media market. Markets of Poland and Hungary were chosen during the research and recommendations concerning international positioning strategy of Ukrainian advertising service were companies formed.

The data needed to develop this strategy was obtained through primary research, including motivational studies of target consumer. A qualitative method of collecting primary marketing information was used, which involved expert surveys. The total number of respondents was 20: 10 persons - experts in the market of television advertising services in Poland and 10 persons - experts in the market in Hungary were interviewed.

According to the results of the analysis, the main strengths of the Ukrainian TV advertising companies on the market of Poland are: a wide range of services; advantages in time of orders fulfilment; variety of services offered depending on the preferences of the customer. The competitiveness of Ukrainian advertising agencies in the media market of Hungary provides a wide range of services, the complexity of orders fulfilment, the flexibility of Ukrainian companies in fulfilling specific orders and offering combined advertising options, as well as the ability to adapt promotional messages to the cultural characteristics of the target audience. Possibilities of positioning advertising services of Ukrainian companies in this target segment according to the criteria of complexity of services / price and fast orders performance/ partnership in mass media were viewed in the research.

According to the positioning maps built according to experts' opinion positioning strategy was developed on markets of Poland and Hungary. Positioning strategy should be based on price and complexity of the offered services in Poland. In Hungary the developed positioning strategy should convince target customers in the ability of the Ukrainian company to adapt advertising messages in accordance with the cultural characteristics of the audience.

Developed strategy can be used by Ukrainian media companies to improve their market strategy on European market and therefore strengthen international relations of Ukraine and European countries.

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Success of Visegrad Group Countries in the Field of Labour Market

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Abstract:

The former Post-communist countries faced after the change of their regimes with an unexpectedly high unemployment. The Visegrad four countries (V4) joined the European Union in 2004 and especially Slovakia and Poland were hit with high unemployment in this time. To the most important aim of the EU members belongs the convergence of EU economies. The sigma convergence of the unemployment rate (UR) calculated in the paper through the coefficient of variation proves a strong convergence of the UR till the beginning of economic crisis. Unfortunately, the crisis started the divergence of UR. In 2000 the coefficient of variation was as high as 53.1% for UR. Due to the decline of UR especially in “new” Member States, including the V4 countries, the variability of unemployment decreased steadily till 2008 when the CV dropped to 26.9%. Unfortunately the crisis caused an increase of UR and so was it also with the coefficient of variation. The variability of the UR in 2016 stood at 52% which means a divergence of the UR. Strong economic growth was reflected in reduction of UR from 18.9% to 9.7% between 2000 and 2016 in Slovakia, while in Poland in the same time span the UR dropped from 16.1% to 6.2%. The divergence process of UR in the EU after 2008 was mainly caused by an extremely high increase of unemployment in Greece, Spain or Cyprus.

Keywords: Unemployment rate; youth unemployment; convergence; European Union; Visegrad group

JEL Classification: E24; C10; J20

Introduction

Unemployment is a serious problem of economies with a strong effect to social exclusion and poor health outcome. The former Post-communist countries including the Visegrad four members were hit by high unemployment rates at the beginning of analysed period of time. The V4 countries joined the EU in 2004. The inclusion of these countries into the club of most development states in Europe had a very positive impact to their development. Successfully evolved the labour market in V4 countries with the effect of convergence of their high unemployment rates (UR) to more acceptable levels. A strong convergence process of the UR was for the EU members typical till the beginning of economic crisis. Unfortunately, the crisis started the divergence of UR. Success of decline and stabilisation on the labour market in Slovakia was demonstrated by a decrease of UR from 18.9% in 2000 to 9.7% in 2016. Strong decline was achieved also in Poland where the UR dropped in the same timespan by 9.9 percentage points (p.p.). Also the youth unemployment rate between 2000 and 2016 declined rapidly in Eastern Europe, by 17.2 p.p. in Poland and by 15.1 p.p. in Slovakia.

1. Research Background

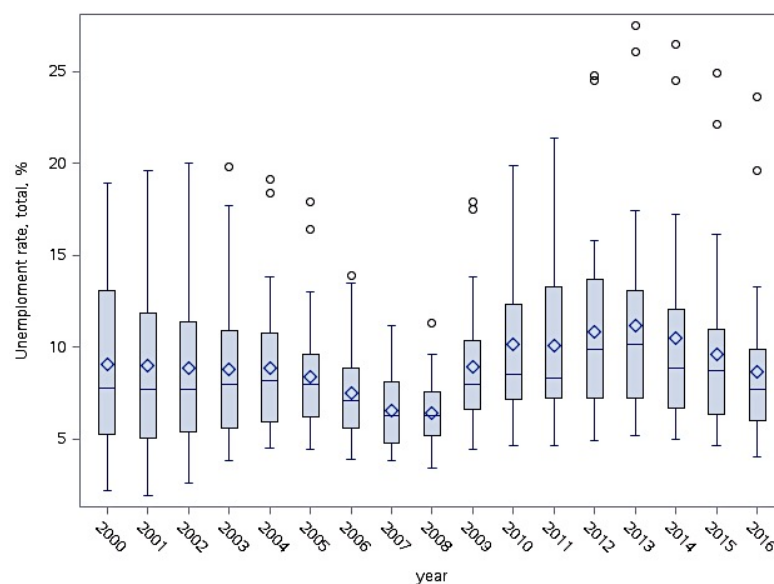
Employment is one of the most important and analysed socio-economic characteristics that determines wellbeing and social inclusion. Not only employment but also unemployment can be used to monitor progress, successes or failures at the labour market development of selected countries. Europe 2020 strategy set a progressive, ambitious goal to increase the employment rate of the population aged 20-64 to at least 75% (European Commission 2010). The employment rate achieved 71.1% in 2016 and so the distance to the Europe 2020 targeted level stood at 3.9% (Eurostat 2017). However due to the impact of economic crisis in some Southern Europe countries the employment rate is still at lower levels (Megyesiova and Lieskovska 2016). To be able to achieve the expected level of employment in 2020 the EU countries must intensify the measures taken in order to fulfil this ambitious aim (Zaharia and Rătezanu 2014). A bit different concept how to examine the changes in the labour market is to look at the development of the unemployment rates. Unemployment rate (UR) is the number of

unemployed persons aged 15 to 74 as a percentage of the labour force (Statistics explained, Eurostat). Unemployment is used to compare the situation of labour market not only at the national but also at regional levels (Pivonka and Loster 2014). Unemployment is linked with sustainable development of societies (Popescu and Lazar 2015) and social economy (Popescu, Cosma and Predescu 2015), it is negatively related to economic growth (Akalpler and Shamadeen 2017). According Táncošová (2013) the foreign direct investments belong to effective factor of economic growth that potentially reduce unemployment and regional disparities. A decrease of the gross domestic product during the crisis led to increase of unemployment in Slovakia (Tvrdon 2013) and other EU members. Not only economic aspects of unemployment are at the focus of societies but more often scientist and physicians point to a negative outcome of unemployment to the health status. Unemployment is related to a negative long-term health effect (Norström, Janlert and Hammarström 2017), especially youth unemployment is related to mental health problems (Thern *et al.* 2017). Youth unemployment rate is the UR of people aged 15 to 24. The youth UR was higher than 40% in Spain and Greece in 2016.

2. Unemployment versus youth unemployment

Unemployment is a serious problem of economies. It affects not only the economy from the macroeconomics point of view but the unemployment seriously affects everyday life of thousands unemployed persons including their family member. In EU-28 the total number of unemployed persons in 2000 was about 20.021 thousand persons, it declined to its lowest level of 16.751 thousand persons in 2008. Due to the negative impact of economic crisis the total number of unemployed persons in EU-28 after 2008 began to increase and reached its higher level in 2013 (26.304 thousand persons). An improvement of the economic condition of the EU Member States was reflected also by a systematic decline of unemployment after 2013 and so the total number of unemployed persons in 2016 is similar to the starting level of our analysis in 2000.

Figure 1. Box plot of unemployment rate, %



Source: Eurostat, own processing

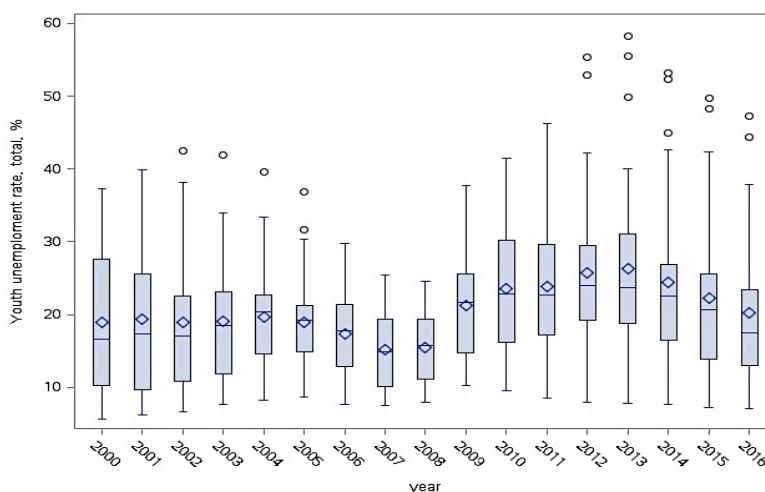
The total UR varied from 2.2% till 18.9% in 2000 (see Figure 1). Low rates were typical for the “old” Member States. The unemployment rate lower than 5% was in 2000 reached in 6 member countries: Luxembourg (2.2%), the Netherlands (3.7%), Austria (3.9%), Denmark (4.3%), Ireland (4.3%) and Cyprus (4.8%). On the other hand, UR higher than 15 % was in the same year achieved in the “new” Member States: Croatia (15.6%), Poland (16.1%), Bulgaria (16.4%), Lithuania (16.4%), Slovakia (18.9%). Especially in two V4 countries the unemployment was extremely high in 2000. The EU average rate was at the level of 8.9%. The improving economic situation in European Union was copied by a decrease of unemployment rate across the Member States. In 2008 the EU had a lowest average rate of unemployment (7.0%). Again the unemployment rate lower than 5% was more typical for the older Member States, but also Czech Republic and Slovenia could boast with this very low UR. The most successful countries in area of unemployment rate were: Denmark (3.4%), Cyprus and the Netherlands (3.7%), Austria (4.1%), Czech Republic and Slovenia (4.4%), Luxembourg (4.9%). Also the maximum value of UR was acceptable, the rate higher than 10 % was achieved in year of “prosperity” only in one Member States, namely in Spain (11.3%). Unfortunately, after the period of positive development and situation on

the labour market due to a very negative impact of economic crises a deterioration of UR levels began to attack the EU Member States. The highest average EU-28 unemployment rate was achieved in 2013 when the UR was as high as 10.9%. The UR lower than 5% was not reached in any of the EU countries. Threshold of 7% of the UR was not exceeded in Germany (5.2%), Austria (5.4%), Luxembourg (5.9%), Malta (6.4%), Czech Republic and Denmark (7.0%). On the other side of the ranking we can detect the most problematic countries which were mostly hit by the economic and financial crisis: Cyprus (15.9%), Portugal (16.4%), Croatia (17.4%), Spain (26.1%), Greece (27.5%). Especially the unemployment in Spain and Greece is alarmingly high.

Positive signs in economics of most of the EU countries was reflected also by a successive decline of UR starting from 2014. In 2016 the average unemployment rate declined to 8.6%. The lowest UR were achieved in Czech Republic (4.0%), Germany (4.1%), Malta (4.7%) and the United Kingdom (4.8%). In Greece (23.6%) and Spain (19.6%) is still the UR very high but compared with the extremes in 2013 also in these countries the labour market absorbed a large amount of unemployed persons.

The youth unemployment rate (Y_UR) at the beginning of the analysed period of time averaged 19.2 percent for all Member States (see Figure 2). In 2000 the Y_UR was within acceptable limits in Austria (5.6%), Denmark (6.2%), Luxembourg (6.4%), Ireland (6.9%). But in some countries young people had more difficulties to find a suitable job that was also reflected in higher Y_UR for example in Lithuania (30 %), France (31.5%), Bulgaria (33.7%), Poland (34.9%), Croatia and Slovakia (37.3%). As the economic situation bettered the Y_UR declined in the EU countries. The lowest average youth UR was achieved in 2008 when the Y_UR declined to 15.9%. Surprisingly the minimum level reached in Denmark (8.0 %) was not as low as the minimum level of the youth UR at the begging of the analysed seasons. The Y_UR lower than 10% was in the same year achieved also in Austria (8.5%), the Netherlands (8.6%), Cyprus (9.0%) and Czechia (9.9%). In any EU country the youth UR overstepped the threshold of 25%. As the economic crisis hits the EU economies the unemployment rate of young people began to grew rapidly.

Figure 2. Box plot of youth unemployment rate, %



Source: Eurostat, own processing

The highest EU-28 average level of the Y_UR was reached in 2013 when the rate jumped to 23.7%. The differences between countries were very high. To the countries with the lowest Y_UR belonged Germany (7.8%), Austria (9.7%), Denmark and Malta (13.0%). Unfortunately, youth unemployment rates higher than 35% were in 2013 not exceptional. For example, the maximum level was as high as 58.3% in Greece. But extremely high rates were reached also in Spain (55.5%), Croatia (49.9%), Italy (40.0%), Cyprus (38.9%), Portugal (38.1%). A stabilisation and growth of the economies was after 2013 expressed by a declining levels of Y_UR that averaged 18.7% in 2016. The best position with the lowest Y_UR belonged in these year to Germany (7.1%), Czech (10.5%), the Netherland (10.8%), Malta (11.0%), Austria (11.2%). A decrease was achieved also in countries with extremely high Y_UR in 2013 but still is the rate very high in Croatia (31.8%), Italy (37.8%), Spain (44.4%) and Greece (47.3%).

Convergence process of socio-economic indicators of the EU Member States is one of the most important agenda of the European Union. To measure the convergence, process some Beta or Sigma convergence coefficients can be used. Sigma convergence of the unemployment rates in the EU was measured using the coefficient of variation (CV). The CV is a relative measure of variability that enables a direct comparison of

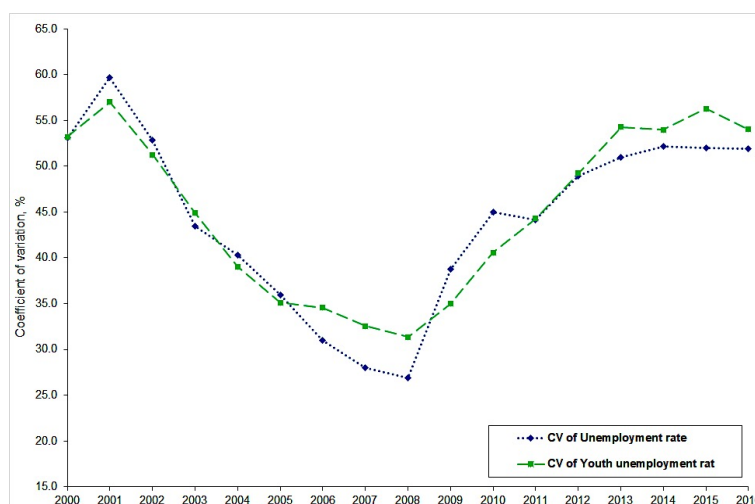
variation between samples with different means or between samples with different units of measurement. Higher value of CV stands for greater dispersion. The CV is a unit free statistic expressed by following formula:

$$CV = \left(\frac{s}{\bar{x}} \right) \cdot 100 \quad (1)$$

where s – standard deviation, \bar{x} – mean.

Variability of the UR and Y_UR measured by CV was as high as 53 % in 2000 (see Figure 3). It increases to the highest levels of 57 % for Y_UR and 59.7 % for UR in 2001. Strong convergence process of both unemployment rates began in 2002 and was ended in 2008. During years of prosperity the convergence of the UR was typical for the EU Member States. But unfortunately the positive signals of convergence in case of unemployment rates were ended at the time when the crisis began to influence the world economies. Lowest variability of the UR was reached in 2008, when the CV of UR was less than 27% and the variability of the Y_UR ended with 31.4%. In this time nobody expected such a dramatic increase of the unemployment rates that was associated also with a sharp increment of the variability of UR, which means a divergence process of selected socio-economic indicator of labour market. In 2016 the CV of UR stood at 52%, the CV of the youth UR was even higher (54%).

Figure 3. Coefficient of variation of UR and youth UR



Source: Eurostat, own processing

Table 1. Unemployment rate and differences of the UR from the EU-28 average level

EU countries in 2000	difference*	EU countries in 2008	difference*	EU countries in 2016	difference*			
Luxembourg	2.2	-6.7	Denmark	3.4	-3.6	Czech Republic	4.0	-4.6
Netherlands	3.7	-5.2	Cyprus	3.7	-3.3	Germany	4.1	-4.5
Austria	3.9	-5.0	Netherlands	3.7	-3.3	Malta	4.7	-3.9
Denmark	4.3	-4.6	Austria	4.1	-2.9	United Kingdom	4.8	-3.8
Ireland	4.3	-4.6	Czech Republic	4.4	-2.6	Hungary	5.1	-3.5
Cyprus	4.8	-4.1	Slovenia	4.4	-2.6	Romania	5.9	-2.7
Portugal	5.1	-3.8	Luxembourg	4.9	-2.1	Netherlands	6.0	-2.6
United Kingdom	5.4	-3.5	Estonia	5.5	-1.5	Austria	6.0	-2.6
Sweden	5.6	-3.3	Bulgaria	5.6	-1.4	Denmark	6.2	-2.4
Hungary	6.3	-2.6	Romania	5.6	-1.4	Poland	6.2	-2.4
Malta	6.7	-2.2	United Kingdom	5.6	-1.4	Luxembourg	6.3	-2.3
Slovenia	6.7	-2.2	Lithuania	5.8	-1.2	Estonia	6.8	-1.8
Belgium	6.9	-2.0	Malta	6.0	-1.0	Sweden	6.9	-1.7
Romania	7.6	-1.3	Sweden	6.2	-0.8	Bulgaria	7.6	-1.0
Germany	7.9	-1.0	Ireland	6.4	-0.6	Belgium	7.8	-0.8
France	8.6	-0.3	Finland	6.4	-0.6	Ireland	7.9	-0.7
Czech Republic	8.8	-0.1	Italy	6.7	-0.3	Lithuania	7.9	-0.7
EU-28	8.9	0.0	EU-28	7.0	0.0	Slovenia	8.0	-0.6
Finland	9.8	0.9	Belgium	7.0	0.0	EU-28	8.6	0.0
Italy	10.0	1.1	Poland	7.1	0.1	Finland	8.8	0.2
Greece	11.2	2.3	Germany	7.4	0.4	Latvia	9.6	1.0
Spain	11.9	3.0	France	7.4	0.4	Slovakia	9.7	1.1
Latvia	14.3	5.4	Latvia	7.7	0.7	France	10.1	1.5
Estonia	14.6	5.7	Greece	7.8	0.8	Portugal	11.2	2.6
Croatia	15.6	6.7	Hungary	7.8	0.8	Italy	11.7	3.1
Poland	16.1	7.2	Croatia	8.6	1.6	Cyprus	13.0	4.4
Bulgaria	16.4	7.5	Portugal	8.8	1.8	Croatia	13.4	4.8
Lithuania	16.4	7.5	Slovakia	9.6	2.6	Spain	19.6	11.0
Slovakia	18.9	10.0	Spain	11.3	4.3	Greece	23.6	15.0

*calculation of difference: difference = country rate minus EU-28 average rate

Source: Eurostat, own processing

The differences between the unemployment rates of the EU countries and the average level of the EU-28 are presented in Tables 1 and 2. In 2000 the UR in Luxembourg was by 6.7 percentage points (p.p.) lower than the EU average. On the other hand, in Slovakia the UR was by 10 p.p. higher compared to the overall average level. In 2008 the distinction of the lowest and highest UR was not so extreme, which ended in a difference of Denmark's UR with the average level by only -3.6 p.p. and of Spain's UR by 4.3 p.p. As the variability increased after 2008 the difference between the minimum or maximum UR with the mean value increase too. In 2016 in Czechia the UR was by 4.6 p.p. lower than the EU average and the difference in case of Greece was dire because in Greece the UR was higher by 15 p.p. compared with the overall EU average. In case of Y_UR the differences of the minimum or maximum levels with the EU-28 average values are much higher. For example, in 2000 Y_UR in Austria was by 13.7 p.p. lower and in Slovakia by 18 p.p. higher than the EU-28 average. In 2008 the differences were significantly lower. The Y_UR in Denmark was by 7.9 p.p. lower and in Spain by 8.6 p.p. higher than the EU mean level. Unfortunately, the situation changed a lot till 2016 when the differences increased to -11.6 p.p. in case of Germany and to 28.6 p.p. in case of Greece compared with the EU-28 average level. The absolute differences of the unemployment rates are much higher in terms of Y_UR, but the relative measure of variability of the UR and Y_UR are quite similar, in some years even equal.

Table 2. Youth unemployment rate and differences of the Y_UR from the EU-28 average level

EU countries in 2000		difference*	EU countries in 2008		difference*	EU countries in 2016		difference*
Austria	5.6	-13.7	Denmark	8.0	-7.9	Germany	7.1	-11.6
Denmark	6.2	-13.1	Austria	8.5	-7.4	Czech Republic	10.5	-8.2
Luxembourg	6.4	-12.9	Netherlands	8.6	-7.3	Netherlands	10.8	-7.9
Ireland	6.9	-12.4	Cyprus	9.0	-6.9	Malta	11.0	-7.7
Netherlands	8.2	-11.1	Czech Republic	9.9	-6.0	Austria	11.2	-7.5
Germany	8.7	-10.6	Germany	10.4	-5.5	Denmark	12.0	-6.7
Cyprus	9.9	-9.4	Slovenia	10.4	-5.5	Hungary	12.9	-5.8
Sweden	10.5	-8.8	Malta	11.7	-4.2	United Kingdom	13.0	-5.7
Hungary	11.9	-7.4	Bulgaria	11.9	-4.0	Estonia	13.4	-5.3
United Kingdom	12.2	-7.1	Estonia	12.0	-3.9	Lithuania	14.5	-4.2
Portugal	12.5	-6.8	Ireland	13.3	-2.6	Slovenia	15.2	-3.5
Malta	13.7	-5.6	Lithuania	13.3	-2.6	Bulgaria	17.2	-1.5
Slovenia	16.3	-3.0	Latvia	13.6	-2.3	Ireland	17.2	-1.5
Romania	16.5	-2.8	United Kingdom	15.0	-0.9	Latvia	17.3	-1.4
Belgium	16.7	-2.6	EU-28	15.9	0.0	Poland	17.7	-1.0
Czech Republic	17.0	-2.3	Finland	16.5	0.6	EU-28	18.7	0.0
EU-28	19.3	0.0	Poland	17.2	1.3	Sweden	18.9	0.2
Finland	21.4	2.1	Luxembourg	17.3	1.4	Luxembourg	19.1	0.4
Latvia	22.4	3.1	Romania	17.6	1.7	Belgium	20.1	1.4
Spain	23.2	3.9	Belgium	18.0	2.1	Finland	20.1	1.4
Estonia	23.9	4.6	France	19.0	3.1	Romania	20.6	1.9
Italy	26.2	6.9	Slovakia	19.3	3.4	Slovakia	22.2	3.5
Greece	29.1	9.8	Hungary	19.5	3.6	France	24.6	5.9
Lithuania	30.0	10.7	Sweden	20.2	4.3	Portugal	28.2	9.5
France	31.5	12.2	Italy	21.2	5.3	Cyprus	29.1	10.4
Bulgaria	33.7	14.4	Portugal	21.6	5.7	Croatia	31.8	13.1
Poland	34.9	15.6	Greece	21.9	6.0	Italy	37.8	19.1
Croatia	37.3	18.0	Croatia	23.6	7.7	Spain	44.4	25.7
Slovakia	37.3	18.0	Spain	24.5	8.6	Greece	47.3	28.6

*calculation of difference: difference = country rate minus EU-28 average rate

Source: Eurostat, own processing

3. Association of the unemployment rate and youth unemployment rate

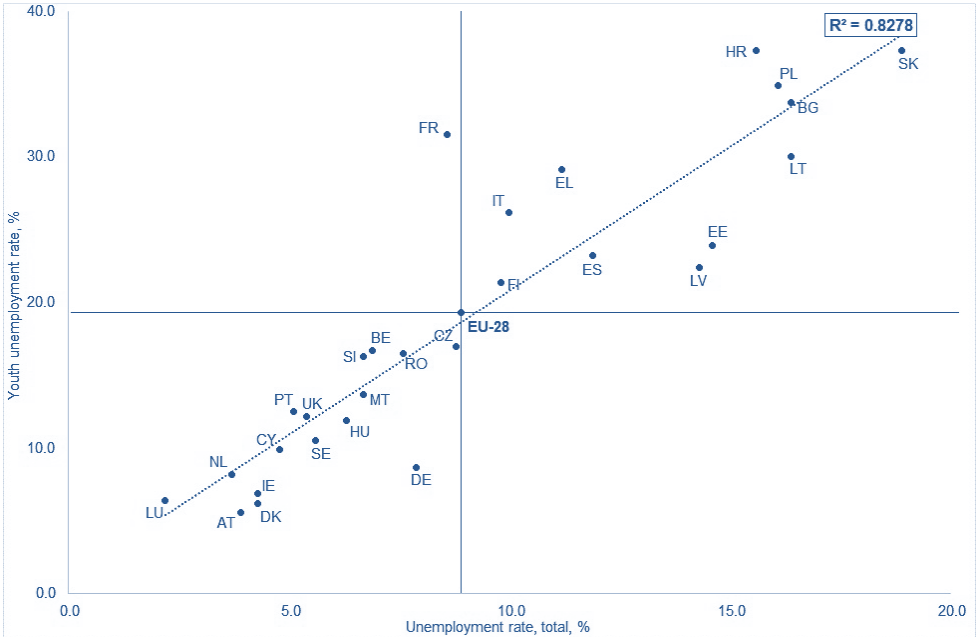
Correlation analysis is a helpful method how to discover and quantify an association between two discrete or continuous variables. For analysis of a relationship between UR and Y_UR the Pearson's correlation coefficient (r_{xy}) was used. This coefficient quantifies the direction and strength of linear relationship of two quantitative variables, for calculation the following formula can be used:

$$r_{xy} = \frac{S_{xy}}{S_x \cdot S_y} \quad (2)$$

where: s_x – standard deviation of variable X; s_y – standard deviation of variable Y; s_{xy} – covariance of X and Y.

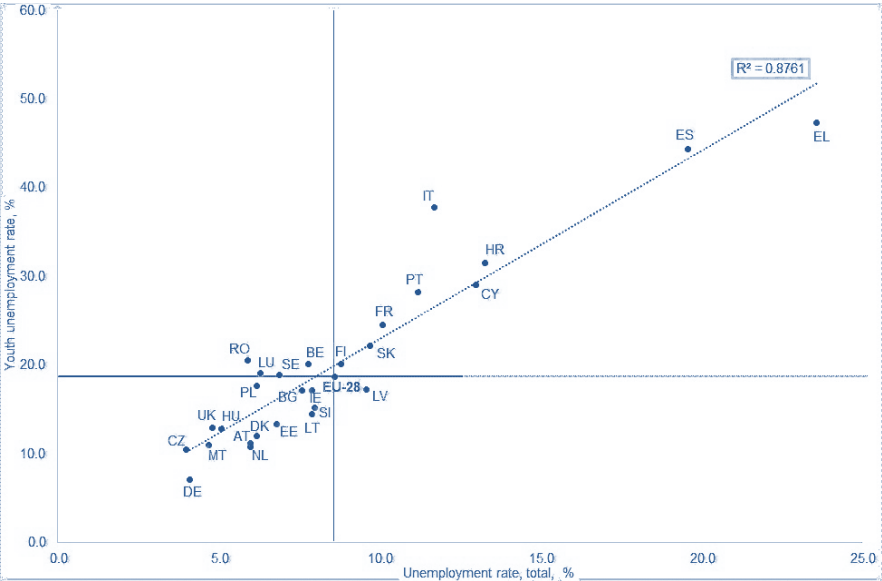
The coefficient of correlation of the UR and Y_UR in 2000 was positive and statistically significant ($r_{xy} = 0.91$, p value < 0.001, R squared = 0.8278). Between the both rates exist a very strong and positive linear association (see Figure 4). The chart for graphical analysis of association was divided into quadrants using the average EU levels of UR and Y_UR. In the bottom left corner of the Figure 4 almost all of the “old” Member States can be find, with the best position of Luxembourg. In Luxembourg the lowest level of UR in 2000 was also combined with the lowest Y_UR. On the other hand, the worst position belonged to Slovakia in the upper top corner. Slovakia’s highest UR was associated with the highest Y_UR between the EU countries. Most of the “new” Member States have been placed in the top right corner of the Figure 4. The correlation analysis of the UR and Y_UR in 2000 proved the expectation that both rates are strongly associated and that most of the new EU countries had a combination of unemployment rates higher than the EU average point.

Figure 4. Association of the total unemployment rate and youth unemployment rate in 2000



Source: Eurostat, own processing
Country codes: BE-Belgium, BG-Bulgaria, CZ-Czech Republic, DK-Denmark, DE-Germany, EE-Estonia, IE-Ireland, EL-Greece, ES-Spain, FR-France, HR-Croatia, IT-Italy, CY-Cyprus, LV-Latvia, LT-Lithuania, LU-Luxembourg, HU-Hungary, MT-Malta, NL-the Netherlands, AT-Austria, PL-Poland, PT-Portugal, RO-Romania, SI-Slovenia, SK-Slovakia, FI-Finland, SE-Sweden, UK-the United Kingdom

Figure 5. Association of the total unemployment rate and youth unemployment rate in 2016



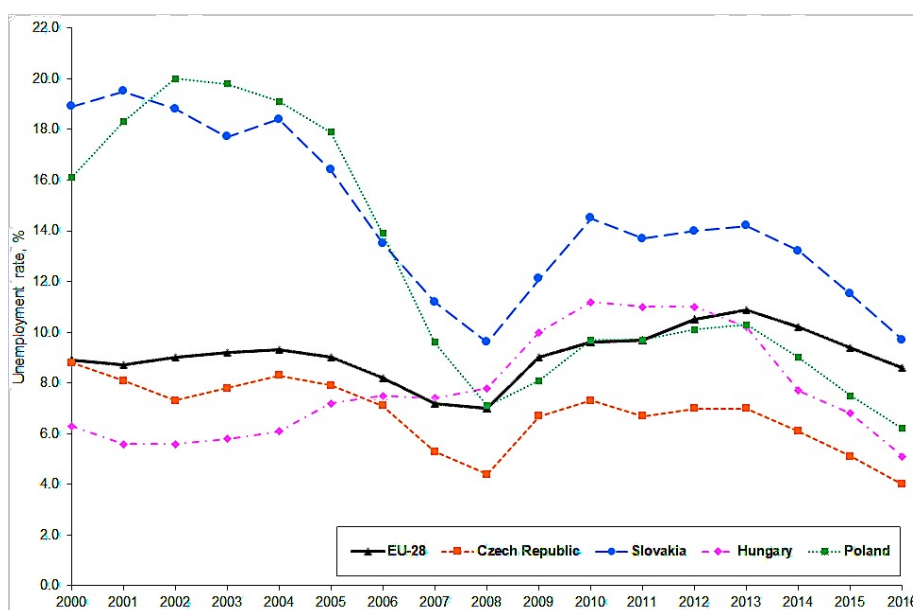
Source: Eurostat, own processing

The Figure 5 presents the association between the unemployment rates in 2016. In this year the correlation coefficient was also positive and even higher than in 2000 ($r_{xy} = 0.936$, p value < 0.001 , R squared = 0.8761). It means that also in 2016 the situation did not change a lot in meaning of a strong and positive linear relationship between both variables, but it changed a lot in meaning of positions of the EU countries in the quadrants of the chart. The best combination of the UR and Y_UR belonged to Czechia and Germany. More of the new Member States are located in the left bottom corner of the Figure 5 compared to Figure 4. So not only Czech Republic can be find in this “better” corner of figure 5, but also Malta, Hungary, Romania, Poland, Estonia, Bulgaria, Lithuania and Slovenia are positioned in the left bottom corner of the chart. In the top right corner, the worst positions belonged to Spain and Greece, where very high unemployment rates were combined with extremely high youth UR.

4. Unemployment in the Visegrad four countries

The unemployment was a serious problem of post-communist countries after the change of the centrally controlled regimes to democratic countries. In 2000 especially Slovakia and Poland were hit by high unemployment rates (see Figures 6 and 7). The highest UR in Slovakia was achieved in 2001 when the rate was as high as 19.5%. In Poland the UR jumped to 20.0% in 2002. The high UR of two of Visegrad four (V4) countries negatively influenced the high variability of the analysed indicator. The UR of Czechia and Hungary was at the beginning of the analysed period of time more close to the average EU levels. In 2000 the UR in Slovakia was by 10 p.p. higher than the average level, in Poland by 7.2 p.p., but in Czechia it was by 0.1 p.p. lower and in Hungary by 2.6 p.p. lower than the mean UR of the EU. The recovery of the Slovak and Polish economies was reflected in rapid decline of the UR. In year “of prosperity” before the UR began again to raise the UR in Slovakia stood at 9.6%, in Poland 7.1%, in Hungary 7.8% and Czechia at 6.7%. In 2008 also the CV of the UR was at the lowest levels. The improved situation at the labour market of the V4 countries resulted in a rapid decline of the UR especially in Slovakia, Poland and Czech Republic. Due to this strong convergence of the UR of the V4 countries the variability measured by coefficient of variation declined rapidly too. Unfortunately, as the crisis began to influence negatively the world economies, the UR began again to grow. The increase of the UR in the V4 countries was not so dramatic than in some Southern Europe countries. In 2016 three of the V4 countries had the UR lower than the EU average and only in Slovakia the UR exceeds the overall average UR. At the beginning of the analysis Slovakia and Poland conducted to the high variability of the UR in the EU, but at the end of the analysed period of time the V4 countries did not negatively influence the variability of UR. The divergence process of the UR at the end of the analysis was caused especially by the Southern Europe countries.

Figure 6. Unemployment rate in EU-28 and V4 countries, %

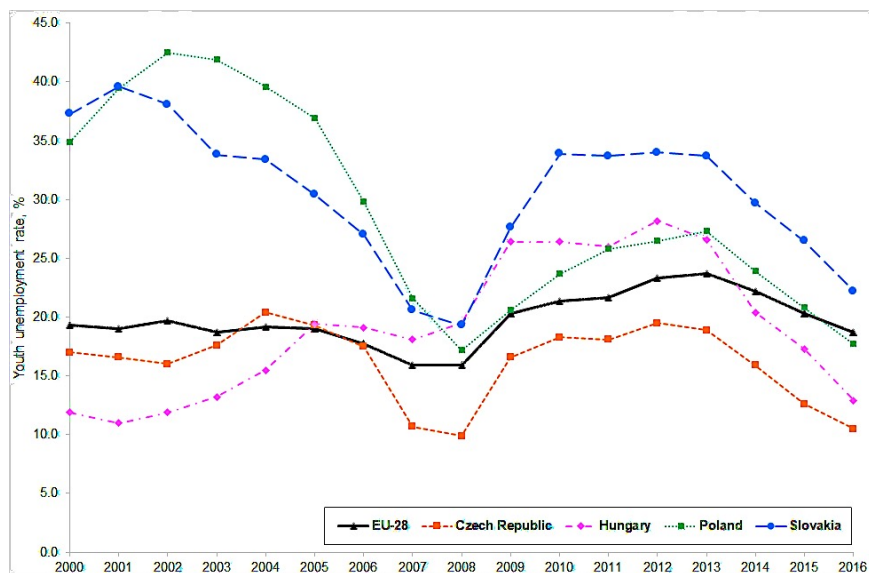


Source: Eurostat, own processing

The youth unemployment rate development was very similar to the changes of the total UR. Extremely high Y_UR at the beginning of the analysis were typical for Slovakia and Poland. In Slovakia the Y_UR jumped to 39.6% in 2001, but in Poland it was even higher in 2002 when the Y_UR reached its maximum at 42.5%.

These high Y_UR strongly participated at the high variability levels of Y_UR at the beginning of the analysed periods. Strong convergence of the Y_UR is visible in Figure 7. Rapid decline of Y_UR in Slovakia and Poland helped to push the coefficient of variation to a level of 31.4% in 2008. Very positive development of the Y_UR in V4 countries was ended in 2008 when a deterioration of the youth UR started and it lasted till 2013. Fortunately, in 2016 the Y_UR of the V4 countries was compared with other EU Member States not so high. In Czechia, Hungary and Poland the Y_UR is lower than the EU average, only in Slovakia the rate is a bit higher than the overall mean level of the EU. The high variability of the Y_UR at the end of the analysed periods was again caused by Southern European countries like Greece (47.3%) or Spain (44.4%).

Figure 7. Youth unemployment rate in EU-28 and V4 countries, %



Source: Eurostat, own processing

Conclusion

The economic and financial crisis did not negatively affect only the unemployment rate that as a result of crisis began to increase, but it negatively influenced also the convergence processes of the unemployment rates. In 2000 the CV was as high as 53.1% for UR and 53.2% for Y_UR respectively. Due to the decline of UR especially in “new” Member States the variability of unemployment decreased steadily till 2008 when the CV dropped to 26.9% (31.4% for the Y_UR). Two countries from the V4 group, namely Poland and Slovakia, have achieved excellent results in reducing unemployment rates. Strong economic growth was reflected in reducing of UR from 18.9% in 2000 to 9.7% in 2016 in Slovakia, while in Poland in the same time span the UR dropped from 16.1% to 6.2%. In 2016 Czech Republic had the lowest UR (4.0%) among the EU Member States and Hungary belonged also to countries with a very low UR (5.1%). The Visegrad four countries have achieved an extraordinary reducing of unemployment between 2000 and 2016. They had a positive effect on convergence of UR. Unfortunately, in some of the “old” Member States the impact of crisis was so strong that still in 2016 the labour market was not able to absorb the high number of unemployed persons and so the UR for example in Spain stood at 19.6% and in Greece at 23.6%, alarmingly high was also the youth UR in Spain (44.4%) and in Greece (47.3%). UR in some of the Southern European countries very negatively affected the variability of unemployment that increased very rapidly after 2009.

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Corruption and Innovation: Mixed Evidences on Bidirectional Causality

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Abstract:

This study is an attempt to address the causality direction between corruption and innovation. In the empirical approach a panel data for 21 European countries in the 2006-2016 period is used. In order to investigate if the causality is context dependent, four different subsamples are considered, namely, Continental countries, Nordic countries, PIIGS and V-4 countries. Using Granger causality test for panel data we find that in whole sample, corruption causes in a Grangerian sense the innovation, while innovation does not cause a la Granger corruption. In the case of Continental and V-4 countries no evidence of causality in both directions is found. In Nordic countries corruption does not cause a la Granger the innovation, albeit innovation causes corruption in a Grangerian sense. In the case of PIIGS countries, empirical evidence reveals bidirectional causality. The empirical findings now obtained are particularly important for unveiling that both in contexts of stronger and weaker institutions innovation precedes corruption, so there is an open room for smart regulation aiming, on the one hand, to prevent 'innovation trolls' in established institutions, and on the other hand, to foster transparency and accountability of institutions.

Keywords: corruption; innovation; panel causality; European countries

JEL Classification: C12; D73; O30

Introduction

As a well-established fact in economic literature, innovation is considered as a pivotal element in the so called growth process (Romer 1990, Cameron 1996). Several scholars have identified both micro and macro determinants of innovation. At micro level researchers argue that R&D expenditures, competition, foreign direct investment and foreign technology licensing (*e.g.* international technology transfer) are important determinants of innovation. At macro level, human capital, innovation policy, industrial factors are considered essential for innovation (*see for example* Mccann and Oxley 2012, Hong *et al.* 2012 and Pradhan *et al.* 2016). After being an intensively explored topic, even now the dynamics of relationship between institutions and innovation are not so clear.

This study is focused on exploring the issue of bidirectional causality between corruption and innovation at macro level for a sample of European countries. We use data for 21 countries in the 2006 – 2016 period, considering four subsamples *i.e.* Continental countries, Nordic countries, PIIGS (Portugal, Italy, Ireland, Greece and Spain) and Visegrad (V-4) countries, for assessing if the referred bidirectional relationship is context dependent. Using panel data Granger causality test, we reveal that innovation causes a la Granger the corruption both in Nordic and PIIGS countries.

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1. Literature Review

Economies need strong institutions for better growth (Nelson and Nelson 2002). Institutions shape the set of possibilities for individuals (Baumol 1990). An out of order institutional framework could harm innovation, entrepreneurship (Anokhin and Schulze 2009) and investment (Mauro 1995). Corruption can be considered as one of the negative institutions, which are harmful for economies. For example, Benfratello *et al.* (2018) found that corruption increases public debt and the effect was stronger for advanced economies. Corruption has both micro and macro level implications (Krammer and Marius 2013). When the firms apply for different types of intellectual property rights (IPRs) and licenses, such as patents, International Organization for Standardization (ISO) certificates, trademarks, product registration, and trade licenses, they are asked for bribery for the things that already deserve.

After the prominent contribution of Mauro (1995), studying the economic effects of corruption became an important research topic. Several researchers have analyzed the effect of corruption on innovation. There are two main streams in the literature on corruption and innovation (Ayyagari *et al.* 2014, de Waldemar 2012, Krammer and Marius 2013, Goedhuys *et al.* 2016, Liu *et al.* 2017, Nguyen *et al.* 2016, Paunov 2016). At macro level, some studies find a positive effect of corruption on innovation (Dreher and Gassebner 2013, Dejardin and Laurent 2014) and other find a negative one (Anokhin and Schulze 2009). The same applies for micro level studies. Both macro and micro level studies provide conflicting results. A part from the sign of effect, this stream of literature develops one sided economic notion that corruption has a causal effect on innovation.

On the other hand, it can be argued the causality could run in the opposite direction as well, depending upon the context under analysis. For instance, in the context of developing countries the institutions are weak anyway, whether the firms innovate or not. In such a weak institutional set up the innovative firms will have to pay bribery for IPRs and licensing activities. Using firm level data from 57 countries Ayyagari *et al.* (2014) reveal that likelihood of paying corruption is higher for innovative firms. One cannot interpret these results as causal effects because the data set used by the same authors is cross-country firm level data.

Patenting is widely considered as a strong indicator of the innovative activities of the firms (Paunov 2016). This indicator has also been used in macro level analyses for measuring the economies' overall innovative performance. Patent counting is applied as a measure of innovation, although taking into consideration the dimension of population. In the innovation literature patents statistics is traditionally used to measure innovations (among the many others we could mention Mansfield (1986), Peri (2005), Bronzini and Piselli (2016) *etc.* Thus, there is a need for checking if the causality runs from innovation to corruption as well as incorporating the time dimension in the dataset.

The remainder of the paper is structured as follows. Section 2 discusses the data and methodology. Section 3 discusses the results of analysis. Section 4 concludes and highlights the future prospects of the research.

2. Data and Methodology

2.1. Data and Variables

In the current study, the main interest variables are corruption and innovation. Thus, the number of patents per thousand of population (INNO) is used in this study. To measure the level of corruption, the corruption perception index (CPI) produced by the Transparency International is applied. Table 1 shows notations, measurements and sources of data collection.

Table 1. Groups of countries used for the estimation

Variable	Measurement	Source
Innovation (INNO)	European patent applications per country of residence of the first named applicant (per thousand of population).	European Patent Office: www.epo.org
Perception of Corruption (CPI)	Corruption Perceptions Index, ranging on a scale from 100 (very clean) to 0 (highly corrupt).	Transparency International: www.transparency.org

Source: compiled by the authors

We use panel data for 21 European countries¹¹ in the period of 2006-2016. We further divide our sample in four subgroups namely Continental (Continental+UK), Nordic, PIIGS and V-4 countries to check if the causality is context dependent. Table 2 reports group wise descriptive statistics of the data. Continental countries demonstrate the highest level of innovation (0.36 patent applications per thousand of population), while Nordics

¹¹ See Table A1 in appendix for details of the countries included in the analysis.

are the cleanest from corruption (Corruption Perceptions Index is 89.97). Countries of Visegrad group show the lowest innovativeness per population and the highest level of corruption.

Table 2. Descriptive statistics by groups of countries

Variable	Statistics	Whole Sample	Continental+UK	Nordic	PIIGS	V-4
INNO	Mean	0.204	0.362	0.273	0.049	0.009
	Median	0.124	0.268	0.320	0.031	0.010
	Maximum	0.877	0.877	0.400	0.143	0.020
	Minimum	0.003	0.072	0.078	0.006	0.003
	Std. Dev.	0.234	0.269	0.109	0.046	0.004
CPI	Mean	70.368	79.546	89.974	56.993	50.359
	Median	74.437	80.000	90.000	60.000	50.500
	Maximum	96.000	91.000	96.000	80.000	62.000
	Minimum	33.890	68.000	79.000	33.890	37.000
	Std. Dev.	17.086	6.283	3.343	13.122	5.513

Source: calculated by the authors using the data from European Patent Office and Transparency International

2.2. Empirical Methodology

As a first step of analysis, the unit root test developed by Levin and Lin (1993) is applied to the set of variables selected including all sub-samples. The test imposes homogeneity on the autoregressive coefficient, which indicates the presence or absence of unit root problem while the intercept and the trend can vary across individual series.

After checking the order of integration of the variables we apply Granger causality test for panel data to check the direction of causality between corruption and innovation. We use the following bivariate regressions to test for Granger Causality in a panel context:

$$INNO_{i,t} = \alpha_{0,i} + \alpha_{1,i}INNO_{i,t-1} + \dots + \alpha_{l,i}INNO_{i,t-l} + \beta_{1,i}CPI_{i,t-1} + \dots + \beta_{l,i}CPI_{i,t-l} + \epsilon_{i,t}, \dots, \quad (1)$$

$$CPI = \alpha_{0,i} + \alpha_{1,i}CPI_{i,t-1} + \dots + \alpha_{l,i}CPI_{i,t-l} + \beta_{1,i}INNO_{i,t-1} + \dots + \beta_{l,i}INNO_{i,t-l} + \epsilon_{i,t} \quad (2)$$

where t is the time period dimension of the panel, and i is the cross-sectional dimension. α and β are coefficients and ϵ is the error term. In the Granger Causality test the coefficients are assumed as same across all cross-sections, with the exception that data from one cross-section is not entering the lagged values of data from the next cross-section.

3. Empirical Results

Table 3 reports the results for unit root test for CPI and INNO, following Levin and Lin (1993). The Granger causality test is applied both on whole sample and on the four subsamples selected. That is why we apply the unit root test on both variables at subgroup level as well. Results of the unit root test show that the two variables under test are integrated of order zero, that is, $I(0)$. Therefore, the results of our Granger causality test are reliable.

Table 3. Variables' stationarity

Regions	Variable	t-Statistic Without trend	t-Statistic With trend	Order of integration
Whole Sample	CPI	-9.50487***	-7.10874***	$I(0)$
Continental+UK	CPI	-3.12695***	-3.72231***	$I(0)$
Nordic	CPI	-3.95322***	-6.30955***	$I(0)$
PIIGS	CPI	-9.01702***	-5.92485***	$I(0)$
V-4	CPI	-8.03501***	-0.51766	$I(0)$
Whole Sample	INNO	-5.06159***	-6.35175***	$I(0)$
Continental	INNO	-4.29977***	-4.45217***	$I(0)$
Nordic	INNO	-4.72152***	-2.83625***	$I(0)$

Regions	Variable	t-Statistic Without trend	t-Statistic With trend	Order of integration
PIIGS	INNO	-2.78955***	-3.05014***	I(0)
V-4	INNO	1.56702	-2.19977**	I(0)

Notes: Marginal significance levels: ***denotes 0.01, **denotes 0.05 and *denotes 0.1.

Source: Calculated by the authors using the data from European Patent Office and Transparency International

Table 4 presents the results of Granger causality test¹². Results reveal that in the whole sample corruption perception causes innovation (for lags 1-3), in a Grangerian sense, while innovation does not cause a la Granger corruption for lags 1-2, although bidirectional causality is observed for lag 3.

Table 4. Results of panel Granger causality tests

Regions	Null Hypothesis	Lags		
		1	2	3
Whole sample	INNO does not Granger Cause CPI	1.05977 (0.3045)	1.87614 (0.1561)	2.81779 (0.0409)**
	CPI does not Granger Cause INNO	6.33782 (0.0126)**	4.63911 (0.0108)**	2.57221 (0.0560)*
Continental+UK	INNO does not Granger Cause CPI	0.12290 (0.7269)	1.79988 (0.1732)	1.02866 (0.3868)
	CPI does not Granger Cause INNO	5.17797 (0.0257)**	2.98986 (0.0570)*	3.96403 (0.0123)**
Nordic	INNO does not Granger Cause CPI	5.73310 (0.0218)**	2.27178 (0.1200)	2.35295 (0.0963)*
	CPI does not Granger Cause INNO	5.55795 (0.0238)**	1.24889 (0.3009)	1.02842 (0.3969)
PIIGS	INNO does not Granger Cause CPI	0.08202 (0.7758)	0.14571 (0.8649)	0.95271 (0.4265)
	CPI does not Granger Cause INNO	3.09831 (0.0849)*	3.58696 (0.0369)**	2.18838 (0.1080)
V-4	INNO does not Granger Cause CPI	0.07565 (0.7848)	0.22931 (0.7964)	0.30030 (0.8248)
	CPI does not Granger Cause INNO	2.21822 (0.1449)	0.61295 (0.5482)	0.75433 (0.5302)

Notes: Marginal significance levels: ***denotes 0.01, **denotes 0.05 and *denotes 0.1.

Source: calculated by the authors using the data from European Patent Office and Transparency International

In the case of Continental+UK group of countries we find an evidence of unidirectional causality from corruption perception to innovation (lags 1-3). For Nordic countries we obtain results of bidirectional causality for the lag 1 and impact of innovation on corruption perception for lag 3. In PIIGS countries innovation does not Granger causes the corruption perception, although corruption perception causes a la Granger innovation for lags 1 and 2. In the case of V-4 countries, empirical evidence reveals no Granger causality.

Conclusions

This study seeks for the direction of causality between corruption and innovation. A set of 21 European countries is assessed in the 2006 – 2016 period, considering 4 sub-samples of countries. The Granger causality test is applied in order to assess the existence of unidirectional or bidirectional causality relationships between corruption and innovation.

These results open new opportunity windows for future research. Concerning the relationship between corruption and innovation, so far, the literature is focused on investigating the effect of corruption on innovation.

In this study, new empirical evidences are provided that constitute a first attempt for assessing the bidirectional causality relationship between corruption and innovation, depending on the context and unidirectional causality from corruption perception to innovation.

In terms of policy implications, the empirical evidences now obtained reveal that depending the context, innovation can precede corruption. This a particularly important insight since further action is required for policy

¹² We also tested the panel causality with the Dumitrescu-Hurlin test, although the significant effects were not found.

makers in order to prevent potential lockout actions of innovative activities. Furthermore, it is an opportunity window to foster the institutionalization of transparency and accountability, especially, at the public institutions level.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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Appendix

Table A.1. Groups of countries used for the estimation

Continental + UK		Nordic	PIIGS	V-4
Austria	Luxembourg	Denmark	Portugal	Czech Republic
Belgium	Netherlands	Finland	Italy	Hungary
France	Switzerland	Sweden	Ireland	Poland
Germany	United Kingdom	Norway	Greece	Slovakia
			Spain	

Source: compiled by the authors

Economic Modernization of BRICS Countries the Background of the Formation of a New Geopolitical Reality

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Abstract:

Classifications of the economy upgrade types are proposed. Results of the studies based on the innovation development of the countries of the world, on the knowledge economics index, ratings of the countries in terms of the global creativity index. Hypotheses in the framework of the modernization theory, systemic upgrade areas, priorities and prospects were laid down. A comparative analysis of the prospects for synchronizing the modernization of the economies of the BRICS countries was carried out.

The success of the chosen modernization time is questioned, taking into account the cycles of economic development. The strategy of catching-up development with active borrowing and copying of advanced foreign technologies is estimated. The principles and contours of the reference model of modernization are described.

Keywords: competitiveness of the countries; sustainable development; technical re-equipment; Global Creativity Index

JEL Classification: A13; O33; F53

Introduction

The present-day economic upgrade is symbolized by the terms like “post-industrial economy”, “information economy”, “economy of knowledge”, “economy of diversity”, “emergent (virtual, synthetic) economy”, “innovation economy”, E-Neural Network Economy, “creative economy”, “economy globalization”, “green economy” etc.

Economists have been actively studying the principles, conditions, measures of the depreciation of the effects of the world financial crisis and anti-crisis macroeconomic strategies. In the recent years focus on the modernization problems resulted in the advent of the modernization theory outlines.

The Reluctance is solely fairway US financial institutions against the backdrop of slowing economic growth was a prerequisite for the coordination of efforts to modernize the economy through international units, the search for alternative ways of stimulating the economies within the BRICS.

China, Russia, India, Brazil, South Africa, act as autonomous geo-economic actors, but in the framework of the BRICS may be obtained by multiplying the effects of including in the framework of the international division of labor. Empowerment policies and practices of the BRICS will affect the international balance of power.

Although China is the undisputed economic leader of this group, Russia plays the role of a diplomatic locomotive (leader). With China’s GDP at roughly \$8.2 trillion which represents over 60 per cent of the total BRICS’ GDP, there’s no question that China is the dominant player within the BRICS economic alliance, so before we can think about the future BRICS, we need to determine if the BRICS economic alliance is a synergistic economic alliance among all the BRICS nations or is it business as usual with China in the driver’s seat? (Rich Marino 2014)

1. Literature Review

The ascent of the emerging markets cannot be dissociated from the global financial crisis. Although it preceded the global financial crisis, the latter certainly contributed to the weakening of Western economic power, which opened up a space for emerging markets to drive the world economy. The financial crisis helped raise questions as to the foundations of economic and political globalization and placed new actors at its centre. Not only did the emerging markets become the heroes of the post-crisis world, but also the state, a dominant force in emerging markets, made a major comeback in the context of a collapsing private sector – before, some might add, collapsing itself (Beausang 2012).

The BRICs are likely to become great powers – not hegemonic, nor in the foreseeable future challenging US hegemony, but highly influential within the international sphere (vom Hau, Scott, and Hulme 2012). Similar to the BRICs, South Korea, Turkey and Mexico are among the upward movers in the global economic order and, we

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believe, from bilateral relations with these countries, the BRICS countries will depend on this unit weight in the new world order, in particular, the restoration of economic relations between Russia and Turkey.

A modernized society is a system of economic, political, environmental and cultural modernization. A number of countries makes an emphasis on certain modernization forms, for example, creation of ecologically safe production, political ones; China initially separated economic reforms and political system, in Russia confidence in the fact that economic results cannot be attained without dramatic change of the political course dominated. In the scientific literature the following modernization types are segregated: organic and inorganic. Primary (organic) modernization was implemented in the pacesetter countries and was conducted at the expense of the internal factors: drastic changes in the mentality culture, world outlook.

Secondary (inorganic) modernization is a response to the external challenges from the more developed countries and is implemented based on the simulation tools, predominantly, under the influence of the borrowing of foreign technologies and production and society organization forms, invitation of international experts, staff training abroad, investment attraction. Russian modernization is related, first and foremost, to economic innovations and therefore may be classified as secondary modernization. For example, Kyrgyzstan which started from political changes is characterized by inorganic modernization with type-based diversity – “pursuit modernization” or “delayed modernization”. As a rule, pursuit modernization is related to the emergency of modern living enclaves, for example, large cities, like Sao Paulo and Rio-de-Janeiro in Brazil, Moscow and St. Petersburg in Russia (Patlasov 2013).

Schaefer and Poffenbarger describe the primary foreign policy and strategic culture foundations of the BRICS states individually. This is done to search for both commonalities and contradictions among the BRICS membership. The existence of the BRICS as an international organization (IO) runs in opposition to traditional international relations theory on the formation of IOs. This IO exists with diversity across government type, level of development, geography, and international power. The BRICS also exist with serious bilateral tensions between some of the membership. The authors analyse the foreign policy of each state to search for common strategic interests so that they can better project the functional development of the BRICS formation (Schaefer and Poffenbarger 2014).

In our opinion, the reference model of modernization, including reference points of the engineering/ technological and economic progress have not been defined yet. Concentration of economic success in the largest administrative and political, industrial, scientific and cultural centre – the megacity of Moscow – is a fait accompli – with some delay of the periphery, though, the regional fixed asset investment breakdown, including that in the Far East has changed (Arkhipov and Ushakov 2014); based on the previously established bilateral links of Russian and Chinese companies the effects of the investment policy diversification and staged equalization of the development of all the regions of the country, primarily, East Siberia and the Far East, may be attained provided the projects are funded by the BRICS New Development Bank (BRICS NDB).

According to a different classification three modernization types are singled out:

- endogenous which the countries performed on their own basis (Europe, the USA);
- endogenous-exogenous which the countries perform both on their own basis and using borrowings (Russia, Turkey, Greece *etc.*);
- exogenous (imitation/ simulation) conducted mostly based on the borrowings.

The third-type modernization is, as a rule, characteristic, for geographically remote countries of the Old World (Patlasov 2015).

Let us make a brief historic excursion to the establishment of the institutions for innovation management in Russia. In the 2009 Message to the Federal Assembly the President of the Russian Federation declared the creation of “smart” economy meeting the interests and demands of the wide strata of the country’s population the strategic aim of the social development. In Russia modernization management agencies are being established, since 2012 the Council of the President of Russia on the Economy Modernization and Innovative Development of Russia has been functioning. In Russia 5 modernization areas are set: energy efficiency and energy saving (including development of new fuels); nuclear technologies; space technologies; medical technologies; strategic information technologies (Medvedev 2009).

2. Methodology

One of the comprehensive indices to characterize the knowledge-based economy development level is the Knowledge Economy Index developed by the group of the World Bank in the framework of the dedicated programme “Knowledge for Development” for the evaluation of the countries’ capability to create, adopt and

propagate the knowledge.

The Index calculation is based on the system of 109 structural and quality indicators classified into four main groups: index of the economic and institutional regime, index of education, index of innovations, IT index. As per this Index, Russia's standing is, for example, the 55th, Brazil's – the 60th, the South Africa's – the 67th, China's – the 84th, India's – the 110th. Top ten consists of mostly developed countries of the OECD (Table 1).

Table 1. Knowledge Economy Index (KEI) Rankings

2012 Ranking	2000 Ranking	Country	Knowledge Economy Index (KEI)	Knowledge Index
55	64	Russia	5.78	6.96
60	59	Brazil	5.58	6.05
67	52	South Africa	5.21	5.11
84	91	China	4.37	4.57
110	104	India	3.06	2.89

Source: World Bank [Web-resource]. Available at: <http://www.worldbank.org/kam>

The creative economy ideas in the BRICS countries were mostly elaborated in Brazil, in recent years China and Russia have been actively scrutinizing the creative economy principles (Table 2).

Table 2. Geographic Breakdown of the World Trade in Creative Products in 2006-2012 (as % of the total)

	Import		Export	
	2006	2012	2006	2012
Worldwide	100.0	100.0	100.0	100.0
The USA	30.4	21.4	9.1	8.6
The UK	8.6	7.3	6.7	4.9
Japan	5.4	4.4	1.9	1.7
China	1.3	1.4	15.8	20.8
Russia	0.1	1.3	0.4	0.4

Source: Creative Economy Report 2010: A Feasible Development Option. – New York and Geneva, UNCTAD, 2010; Creative Economy Outlook and Country Profiles: Trends in international trade in creative industries. UNCTAD/WEB/DITC/TED/2016/5. http://unctad.org/en/PublicationsLibrary/webditcted2016d5_en.pdf

In the global creativity ranking provided in the research by R. Florida, Brazil, for example, takes the 29th standing among 82 countries of the world. This research was based on three key creativity factors, the so-called 3 T's – technologies, talents, tolerance (see Table 3).

Table 3. Rankings of the Countries based on the Global Creativity Index, 2015

Rank	Country	Technology	Talent	Tolerance	Global Creativity Index
1	Australia	7	1	4	0.970
2	The USA	4	3	11	0.950
3	New Zealand	7	8	3	0.949
4	Canada	13	14	1	0.920
29	Brazil	27	68	15	0.667
38	Russia	22	15	123	0.579
39	South Africa	30	62	57	0.564
62	China	14	87	96	0.462
99	India	52	92	108	0.292

Source: Global Creativity Index Report 2015 / [Web resource]. Available at: www.martinprosperity.org; <http://martinprosperity.org/media/Global-Creativity-Index-2015>

3. Results

The Moscow Declaration (the III meeting of the Ministers for Science, Technologies and Innovations of BRICS Countries, October 28, 2015) provides the establishment of the cooperation mechanisms and levels:

- (I) cooperation in the framework of the largest research infrastructures, including “mega-science” projects;
- (II) coordination of the existing large-scale projects of the BRICS countries;

- (III) development and implementation of the BRICS Framework Programme on the financing of multi-lateral joint research projects, projects in the area of technology commercialization and innovative projects;
- (IV) creation of the Research and Innovative network platform of BRICS countries.

The cooperation covers five topical areas previously outlined in the Brazil Declaration and supervised by each BRICS state, namely:

- natural disaster prevention and termination supervised by Brazil;
- water resources and fighting against water pollution – supervised by Russia;
- geo-spatial technologies and application thereof – supervised by India;
- new and renewable power-engineering, energy efficiency – supervised by China and
- astronomy – supervised by South Africa. The works on these five areas will involve Research and Innovative network platform of BRICS countries to provide direct communication link between the countries concerned.

The Moscow Declaration welcomed the following new initiatives:

- establishment of the Forum of young scientists of the BRICS countries (coordinating country – India);
- cooperation in the area of biotechnologies and biomedicine, including human health and neurobiology (coordinating countries – Russia and Brazil);
- cooperation in the area of information technologies and high-performance computations (coordinating countries – China and South Africa);
- cooperation on scientific and technological research of the ocean and polar areas (coordinating countries – Brazil and Russia);
- cooperation in the area of material studies and nano-technologies (coordinating countries – India and Russia);
- cooperation in the area of photo-electronics (coordinating countries – India and Russia).

BRICS Work Plan on science, technology and innovations for 2015-2018 partially eliminated controversy in different national documents and BRICS declarations.

In October 2012 at the session of the Council of the President of Russia on the Economy Modernization and Innovative Development of Russia the President of Russia voiced the following facts: “In the world ranking of the business activity attractiveness Russia takes the 112th standing but simultaneously it rose by 8 standings from the 120th position”. Distortions in the Russian economy have not been rectified. In the industrial production structure the raw-material trend became even more predominant – the specific weight of the fuel and energy system in the total industrial production grew by factor 2.6 and the share of the investment sector reduced by factor 1.9, in table it is represented by machine-building and metalworking. The share of Russia in the world market of science-intensive products in 1990-2011 (the 1990 data represent RSFSR – note by Накануне.RU) shrank from 7.5% to 0.3%, and 65% of the GDP, 73% of capital investments and 85% of the economy consolidated returns stay in the pockets of raw-material oligarchs, intermediate agents, natural monopolies and metallurgists. Simultaneously, by the 2011 results the share of machines and equipment in the consolidated commodity export dropped to the level below 3.4%, whereas even in the de-industrialized economies of Egypt and Ethiopia the peer indicator exceeds 4.6% and 4.8%, respectively. In 2017 international sales of the software developed by Russian programmers contributed USD 8 bn; proceeds from telecommunication services’ export yielded another USD 1.7 bn, Rosoboronexport Corporation delivered arms and military equipment abroad for USD 14 bn. Recognizing the significant decline in Russian exports from 2014 to 2017, the share of machinery, equipment and transport means increased from 5.3 to 8.5%. (Russia in Figures 2017)

As a result of the social-economic policy implemented in Russia the specific weight of the innovative products in the overall scope of Russia’s industrial production dropped from 16–18% in the early 2000s down to less than 7 %. Hereby, even in the by no means successful Portugal the share of hi-tech products with a high specific weight of the added value amounts to about 37.6% of the total commodity output, and in Finland – an advanced (in terms of innovative activity) EU country the share of science-intensive products is 58.6% of the consolidated industrial product output. In terms of the share of machines and equipment in the export (5,4%) structure Russia stands behind a group of new industrial countries (in the Philippines – 69.3%, in Mexico – 61,9%, in South Korea – 55,0%, in China – 46,8%); in India – 16,4%, in Brazil – 16,4%, in South Africa – 22,4% and Eastern European countries (in Hungary – 56,3 %, in Slovakia – 59,6%, in Poland – 39,1%). To say nothing of the economically developed countries: in the USA the share of machines and equipment exceeds 35.0% of the

cumulative cost estimate of export, in Japan – 58,7%, in Germany – 48.0%, in France – 41,7%. (Rossiya i stranyi mira. 2016. S. 366).

Currently the most comprehensive and systemic research of the level of innovative development of the countries of the world is the study of international business school INSEAD (France) on the calculation of the Global Innovation Index. The Index is calculated as the weighted sum of evaluation of two indicator groups:

1. Available resources and conditions for innovations;
2. Attained practical results of the innovation implementation.

Table 4. Rankings of the Countries of the World in terms of the Global Innovation Index 2017

Ranking	Country	Index
1	Switzerland	67.69
2	Sweden	63.82
3	the Netherlands	63.36
4	the USA	61.4
5.	the UK	60.89
16	Hong Kong (China)	53.88
22	China	52.54
42	Romania	39.16
45	Russia	38.76
57	South Africa	35.80
60	India	35.47
69	Brazil	33.10

Source: Cornell University, INSEAD, and WIPO (2017): The Global Innovation Index 2017: Innovation Feeding the World, Ithaca, Fontainebleau, and Geneva. Available at: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf

Prospects in the Russian Federation: the scope of financing of the Russian economy modernization slowed down due to the Western economic sanctions.

We do not share the opinion of the scientists of the appropriateness of the time selected for the economic backlog termination. In the coming 20 years due to the world economy entering the downward period of Kondratiev cycle, the economic backlog of Russia from the world leaders will grow in a lot smaller increments than in the preceding 30-year period. It was in a similar period of the previous Kondratiev wave (the 1960s – 1980s) when the South-East Asia countries managed to make a technological leap and enter the list of the world's most advanced economies. However, to attain this it is necessary to shift over to the pursuit development strategy which requires active borrowing and copying of the advanced international technologies, attraction of international capital represented as the establishment of new production companies with the commissioning of our own technologies, mass-scale purchase of state-of-the-art international equipment, establishment of special economic zones targeted at the investors from technologically advanced countries etc. The personal experience in the creation of new agricultural fodder choppers and planting machines based on the achievements available, for example, GRIMME Company, testifies to the correctness of the course for the creation of, for example, Russian breeding machines for potato and root artichoke growing in the framework of the Union State Programme with the possibility of borrowing of the world peers' ideas.

In this area creative application of the experience of benchmarking technology in China could help Russia to repeat their quite successful modernization route. Prospects in the Russian Federation: the scope of financing of the Russian economy modernization slowed down due to the Western economic sanctions.

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In this area creative application of benchmarking experience, Chinese industrial espionage could help Russia repeat their quite successful modernization route.

4. Areas of potential research

The modernization theory and, consequently, practice in the BRICS countries and Iran faces a number of issues requiring extra arguments:

1. Is low systemic nature of the modernization in the conditions of limited financial and other resources admissible? It is known that economic growth without debt burden increase is impossible. Which is primary: investment or financial solutions? If there is no financial safety margin, it is difficult to implement global investment projects, in this connection the operation principles of the new BRICS Bank are of top importance.

It is not clear, what is subject to modernization in each of the BRICS countries – we have 5 countries and 4 civilizations: how should different civilization formats be accounted for and, if we also include candidate countries, we get Islamic and Buddhist civilizations. Should Russia retain the leading role in the industrial knowledge generation including prototype fabrication which will be produced in mass scale by China? Schaefer and Poffenbarger (2014) describe the primary foreign policy and strategic culture foundations of the BRICS states individually. This is done to search for both commonalities and contradictions among the BRICS membership. The existence of the BRICS as an international organization (IO) runs in opposition to traditional international relations theory on the formation of IOs. This IO exists with diversity across government type, level of development, geography, and international power. The BRICS also exist with serious bilateral tensions between some of the membership (Schaefer and Poffenbarger 2014).

2. Why the programmes do not account for the peculiarities of the relationships with the observers the list of which is open and is not ended by Iran; the relationships and effort coordination with the Shanghai Organization of Cooperation countries are not clear either.

3. Does economy modernization suppose transformations of social policy and building new institutions for the support of the economically active population?

4. How is it possible to combine the policy of cluster development in the regions with the attempts of replacement of industry modernization programmes for target (cross-industry) programmes of economy modernization? What is the role of agro-industrial system sectors' modernization in certain countries? The Joint Declaration of the 5th Meeting of the BRICS Ministers of Agriculture and Agrarian Development of BRICS Countries (2015) confirms the "interest in the development of agricultural research, science and technologies which play an important part in the agricultural production increase and productivity improvement, farmers' income growth and global famine scope reduction. Pursuing this target we are going to pay the largest attention and grant priority importance to various aspects of agricultural studies, including their conduct in field conditions".

Emergent economies such as the BRICS (Brazil, Russia, India, China, and South Africa) play an important role in the international economy. These countries are seen as areas of opportunity, not only for business but also for employment, predominantly nowadays with the economic and financial crisis in older developed regions, such as North America and Western Europe. The agricultural sector is determinant for the economic performance of these countries, namely because some of them are bigger, in terms of area and in terms of population. In this way it seems fundamental to analyze the dynamics of this sector in those countries and investigate the factors which influence their farming outputs (Pereira and Martinho 2014).

5. What are the controversies to be solved in the course of modernization? Innovation is the disaster for the manufacture which breaks the streamlined mechanism.

6. Is it right to believe that state corporations, state and municipal companies, joint-stock companies with the state share, joint ventures of BRICS member countries are the main "agents of modernization"? Can small venture business provide weighty assistance? Is there critical mass of civilized entrepreneurs in the countries? With over 1.2 billion people, India is the second most populous country on earth and currently the third largest economy in Asia behind China and Japan. While India is home to the third largest middle class on the planet, its income per capita at purchasing power parity is still ranked lowest compared to the other BRIC countries. India is a land of paradoxes, with remarkable high-technology, many world class companies like Tata, Arcelor Mittal, Suzlon or Reliance and a leading position in business process outsourcing. It is also the country where more than two-thirds of households and factories need to deal with power cuts almost on a daily basis and where four out of five people live on less than \$2 a day. The new Prime Minister Narendra Modi has the mandate and the agenda to launch new round of major reforms. He wants to establish a system with "maximum governance and minimum government" and advertises for "Make in India". If that works, India would become China's toughest competitor for foreign investment and global market share (Schaffmeister 2015).

7. Is the modernization of Russia possible at the expense of the raw-material system in the conditions of falling efficiency of oil and gas industry with a significant cost inflation and reduced production capital intensity and oil prices? It is necessary to depart from the populist idea of shift-over from the raw-material trend in the Russian Federation to deep conversion of oil and gas with the acknowledgement of the industry capable of development based on the innovation premises.

8. Is it theoretically possible to define the modernization aim tree in the conditions when the world economy is in the lowest point of all the known economic cycles (Kondratiev waves, Kuznets swings, Jugler cycles, Kitchin cycles)?

9. What are the prospects of economy modernization in case of erroneous modernization task setting? Can Russia set the global task of changing the GDP structure, shift accents from resource-based economy to the manufacture of technically and technologically complicated products? Should Russia conduct the policy of industry diversification reducing the share of fuel and energy system in the GDP; is it possible to change the present-day agricultural and trading structure of the economy towards a more technological and service side. It would be wrong to suppose that the fuel and energy economy sector is not science-intensive.

10. What are economic export solutions under the continued world financial crisis and economic sanctions?

11. How will the problems of engineering and technological cooperation be solved in real world with the remote location of Brazil and South Africa? Undoubtedly, there are profitable cooperation areas in South Africa on the expansion of the railway network, thermal power stations' upgrade, armaments etc.

12. In which direction will the strategy of socially oriented innovative development will be transformed in the "dormant giant" (Brazil) based on the claimed BRICS priorities? Is it possible to modernize the observer (Iran) based on the modernization democratic model or based on thee socio-cultural background and Islamic principles of business, Islamic banking, their application mechanics it is possible to speak of Iranian modernization model? Only one method of conduct is possible: authoritarian power mobilizing all the required resources; what are the tasks of the ruling elite on the modernization implementation?

13. What is the way to neutralize clan ties, corruption in making business decisions, state purchases *etc.* What is the mechanics of priority setting for BRICS country companies' participation in the state purchases of the partner countries?

14. How are the development areas and economic burden on the territories accounted for, primarily, in China? After more than 30 years of rapid growth, China's economy is increasingly faced with the bottleneck brought about by resources and environment. To achieve a sustained economic growth, more attention should be paid to the safety of the arable land, fresh water, energy, and other important resources. Great efforts should be made to transform the mode of economic development, adjust the economic structure, deepen reform, and expand opening-up. It is necessary to promote the transformation of the growth means characterized by ineffective utilization of resources and extensive expansion to the one characterized by intensive and efficient utilization of resources as well as quality and efficiency so that the economy and society are really going toward the track of scientific development (Zhang Zhuoyuan 2015). When a society transits to a new type of civilization, institutional innovation is indispensable to constantly regulate and accelerate the transition process (Ushakov 2011). During transition from farming civilization to industrial civilization, through institutional innovation, capitalism was created and improved. While the ecological civilization institutional system will not totally deny the industrial civilization, it will form and improve on the basis of industrial civilization and through continuous innovation (Jiahua Pan 2016).

15. What are the expected modernization results? Despite the biased nature of the world rating agencies, it is appropriate to track the changes in the countries' standings. There are three main centers to study the countries' competitiveness: Institute for Strategy and Competitiveness at Harvard University; Davos World Economic Forum and International Institute for Management Development. By the sum of all the indicators to be accounted for during rank setting, Russia took the 58th position, Brazil – the 72nd. The ranking is led by the USA followed by Switzerland, Denmark and Sweden (Davos Forum Solved the Competition Puzzle – access mode. 2015).

Conclusion

In terms of theory, if we acknowledge that social-market economy with the socio-cultural specific features is the model of industrial economy, we have to answer the question: what is the "ideal" model of economy of knowledge and which type of modernization to select. How will the model selected fit the expansion of the economy openness and, consequently, vulnerability to the world financial crises; degree of infrastructural transformations, including those in the bank sector, hereby, what is the share of banking sector which may fall on the Islamic

banking products, what is the sustainable small business sector and landmarks in the privatization policy. The reduced influence of the West in the world policy and economy, including the growing potential of China, India and Russia, independent foreign economic policy of a number of countries cannot but provoke the irritation of the USA. Among the newest concepts of the post-industrial development are the outlines of the green economy, of the creative economy theory based on the intellectual activity, this theory is characterized by the increase of the creative values in the society by means of the creative work development and establishment of favourable condition for its implementation.

The environmental situation in China is very negative, which constitutes a threat to public health, the preservation of the natural balance, and also addresses the problem of the political stability and international relations. Chinese applicants are increasingly showing interest in learning in undergraduate environmental management and an interdisciplinary Masters degree ambient environment.

Therefore, the BRICS countries are searching for their own way in the epoch of the geopolitical configuration change.

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Case Study on the Patterns of Irregular Expenditure in Tswaing Local Municipality of North West Province in South Africa

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Abstract:

This research was conducted in Tswaing local municipality which is one of the five local municipalities in the Ngaka Modiri Molema district. Tswaing municipality is made up of 15 wards with major towns such as Sannieshof, Ottosdal and Delareyville which is the capital territory. This paper further investigates the organisational management failures resulting to irregular expenditure in Tswaing municipality of the North West Province, South Africa. The Auditor-General posit that the major causes of irregular expenditure in the public organisations occur during the procurement of goods and services. The Public Finance Management Act, Act 1 of 1999 and the Municipal Finance Management Act, 56 of 2003 posit irregular expenditure as an unauthorised expenditure that is incurred in violation of what is not acceptable with the requirement of the legislations of any applicable legislation.

The paper contributes in establishing a link between organisational and management measures to reduce irregular expenditure in the Tswaing local municipality which may lead to improved audit opinions and service delivery. The study will further establish a link between organisational and management failures to irregular expenditures in the Tswaing local municipality. The study will also be useful in providing knowledge to policy makers, also in academia and the communities that are served by the Tswaing local municipality.

Keywords: organisational management; irregular expenditure; Tswaing local municipality; municipal finance management act; public finance management act; north-west province

JEL Classification: G28; H53; H72

Introduction and Background

The attainment of independence by South Africans brought some changes in the municipal governance as it is documented that it had a history of poor governance. Consequent to this change, the Constitution of the Republic was enacted which indicates the precepts by which the National, Provincial, and the Municipalities will be governed. The local municipality is placed by the Constitution as the third arm of government as it falls just below the Provincial government. This transformation introduced other Acts such as the Public Finance Management Act, Municipal Finance Management Act, Municipal Systems Act and the Municipal Structures Act that supported municipalities to raise own revenue and to make effective use of the available funds to ensure equitable service delivery.

In South Africa, there are 319 audits completed in the 2014/2015 financial year, 22 municipalities achieved a complete audit and eight municipal entities achieved clean audits (Auditor General 2014). This constitutes an overall 9% as compared to the 5% obtained in the 2012/2013 financial year. In 2012/2013 financial year to 2014/2015 financial year, it was recorded that only 30 clean audits were obtained from the 319 municipalities across the country. It is also noted that the 13 municipalities that obtained clean audit in the 2012/2013 financial year sustained their achievement competently (Auditor General 2014). Despite the commitment made by the government since 2011-2012 to achieve clean audit reports from the municipalities, the results have shown negative audit outcomes.

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The annual reports of South African municipalities have been criticized by the Auditor General. This is as a result of management failures that result to irregular and unauthorised expenditure; wasteful, fruitless and under expenditure (National Treasury 2014). According to DuBrin (2011), management can be regarded as an act of planning, organising, controlling, and directing business activities to achieve organisational goals. In this regard, it is deemed obligatory that the municipal workers should effectively manage the inflow and outflow of funds in the municipality to avoid failures which may result to irregular expenditure. Ensor (2011) attributes the management failures that result to irregular expenses as weakness in supply chain management, incompetency in handling information technology, lapses in human resource management and performance reporting. Scholars in municipal finance have different perceptions on the major causes of management failures resulting to irregular expenditure.

The purpose of this research paper is to investigate operational management roles and responsibilities towards the resolution of irregular expenditure in Tswaing Local Municipality of the North West province in South Africa. The concept of irregular expenditure dates as far back as 1994, as a result of the changing financial management systems and the global conditions in which we find ourselves within in South Africa. The concept of irregular expenditure was introduced during the adoption of the South African constitution in 1996 (National Treasury 2010).

This research was conducted in Tswaing local municipality which is one of the five local municipalities in the Ngaka Modiri Molema district. Tswaing municipality is made up of 15 wards with major towns such as Sannieshof, Ottosdal and Delareyville which is the capital territory. This paper further investigates the organisational management failures resulting to irregular expenditure in Tswaing municipality of the North West Province, South Africa. The Auditor-General posit that the major causes of irregular expenditure in the public organisations occur during the procurement of goods and services. The Public Finance Management Act, Act 1 of 1999 and the Municipal Finance Management Act 56 of 2003 posit irregular expenditure as an unauthorised expenditure that is incurred in violation of what is not acceptable with the requirement of the legislations of any applicable legislation.

In other countries, irregular expenditure has been viewed in different ways in order to achieve a clean audit report. In Kenya, the concept of irregular expenditure is defined as expenditure as well other than unauthorized expenditure incurred in contravention of the law and regulations (National Treasury 2014). According to a report from the office of Kenya's Auditor-General report 2013/2014, there also exist detailed irregular payments, unauthorized expenditures, diversion of funds, and in some cases, blatant plunder of public resources by government officials in the utilization of government funds. In Brazil, irregular expenditure is viewed as expenditure incurred in violation of the laws, regulations and code of conduct.

This study investigates the organisational management failures resulting to irregular expenditure in Tswaing municipality of the North West Province, South Africa. The Auditor-General posit that the major causes of irregular expenditure in the public organisations occur during the procurement of goods and services. The Public Finance Management Act, Act 1 of 1999 and the Municipal Finance Management Act, Act 56 of 2003 posit irregular expenditure as an unauthorised expenditure that is incurred in violation of what is not acceptable with the requirement of the legislations of any applicable legislation, as well as:

- Act (PFMA); or
- State Tender Board Act, 1968 or other regulations made in terms of that Act;
- Any provincial legislation providing for procurement procedures in that provincial government.

The Auditor General (2014) aver that three provinces failed to produce any municipality with clean audits. The provinces are the Free State, North West and Limpopo. The report revealed that, the Western Cape, KwaZulu-Natal and the Gauteng are the provinces that have the highest number of municipalities with clean audits. According to Auditor General (2014), irregular expenditures in municipalities in 2014/2015 remains a serious problem in the South African context. In 2015 South African municipal report, Tswaing Local municipality which is one of the five local municipality of the Ngaka Modiri Molema District Municipalities of the North West province of South Africa that have not achieved any clean audit in the past years. In a preliminary study, the financial statements of some entities were collected to scrutinise the level of irregular expenditure and achievement of clean audit reports. Also, the financial statement of Tswaing municipality was collected to show the level of irregular expenditure in the municipality.

Table 1 presents the audit report of government entities in South Africa while Table 1.6 presents the financial statement of Tswaing municipality showing the irregular expenditure from 2010/2011 to 2014/2015 financial years.

Table 1. Audit Opinions on all public sectors entities for 2010/11 financial year

Audit Outcome	National Government & Entities		Provincial Government		Local Government	
	2011/2010	2010/2009	2011/2010	2010/2009	2011/2010	2010/2009
Clean Audit Report	116	145	46	54	13	17
Unqualified Audit Report	163	119	140	153	114	149
Qualified Opinion	24	30	47	42	54	55
Adverse Opinion	3	3	1	1	7	7
Disclaimer Opinion	5	4	8	19	57	58
Outstanding Audit Report	5	2	29	11	38	51

Source: Accountancy SA (2012)

Table 2. Established irregular expenditure in Tswaing local municipality

Auditee	Audit year	Irregular expenditure	Cumulative irregular expenditure
Tswaing Local Municipality	2010/2011	6.644.604	6.644.604
Tswaing Local Municipality	2011/2012	16.501.082	23.145.686
Tswaing Local Municipality	2012/2013	49.295.192	72.440.878
Tswaing Local Municipality	2013/2014	12.085.714	84.526.592
Tswaing Local Municipality	2014/2015	6.693.623	91.220.215

Source: Financial department of Tswaing local municipality (2016)

According to Table 2, it is observable that there have been management failures in Tswaing local municipality as they have not achieved a clean audit report due to the irregular expenditure as obtained in 2010/2011 to 2014/2015 financial years. It is ostensible that the municipal finance management unit has been deviating from abiding with the legislative precepts as indicated by the Public Finance Management Act and the Municipal Finance Management Act. The problem persists and the situation is worsening as Table 2 confirms the cumulative irregular expenditure from 2010/2011 to 2014/2015 amounts to over ninety-one million rand. It is deemed necessary to conduct a research to know why there exist irregular expenditure in Tswaing municipality and to find soluble measures to arrest the deteriorating situation.

1. Aims and Objectives of the study

The study will contribute in establishing organisational and management measures to reduce irregular expenditure in the Tswaing local municipality which may lead to improved audit opinions and service delivery. The study will further establish a link between organisational and management failures to irregular expenditures in the Tswaing local municipality. The study will also be useful in providing knowledge to policy makers, also in academia and the communities that are served by the Tswaing local municipality.

The research objectives of this study are:

- to identify the context of irregular expenditure as defined by MFMA in Tswaing municipality;
- to identify the factors that results to irregular expenditure in Tswaing municipality;
- to establish the link between organisational management failures and irregular expenditures in the Tswaing local municipality;
- to examine the effects of irregular expenditure on service delivery and to proffer possible solutions to reduce irregular expenditure in Tswaing local municipality.

The research questions this study will seek to address are:

- What is irregular expenditure according to the Municipal Finance Management Act (MFMA)?
- What are the factors contributing to irregular expenditure in Tswaing Local Municipality?
- What are the link between organisational management failures and irregular expenditure in Tswaing municipality?
- What are the effects of irregular expenditure on service delivery?
- What are the current measures put by management to reduce irregular expenditure in the municipality?

2. Review of Literature

Local municipalities in South Africa raise revenue through own sources and through inter-governmental transfers. According to Pauw *et al.* (2013), financial management is a management strategy which an organization adopts to achieve its financial goals. The actualization of these financial goals entails analysing financial opportunities, evaluating investment opportunities and monitoring the financial implications of the investment. Furthermore,

Pauw *et al.* (2013) established three basic fundamentals of financial management as why, what and how financial resources can be effectively maximized and managed.

“Why should we manage the financial resources of the local municipalities?” This question in this category gives the municipality a guideline and a direction in getting involved in any financial activity. It should be clearly guided that the business aim of municipalities is to maximize profit and minimize cost in business opportunities, also to secure the available financial resources for the interest of the residents.

“What is the function of financial management?” This question helps to ascertain the basic function of financial management. Pauw *et al.* (2013) recognized the basic functions of financial management as assessing and sourcing of funds, making of sound strategies for management of finance, making of targets, measuring and evaluating of targets, presentation of results and remedial actions to deviations.

“How are the financial resources of the municipalities managed?” The process by which the municipalities manage their financial resources is determined by answering this question. The municipal managers and the accountants are expected to implement reasonable policies that will be able to guide municipal financial management, make good budgets, monitor budgets, raise technological standards, and make proper account on revenue and expenditure which will help the municipality to achieve their desired objectives.

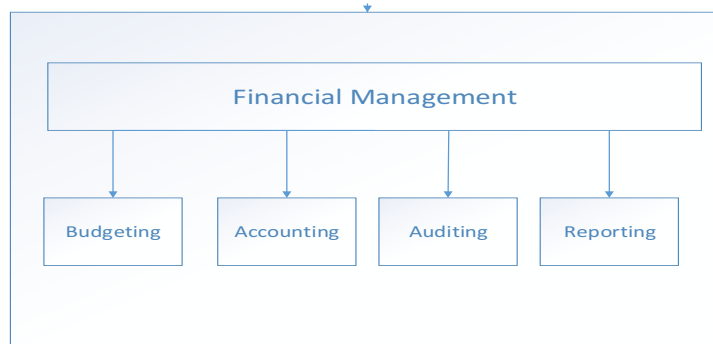
Fourie *et al.* (2011) asserts that municipal financial management is the aspect of management that ensures that the municipality raises enough funds from tax payers, make effective and efficient use of the funds, provide the needs of the citizens and account for the funds raised from the taxpayers. Furthermore, the fundamental function of the municipal financial management is seen to be sourcing of financial resources and making effective use of the sourced resources.

According to Banerjee (2015, 4) financial management is the act by which funds are acquired for the organisation. Also, financial management aids in making an investment decision and ensuring that investments are profit oriented. Continuing, financial management is a very sensitive aspect of the organisation because it enhances the choice of financial decisions, investments and dividend sharing. The maximisation of profit depends on the wise financial decision and investment by the top management of the municipality (Oberholzer 2011). Furthermore, it is a well-known fact that lack of financial management will have a setback in the service provision duties of the municipality.

Municipal financial management enables the municipality to source revenue to ensure that the basic needs of the residents are provided (Blore, Devas and Slater 2004, 3). Furthermore, the financial management functions of the municipality involve raising revenue for the municipality, making taxes reasonable and collection of taxes, service provision and subsidizing for the services, accounting for the financial resources and monitoring the financial resources.

Financial management is the aspect of management that ensures that the municipality gathers and makes use of the accrued funds in an effective and efficient way (Venkateswaran 2014, 93). Municipal financial management consists of four major important aspects namely, budgeting, accounting reporting and auditing. These aspects of financial management help the municipalities to manage their available resources effectively to ensure that the municipality will provide their traditional duties to the residents. Figure 1 below shows the link between financial management and its categories.

Figure 1 Aspects of Financial Management



Source: Adapted from Blore, Devas and Slater (2004)

Municipal budgeting is a planning activity that involves forecasting the expected revenue that will be mobilised by a municipality and anticipated expenditure in a given financial year (Blore *et al.* 2004, 91, Fourie *et al.* 2011, 122). Municipal budgeting represents a comprehensive corporate plan for financial control and an intensive guide to limiting expenditure in the financial management practice. Devas *et al.* (2008, 89) asserts that

municipal budget encompasses the necessary development plans that a municipality adopts in achieving its long-term and medium-term objectives. Furthermore, the content of the municipal budget may include the income and expenditure targets, the revenue sources, the expected expenditure, threats to budget objectives and combination of strategic networks for achieving the objectives (Devas *et al.* 2008, 89).

However, the budget provides a direction of expected income and expenditure for a financial year, in most developed countries, some municipalities hardly use budgets as a monitoring tool to achieve municipal effective performance. In Republic of South Africa, the Municipal Finance Management Act, (No 56 of 2003) states the contents of municipal budgets as the total expected revenue for the financial year, expected total expenditure for the financial year, expected revenue on each revenue source, and an information concerning amendments on the expected income and expenditure which will tend to effect the voted budget.

Municipal accounting is a process of recording, classifying, interpreting and presenting financial related information of the municipality over a period of time (Devas *et al.* 2008, 101). Municipalities receives funds from so many sources, it is the duty of the municipal accountant to record and present the financial receipts and expenditures made by the municipality. Hence, it is deemed necessary to employ a certified accountant for this task to ensure an effective record and performance. The prime objective of preparing a financial record is to ascertain the financial position of the municipality and to know the changes in the cash receipts and expenditure over time (Fourie *et al.* 2011, 546).

The preparation and presentation of a financial statement enable the entire public to know the flow of funds in the municipality and how credible they are in handling municipal finance (Fourie *et al.* 2011, 546). Municipal accounting enables the general public to have knowledge of the financial transaction of the municipality, enhances the public to compare the rate of income that is mobilised by the municipality and assist both the management and the public to ascertain the financial capacity of the municipality (Fourie *et al.* 2001, 547). MFMA Act No 56 of 2003, (Section 95) states the functions of the accounting officer as management of financial resources, recording of financial transactions, internal financial control and audit systems, and maintaining policies in accordance to the municipal financial transactions.

Auditing is a process of evaluating the performance of the financial effectiveness of a local municipality, also it examines the progress of the financial report with proper compliance with the judicial precedents and to provide a detailed financial report on the findings. The auditor examines the financial report prepared by the municipal accountant to ensure that the content conforms to the policy of the municipality (Devas *et al.* 2004, 105). Auditing helps to reveal management fraud, incompetence, progress, threat and other sensitive information contained in the financial report.

The Municipal Finance Management Act, No. 56 of 2003 states that the auditor general is responsible for auditing the municipal financial reports at the end of every financial year. Municipal financial reporting is the process by which the municipal financial officer issues out a reliable information on issues related to finance. This financial report gathers adequate information on receipt of funds on each financial source and the total expenditure by the municipal financial management (Blore *et al.* 2004, 127). The revenue performance, the assessed income behaviour and the expenditure by the municipality should be recorded and reported regularly, monthly or quarterly and submitted to the management for scrutiny. Continuing, there is a need for adequate financial information on the flow of funds in the municipal administration to enhance effective and efficient decision-making in a dynamic environment (Devas *et al.* 2004, 48).

In republic of South Africa, the Municipal and Finance Management Act no. 56 of 2003, (section 121), states that every municipal financial officer must prepare a financial report at the end of every financial year. Continuing, the (MFMA) states that the purpose of the financial report is to provide a detailed financial report on income and expenditure, provide an analysis of budget and financial performance, and promote the object of accountability. According to Fourie *et al.* (2011, 530) municipalities must ensure that their financial report must be presented at every financial year because it will help to communicate financial transactions made by the municipal financial management to the public thereby enhancing confidence therein.

3. Research Methodology and Data Source

Six financial executives of the Tswaing local municipality were selected and interviewed for this study. These executives include the municipal accountant, the municipal manager and the internal auditor. According to Gray (2014, 146), in order to know the attributes of the entire population, sampling is applied whereby subsets within the population are selected and examined. Bhattacharjee (2012, 66) upholds that sampling in a study should be carried out such that the study result will epitomize the real features of the entire population. In a research study,

sampling is carried out to know the characteristics of the population which helps to reduce expenses, save time and to evade the inconveniences of continuous appointments with the population group (Gray 2014, 146).

This study adopts a non-probability method of sampling known as the purposive sampling. Bhattacharjee (2012, 70) posit that a non-probability sampling method entails selecting respondents in the study where the opportunities of selection cannot be adequately determined because of the non-randomness in selection while Gray (2014, 145) affirms that a non-probability sampling method does not involve chance selection but a personal judgment of the researcher. The purposive sampling method was adopted in this study.

This study used the qualitative research method. Bryman and Bell (2015, 391) affirms that a qualitative research is the collection of non-numerical data using designs such as participant observation, phenomenology, or case study to interpret results in a narrative or descriptive accounts. This study adopts the qualitative approach based on the following reasons:

- 1) Assists the researcher to acquire a thorough understanding of the phenomenon under investigation;
- 2) It enables the researcher to interact with the municipal financial workers through interviews, thereby gaining extensive information regarding the occurrence of irregular expenditure in the municipal accounts;
- 3) It enables the researcher to obtain the historical account of the occurrence of irregular expenditure and the seek solutions to halt the deteriorating situation.

It supports the researcher to presents the findings in a narrative account thereby establishing the central ideas and discussing these ideas consequently.

4. Results of the Study

This section provides results and discussion of the study. We begin with the biographical information of the participants as well as the summary of findings obtained through the empirical studies which was done according to the research objectives.

Biographical information of the participants

The study revealed that the majority of the participants are above 40 years; majority of the participants are blacks while majority of the participants indicated that they have worked in the finance department for more than 17 years. Also, the highest academic qualification obtained by the majority of the participants is undergraduate diploma with no additional qualification.

The managerial implication of this is that the financial executives should strive and undertake additional training or courses in the area of financial management since the highest qualification of the majority of the participants is undergraduate diploma.

The context of irregular expenditure as defined by MFMA in Tswaing municipality

The findings portray that the participants acknowledged that irregular expenditure are all expenditures made in contravention obtained in Public Finance Management Act, Treasury Regulations, and National Treasury Instructions which are in terms with Section 18(2) (a) of the Public Finance Management Act or any other financial regulations. The participants further understand irregular expenditure as a result of spending municipal funds personally without due consultation of the necessary financial officials.

The managerial implications portray that the municipal financial workers should not involve in any kind of expenditure that is in contravention of MFMA or any financial regulation. The findings in this section further indicate that the municipal financial workers should conduct proper variance analysis, consult other executives before incurring other financial expenditure as it is obtained in the Modified Cash Standard in order to achieve a clean audit report.

Identify the factors that results to irregular expenditure in Tswaing municipality

In this category, the study moved further to inquire the factors that causes irregular expenditure in the local municipalities. The findings disclosed that the financial workers do not strictly follow the competitive tender process bids in procuring goods and services; do not follow procedure in spending public funds as the cost of some goods and services exceed the benchmark values, also variations exist in the procurement of goods and services and other compliance issues such as the inability to strictly comply with the treasure regulations and other fiscal regulations.

The managerial implications of this finding imply that the municipal financial employees should strictly follow the aforementioned factors in order to achieve a clean audit report. The findings indicate that the financial

employees should be law abiding to follow the prescripts of the financial regulations especially in following tender bid process and avoiding variations in the procurement of goods and services.

Establish the organisational management failures that result to irregular expenditures in the Tswaing local municipality

In this category, the findings as obtained from the participants indicates that irregular expenditure is caused as a result of inability to conduct adequate internal control measures, benchmarking, budgeting, risk management, auditing, financial reporting, adequate planning, and other human resource issues. The findings further revealed that the link existing between organisational management failures and irregular expenditure is poor service delivery to the residents due to wastage of public funds which are meant for service provision and upgrade of infrastructure.

It is advisable; therefore, that the financial executives of the Tswaing local municipality should conduct internal control measures and all the aforementioned factors to avoid incurring irregular expenditure. More so, since it is deduced that the link between irregular expenditure and organisational management failures is poor service delivery, the financial executives should strive to implement possible measures to avoid incurring irregular expenditure in order to provide adequate services to the residents as constitutionally mandated.

Possible solutions to reduce irregular expenditure in Tswaing local municipality:

The findings indicated by the participants show that the following could be implemented to reduce the incurring of irregular expenditure: implementation of variance analysis, budget controls, risk management and risk control measures, expulsion from work, disciplinary actions, instituting a monitoring committee, make agreements with culprits to recover expenditure and to report to SAPS for prosecution.

The managerial implication of this finding indicates that the management of Tswaing local municipality should be very strict in matters related to income and expenditure of municipal funds. The internal financial control measures should be very strict and transparent. In the case of fraud or attempts to commit fraud, the municipal executives should take up the matter to ensure that it will not result to irregular expenditure, in extreme cases, the culprits should be sanctioned.

5. Analysis and Discussion

Legislative background of municipal financial management

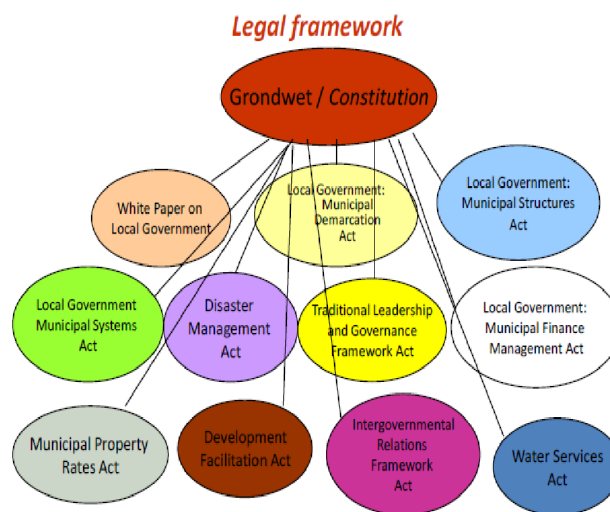
Prior to the attainment of independence by South Africa in 1994, several laws and Acts were promulgated to foster the pace of effective financial management in all the municipalities in the country. These frameworks are the government guidelines to improve effective and efficient municipal financial management (Khalo 2007). The Constitution of the republic of South Africa established the framework at which the local municipalities control the activities and overall functions of local government. The Constitution of the Republic of South Africa therefore, forms the base or framework at which other municipal legislations exist. The municipal governance as preserved in the Constitution of Republic of South Africa sustained by other Acts namely; the Municipal Structures Act, Municipal Systems Act, Municipal Finance Management Act and the Property Rates Act. Ababio (2007) assert that these municipal legislations buttress the financial management objectives and frameworks of the municipalities and to ensure sustainable financial stability within the spheres of the municipality.

The Constitution of the Republic of South Africa

According to Pauw *et al.* (2009), the Constitution of the Republic of South Africa forms the base of the municipal finance framework in South Africa. It is to note that when disputes arise between the different spheres of government or in the municipalities and between different stakeholders regarding municipal financial management issues, the provisions made by the Constitution will provide a guide. Section 152 restrains the local government to attempt, within its financial and administrative capacity, to provide adequate services to the communities in order to pursue its fundamental objectives. With regard to this provision, an accountable government must be provided for the local communities (Ababio 2007). In the Constitution, numerous facets of municipal finance are discussed which includes the principles of municipal financial management and administration in section 195(1) and the municipal budget, revenue and expenditure in sections 160(2), 215 and 227 (Khalo 2007). Figure 2 presents the several legislations that emanated from the Constitution.

Other municipal legislations which supports the Constitution in the management of municipal finance are discussed below.

Figure 2. Background of South African municipal legislations



Source: Wilgenbus P (2014)

Municipal Finance Management Act (Act 56 of 2003)

The objective of this Act is to enhance economic development in the local municipalities through proper financial management. Additional contents of this Act include promoting an effective financial management, proper implementation of sound budgeting, corporate governance; sustainability of service delivery, proper planning, accounting, and reporting of financial activities of the municipalities. The Municipal Finance Management Act provides the basis for proper financial management philosophies, practices, norms and standards in the local municipal sphere (Ababio 2007, Khalo 2007). The Municipal Finance Management Act is aimed to transform the local municipalities in South Africa to become more participatory, transparent and accountable. Khalo (2007) and Fourie and Opperman (2011) posit that the key aim of this Act is to govern and to guide effective municipal financial management by establishing ethics for efficient categories of duties, municipal budgets, financial statements and management of revenues, expenditures, assets and liabilities and the handling of all financial dealings of municipalities and municipal entities. The MFMA took effect on 1 July 2004 (National Treasury 2004).

The Municipal Finance Management Act contains 16 chapters. Chapters 4, 7 and 8 will be explained to suit the purpose of this study:

- i) Chapter 4 expressed all the matters relating to the municipal budgets, as well as content, funding and approval, responsibilities, capital projects, adjustment budgets and unauthorised, irregular or fruitless and wasteful expenditure.
- ii) Section 53 and section 54 which are found in chapter 7 specifies the responsibilities of the mayor related to the budget processes and budgetary control as well as early identification of financial problems.
- iii) Sections 62 and 65 which are found in Chapter 8 of the MFMA, the Chief Financial Officer (CFO) is to assist the municipal manager to carry out the financial management duties which include budget formulation responsibilities and preparation, financial reporting, implementation and internal control procedures.

In sections 62–70 the Municipal Finance Management Act supports the accounting officer to manage the revenue and expenditure, assets and liabilities, cash and banking, investments, borrowings, including the formation of suitable internal controls and financial management systems, subject to certain delegations of responsibility. The responsibility of the Chief Financial Officer for internal control arises from the delegated authority received from the accounting officer. The Chief Financial Officer must provide the leadership and the necessary guide to realise adequate financial management practices by applying applicable policies and managerial procedures.

The Municipal Finance Management Act (Act 56 of 2003), Sections (64) (1) posit that the municipal financial accountant is responsible for the management of the municipal revenue. Also, Municipal Finance

Management Act (Act 56 of 2003), Sections (64) (2) states clearly the duties of the municipal accountant as follows:

- i) A collection of municipal revenue to conform to Section 95 of Municipal System Act and other debt collection policies guiding the municipality.
- ii) Calculating and reporting the municipal revenue on a monthly basis.
- iii) Ensure that surcharges and interests are charged in the municipal payment arrears or debts except where there is an indication by the municipality for exemption.
- iv) Ensure that the revenue collected by the municipality and or other revenue collecting agents are being reconciled on a weekly basis.
- v) Ensure that the revenue collected by the municipality is calculated and presented every month.
- vi) Ensure that the revenue collected from each section of revenue target are being paid into the municipal working account.
- vii) Ensure the maintenance of municipal information system and accounting, recognising revenue when it is earned, accounts for receipt of revenue, and accounts for debtors.

Other relevant functions of the municipal executives are:

- *Municipal managers*: The municipal managers serve as a link between the municipality and the councillors. They ensure effective financial management and accountability in the municipality. Also, they make recommendations and reasonable financial advice to the councillors.
- *Auditor General*: The Auditor-General ensures that the annual municipal financial accounts are reconciled by engaging in proper auditing and presenting the audits in the annual financial accounts.
- *Councillors*: The financial issues of the municipality is handled and monitored by the councillors. The councillors make sure that the municipal finances are utilised effectively.
- *Treasurers*: The municipal treasury is entrusted with the rights to make and implement the annual budgets of the municipality, ensure that the municipal revenue is not mismanaged.

[Municipal Structures Act \(Act 117 of 1998\)](#)

According to South African Legislation, the Municipal Structures Act (Act 117 of 1998) established the main criteria of grouping the types of municipality ranging from the population of the particular area to its functions. The Municipal Structures Act (Act 117 of 1998) grouped municipalities into A, B, and C categories. Category 'A' municipality is known as the metropolitan municipality; category B municipality is known as the local municipality while category C municipality is referred to as the district municipality.

The metropolitan municipalities are types of municipalities that have self-standing authority in its area of jurisdiction and falls at the second level of an administrative level just below the provinces. The areas that have category A' municipalities are areas of high population and places that are comprehensively developed. Category A municipalities are distinguished by high movement of goods and services, great industrial areas with multiple business districts, a place for higher economic activity, a place for integrated development and having interdependence for social and economic linkages between units. According to the Municipal Structures Act (Act 117 of 1998), the areas that do not meet up with these standards will fall under category B and category C municipalities.

The Municipal Structures Act (Act 117 of 1998) further state that regions that are not capable of having metropolitan municipalities must be awarded a district municipality. District municipalities (category C municipalities) shares authorities with the local municipalities (category B municipalities) and have greater authority and control in areas that have more than one category B' municipality just within the area that it falls. They have executive and legislative authority and share in common the functions and duties of a local municipality.

Local municipalities (category B) shares same municipal executive and legislative supremacies in its area with district municipalities within whose area it falls. The Local Government Municipal Structures Act (Act 117 of 1998), Sections 9 (a-f) specifies that category B municipalities are municipalities with collective executive system, ward participatory system, mayoral executive system and plenary executive system.

The Municipal Structures Act, 1998 (Act 117 of 1998) indirectly directs the municipal financial management as it specifies that the executive committee must endorse the direction the municipality should adopt to address the needs of the community via the integrated development plan. Furthermore, it recommends the estimated revenue and expenditure for the Medium Term Revenue and Expenditure Framework (MTREF) (Ababio 2007). The Local Government: Municipal Structures Act also stipulates that a system of delegations

should be established to exploit administrative and operational effectiveness (Van der Walt 2007). Municipal Structures Act regulates the context and the situation which the municipalities must manage their finances. An appropriate division of powers and functions between the different categories of municipalities is also specified in the Municipal Structures Act (Fourie and Opperman 2011, 6).

White Paper on Local Government

In 1998 the White Paper on Local Government specified how the municipalities should incorporate the various development planning programmes with community-based objectives and necessities. The White Paper on Local government equipped the municipalities on the adequate legislations for long-term financial management solutions for the various financial challenges municipalities were experiencing. Pauw *et al.* in Ababio (2007) specified that planned legislation is highly needed to restore financial discipline, eliminate the ever-increasing consumer debt and to generate the necessary cash flow, also to foster the developmental plans of municipalities.

Municipal Systems Act (Act 32 of 2000)

The objective of this Act is to establish good and cordial relationships between the municipality, administrators and the members of the community. It made provision for the municipalities to control credit and collect debts; monitor standards and establish frameworks for support to ensure that municipality financial position would function effectively. This Act is viewed as the basis at which the new local government system is founded. The Municipal Systems Act specifies the principles which the municipal managers will adopt to manage the internal systems. It also stipulates the duties of the administration of the local municipalities to enhance development and to empower municipalities to deliver basic services and to embark on their economic developmental activities (Van der Walt 2007, Fourie and Opperman 2011).

In Sections 73(2) of the Municipal Systems Act, it explains the contents of the Constitution which enshrines the municipalities to deliver equitable and accessible services to the residents. In Sections 74 and 75 of the Municipal Systems Act, it explains the requirement for a tariff policy for levying of fees for municipal services and section 96 stipulates that municipalities must collect all monies due and payable to them and a credit control and debt collection policy needs to be approved by Council and be promulgated as a municipal by-law.

It should be noted that a loose link exists between the MSA and other legislations, particularly the Municipal Finance Management Act. In both Acts, it should be noted that the budgeting procedures, supply chain management, the responsibilities of the stakeholders are explained which makes them to be complementary. These sections must be read together to get a clear understanding of the intent and application of the acts (Fourie and Opperman 2011).

Meaning of irregular expenditure

As noted in the background of the study, irregular expenditure is regarded as the contraventions of financial expenses obtained in: PFMA, treasury regulations, National Treasury instructions in terms of Section 76 of the PFMA, provincial Treasury instructions issued in terms of Section 18(2)(a) of the PFMA; or any other relevant legislations

The Municipal Finance Management Act defined irregular expenditure as any kind of expenditure which is incurred in contravention with or is not compliant to either the MFMA, the MSA or the Remuneration of Public Office-Bearers Act, 1998 (Act 20 of 1998) or the expenditure which is incurred in contravention of the supply chain management policy/by-law of the municipality. Furthermore, Irregular expenditure may also be incurred when an official spends public funds without informing the officers involved in the spending of public funds, while the expenditure should not be regarded as unauthorised or fruitless and wasteful expenditure in the organisation (Pauw *et al.* 2009, 43).

According to the findings obtained in paragraph of the 2011 Draft Management letter by the Auditor General in 2011, it revealed that R32,50 million expenditures was spent due to non-compliance with the Municipal Supply Chain Management Regulations of the MFMA, 2005 (National Treasury 2005b). It is observed also that in 2010 financial year, the total of R95, 24 million was mentioned to in the audit report as non-compliance with the Municipal Supply Chain Management Regulations. The total of 12 findings in the 2012 audit report as regards the non-compliance with the Municipal Supply Chain Management Regulations clarify the worth of irregular expenditure as R147,74 million spent in the past financial year (Auditor General 2012).

The Auditor General specified in his North West MFMA 2009–10 General Report (2011b, 17) that despite the fact that supply chain management policies are in order, there is the lack of enforcement and monitoring of compliance with the supply chain management policies by the management which results in the irregular

expenditure incurred by several municipalities in South Africa. Basic controls such as proper record keeping, risk assessment and internal monitoring are lacking and this lack of internal control leads to inefficient contract management and irregular contract amendments, extensions and renewals.

More than 60% of the local municipalities in North West did not submit their financial documentation to the Auditor-General's office on time. Twenty-three municipalities in the North West (N.W.) were reported to have failed achieving a clean audit during the 2013/2014 fiscal year. The report further paints a disturbing picture of high levels of unauthorized, irregular, wasteful and fruitless expenditure, the disappearance of tender documents, unfair and non-competitive procurement, and lack of provision of adequate services such as water and sanitation. The reports on irregular, fruitless, unauthorised, and wasteful expenditure are shown in the ensuing Table 3 below.

Table 3. Municipal Expenditures in the North West Province: 2012/2013/2014

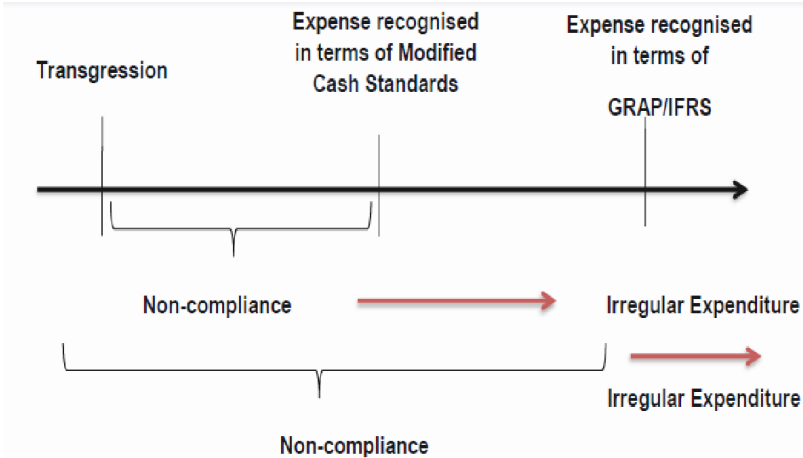
Nature of expenditure	2013/14	2012/2013
Unauthorized expenditure	R4.3bn	R6.3bn
Irregular expenditure	R10bn	R4.7bn
Fruitless/ wasteful expenditure	R260m	R253m
Total	R14.6bn	R11.3bn

Source: Daily Maverick 2014

In the North West Province, poor planning was cited as the major cause for such high irregular expenditure hence impacting negatively on sustainable service delivery. To this background, two municipalities in the North West were placed on administration in 2014 (Makwetu 2015). It is also acknowledged that basic municipal services were poor.

According to the Updated Guideline on Irregular Expenditure (2015), irregular expenditure is linked to the financial expenditure made in an organisation without consenting to the available legislations or without recognising the principles as obtained in the Modified Cash Standard. Figure 3 presents the non-compliance and recognition of irregular expenditure.

Figure 3 Non-compliance and recognition of irregular expenditure



Source: Updated guideline on irregular expenditure (2015)

Figure 3 explains the relationship between non-compliance and recognition of irregular expenditure as observed in paragraph 5 and 6 of the Updated Guideline on Irregular Expenditure (2005). The diagram shows that, if non-compliance is corrected or condoned on any expenditure sustained in terms of the appropriate accounting principles, such a transaction, condition or event will not result in irregular expenditure.

Cases of irregular expenditure

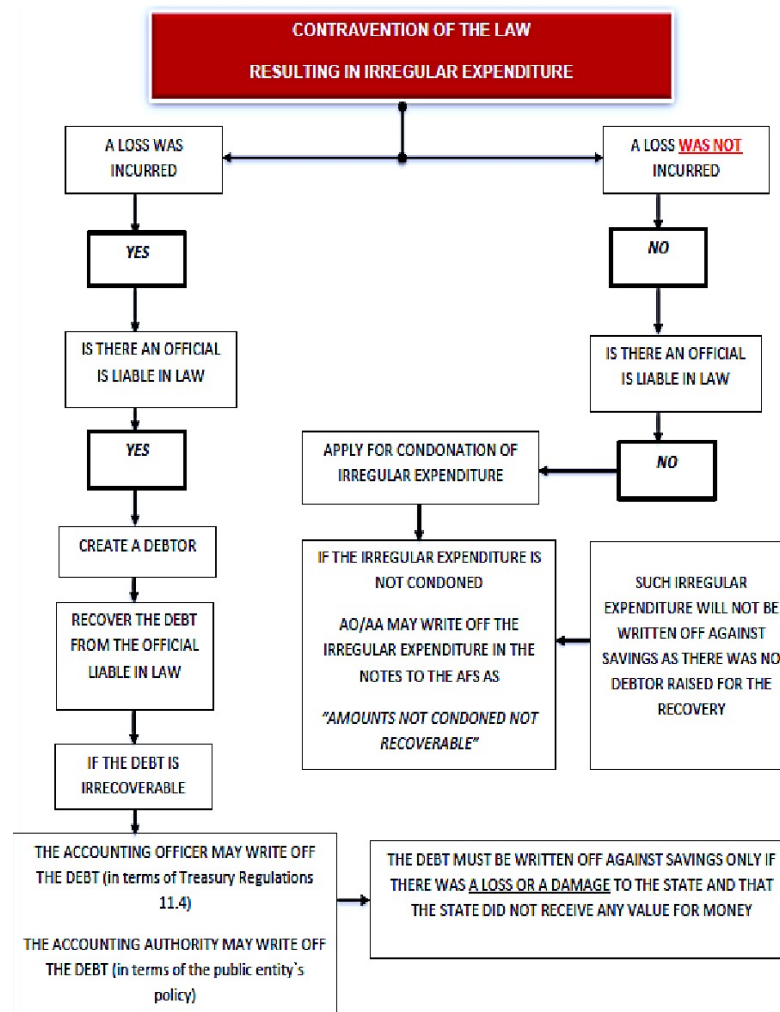
Table 4 provides the examples of irregular expenditure as obtained in Sections 35 of the Updated Guideline on irregular expenditure (2015).

Table 4. Examples of irregular expenditure

Categories of irregular expenditure	Authorities responsible
Irregular expenditure can be incurred as a result of inability of departments, organisations, trading entities and institutions to comply with the treasury regulations or to incur expenditure in partnership with other entities without written approval of the designated authority	National Treasury and the provincial Treasury
Irregular expenditure can be incurred as a result of the procurement of goods and services by departments, organisations, trading entities through price quotation and where the where the worth of the purchase exceeds the benchmark values as determined by the National Treasury for price quotations. (Contravention of Treasury Regulation 16A6.1)	The National Treasury
Irregular expenditure can be incurred in organisations and institutions as a result of obtaining goods and services through competitive tender process bids and where the reasons for avoiding the competitive bids has not been explained or written down by the relevant accounting officer (Contravention of Treasury Regulations 16A6.4)	The Accounting authorities
Irregular expenditure can be incurred as a result of the inability to comply with the requirements of the institution's legislations in terms of PFMA. Overdue performance is inappropriate, <i>i.e.</i> An accountant or officer approving R50 000 while his limits is within R40 000.	Accounting authorities
Irregular expenditure may be incurred as a result of inability of departments to comply with the provisions as provided in the available legislations.	The Departments responsible for the transactions

Source: Updated guideline on irregular expenditure (2015)

Figure 4. Step by step approach in the treatment of irregular expenditure



Source: Updated guideline on irregular expenditure (2015)

According to Figure 4, it is observable that a debtor is created when an officer has been found liable in incurring an irregular expenditure of which a loss is incurred. The said expenditure should be recovered from the officer and if it is deemed irrecoverable, the debt should be written off in terms of the Treasury regulations. Consequently, when a loss was not incurred and if there is no officer liable in law, application for condemnation of the irregular expenditure should be made. In a case where the irregular expenditure is not condoned, the Accounting officer may write off the irregular expenditure. It should be noted that debts occurring in the irregular expenditure should be written off against savings if there is no loss or damage to the state and if the state did not receive any value for money.

6. Management Failures Resulting to Irregular Expenditure

In the organisation, managers and sectional managers assume the responsibility to set targets and achieve the relative targets that are set in the budget, in the case of occurrence of variances, managers have to implement reasonable action to put the organisation back to action. The real resources used are measured to the budgeted resources and the calculated adjustments are used to measure the performance of the manager as well as the responsibility centre. The implementation of the variance analysis assists the organisation in changing the activities to achieve expected budget or to revise their objectives (Lanen *et al.* 2011). According to Fourie and Upperman (2011, 12), the major causes of irregular expenditure may be lapses in the budgetary control by the authorities. This section explains the link existing between budgetary control, internal control, risk management and irregular expenditure.

Fourie and Opperman (2011) aver that adequate budgeting, internal financial control and risk management are the most essential tools to achieve municipality's service delivery plans. In implementing the Integrated Development plan, the annual budget serves as an essential tool which is regarded as the main strategic tool of the municipality. Fourie and Opperman (2011) posit the annual budget to be designed in a way to assist the organisation in the planning, co-ordination and control of the numerous functions and activities of the municipality. Budget control is seen as "the watchdog" to make certain that what is budgeted for a specific activity or function actually is achieved within the context and timeframe planned. If discrepancies are recognised which are extensive that future service delivery could be negatively affected, remedial actions are expected to be effected. According to Ensor (2011), the management failures that result to irregular expenditure include as weakness in risk management, supply chain management, lapses in human resource management and performance reporting.

Risk management

Stanleigh (2016) posit risk management as the identification, analysis, control and extenuation of risk exposure in relation to specific organisational goals. Risk management is further classified as a proactive control of possible events or risks in the organisation. Wyman (2007) states that the simultaneous demand for faster growth and stronger governance are forcing municipalities especially in the current economic environment to determine how much risk they want and are able to take. According to Wyman (2007), many municipalities do not fully consider the level of risks they are able and willing to take. It is certain that municipalities must take risk in order to generate returns, but the amount of risk that organizations take is often set as a result of strategic decisions, and not as an input to these decisions (Wyman 2007).

Municipalities have risk appetite that is quantified more formally, but according to Wyman (2007), these municipalities do not make a full linkage to the evaluation of their strategic options. It should be noted that the risk appetite is primarily formed on the basis of managerial instinct. This approach is very dangerous and can be severely damaging for organisations in the current economic and corporate environment. Wyman (2007) further states that organisations have to create a formal risk appetite framework to help them make and defend decisions on how much, and what sort of, risk they should take in order to avoid wasteful and irregular expenditure.

Municipal risk management is a comprehensive and integrated framework for managing risks in order to maximize the municipality's value (Chapman 2006). Risk management is essential concern for organisations that want to grow and survive in the business environment. In order to keep a competitive advantage, organizations should identify risks and then find a way to moderate the risks that possess to hinder productivity. Risk management assists organizations in making the appropriate decisions without the negative and damaging results that may have occurred in absence of the proper research (Gitman 2006). Stanleigh (2016) states that in order to achieve maximum profitability, municipalities should consider and evaluate necessary risks and return. Without proper evaluation of risk in the business environment, organisations are bound to make wrong decisions, which will disrupt achieving the goals in both the long run and the short run curves (Gitman 2006).

The implementation of risk management has aided the municipalities to reduce unexpected, irregular and wasteful expenditures in the allocation of resources. It advances communication and provides senior management with a concise summary of threats, which can be faced by organisation, thus helping them in better decision making. In the organisations, strategic risks are the risks which emanate from directors' decisions concerning the organisation's goals. According to the Institute of Risk Management (IRM) (2002), good risk management focuses on the identification and treatment of risks. In this way, it helps the organization to understand the potential risk factors that can affect the organisation. The IRM (2002), opines that risk management reduces the probability of organisational failures and the uncertainties in achieving the organisational goals. In this regard, municipalities that fail to conduct adequate risk management forecast are bound to incur irregular expenditures which will have a negative effect in achieving a clean audit.

Budget formulation

Vanderbeck (2010) affirms that budgeting is an art of planning used by organisations to assist in setting organisational goals. Brock *et al.* (2007) extends the context of budget by including a particular period of time to the calculated plan. CIMA study guide (2009) posit budget as a comparison of a forthcoming accounting period to a forecast that is viewed to be an estimate of what is likely to happen in the nearest future. The budget can be regarded as a road map that specifies the way to organisations as well as alerting them when they depart from the scheduled route (Vanderbeck 2010). Furthermore, Brock *et al.* (2007) refer to the budgeting process as a very essential part of cost accounting.

Coombs *et al.* (2005) see the planning process on several levels which are tactical, strategic and operational levels. The planning made at the end of the financial process is referred to as budgets though at the strategic and tactical stages the term financial planning is preferred. A budget as an essential business activity which should be made by the top management of the private and the public sectors. In the private sector, if a master budget is prepared, it is viewed as seen as the general organisational plan for the next financial year which consist of the objectives of the organisation (Lanen *et al.* 2011). The general budget and planning procedures in the South African Municipalities is comparable as it consists of a five-year plan, the IDP, a three-year MTREF budget and the actual one-year SDBIP.

It is viewed that municipalities prepare budgets for diverse reasons of which co-forecasting of future risks, organisation of activities, the review of the objectives of the organisation which are communicated to staff, motivation of current staff to achieve the desired targets, even allocation of financial resources to all the department, and performance evaluation are seen as the most important reasons for budgeting (Adams *et al.* 2003).

The process of budget in local municipalities

Pauw *et al.* (2009) affirms that a public sector budget is a financial road-map for work related activities to be done in the interest of the public. The municipal budget estimates the expected revenue to be earned and the expected expenditure to be made as well as authorising certain expenditures" In South African local municipalities, the municipal budget serves as a manifestation of the masses' desires which makes it to be binding whenever it is approved. Furthermore, the budget specifies the specific objectives of the municipalities as it specifies the programmes that is to be funded within the sphere of the local municipality. The budget predominantly set limits to which financial expenditure should be made and set targets on how to generate revenue (Lanen *et al.* 2011). Since the public sector is owned by the public, the various objectives of the public must be clearly stated in the budget, though municipalities are envisaged to provide quality services to the residents and not to make profits (Coombs *et al.* 2005). Also, the public sector budgets have to be made in a way that it will support the municipalities with the planning, co-ordination and control of the different activities to ensure efficient service delivery (Fourie and Opperman 2007).

Pauw *et al.* (2009) posit that a distinction should exist between the budgeting process and the budget cycle in the municipalities. The budgeting process indicates the various procedures and processes which is determined by the current legislation to set up the budget and to get it endorsed in chamber. All the viewpoints required in budgeting from the planning stage until the approval stage, are incorporated into the budget cycle.

The budgeting process are the standards connected in the budgeting procedure in the national and provincial government however, few perspectives remarkably attribute in distinctive way of local municipalities. Budgeting and the planning process should be incorporated by guaranteeing that the capital and operational spending plan is connected to the revenue and expenditures as contained in the IDP. The IDP is a five-year key

advancement or strategic plan to improve to planning, development advancement and administration in the local sphere of governance (Pauw *et al.* 2009).

Maphiri (2011) clarifies that, taking after a conventional method of budgeting by the developed countries, in the most recent two decades, South African municipalities has set out on a change of the budgeting process. The view point is to enhance productivity and viability in service delivery. Government at first began with detailed budgeting to guarantee control over contributions and in addition, changes to upgrade financial train and controls to ensure that financial expenditure will remain within the budget. In this regards, the various departments need to submit each departmental budget, key planning activities which involves the needs that are to be addressed in the budgeting process. These arrangements must be adjusted to the government general key plan. The last change is the presentation of the performance budget plans where the accentuation is put on yield and result construct measures and less concentration in light of information based measures. The last budget reform stage is not completely accepted in South Africa as non-financial related execution displayed as a supplement to budgetary data and the reviews done by the Auditor General are likewise predominately done on financial information sources and less on the service delivery outputs and results. In 2006 budgetary year the Auditor General initiated phasing in performance audits.

National Treasury sets up the budgetary guidelines to ensure that the three arms of government do not deviate from their budget focus (Pauw *et al.* 2009). The budget reform process was impacted to the municipal government through the rules gave by and the phasing in performance audits as directed by National Treasury in MFMA Circular 28, dated 2005. The Municipal Budget and Reporting Regulations, 2009 also contain the format and tables in which the budget information regarding the annual and adjustments budget must be completed (Fourie and Opperman 2011).

The Municipal Finance Management Act opined that the Municipal mayor should guide and co-ordinate the budget procedure and must guarantee that the financial expenditure agrees to the spending requirements and be submitted to chamber for endorsement as per a planned time-table affirmed by the house. The budget must be presented in an approved format by the National Treasury, comprising of an operating budget that sets out the revenue and expenditure for three years (MTREF) and a capital budget, which is in accordance with the IDP (Van der Walt 2007, 63). The community and all the stakeholders which are involved in the budgetary process should be counselled before the budget is endorsed by the legislature. The participatory process should be highly enabled and it should be obligatory that the provision for financial outlay to fund some capital projects should be made. The needs of the women in the society, disabled and the disadvantaged should be competently addressed (Fourie and Opperman 2011).

The legitimate structure regarding the budgetary procedure, the National Treasury in every year issues a Municipal Budget Circular giving direction to districts on how to prepare annual budgets and MTREF. The national needs, inflation forecasts and also direction with respect to applicable key issues for the particular year, for example, planning with the expectation of complimentary essential administrations, optional spending portions, electricity tariffs, are contained in these directives. Tariff increments of the municipalities higher than the inflationary forecasts must be disclosed in detail to National Treasury, in spite of the fact that its endorsement for the budget is not required.

However, it is unfortunate that there exist some issues encountered in the budgetary systems in South Africa. In spite of the fact that the municipal budgetary process is underpinned by the MFMA and the annual MFMA guidelines, the budgetary process is not generally followed as a guide hence the needs of the communities are not always addressed in the annual budgets. In this regards, Tswaing local municipality should ensure that the budgetary process is recognised to avoid incurring irregular expenditure during the financial year.

Importance of budgetary control

Leitch (2003, 2) affirms that budgetary control is any measure used by the management to set efforts, to quantify these objectives against the real results and to direct the employees to abide with the due legislations to achieve the set goals. Spending plans, additionally a blend of monetary and non-money related targets, can be utilized as a part of this control instrument. Ababio *et al.* (2008) posit that no financial control framework may be used more sufficiently than the financial plan. The budget is regarded as the basis of a company's financial control system and a control device. The budgetary control framework is the regarded as the real outcome when it is compared with the objectives while corrections are made on the deviations (Brock *et al.* 2007). After real outcomes are contrasted and the financial plan, directors can change their exercises to achieve the financial plan or they can even overhaul their arrangements or objectives (Lanen *et al.* 2011). Otley (1995) sees budgetary control as imperative in the foundation of successful authoritative control and the sole formal control system at senior

administration level. Indeed, even in Japan the significance of the utilization of planning for cost arranging and control is recognized and apparently controls costs and is pivotal in the arranging procedure (Sakurai and Scarbrough 1997).

The budgetary control system is the actual results compared to the budgeted goals and corrective actions taken to rectify the variations (Brock *et al.* 2007). After actual results are compared with the budget, managers can change their activities to reach the budget or they can even revise their plans or goals (Lanen *et al.* 2011). Otley (1995) sees budgetary control as very important in the establishment of effective organisational control and the sole formal control mechanism at senior management level. Even in Japan the importance of the use of budgeting for cost planning and control is acknowledged and is seen to control costs and is crucial in the planning process (Sakurai and Scarbrough 1997).

Budgetary control, according to Leitch (2003), is any approach management undertakes to set targets, to measure these targets against the actual outcomes and to motivate the staff to reduce these variances. Budgets, but also a combination of financial and non-financial targets, can be used in this control mechanism. Ababio *et al.* (2008) assert that no organisation can implement any financial control competently than a budget.

Process of budgetary control in local municipalities

In the municipalities, the municipal managers are liable to control the municipal income and expenditures after the budget allocations have been furnished. It is to be noted that the cycle of the budget includes monthly, quarterly and mid-year reports while a full report is issued at the end of the financial year as a financial report. The managers are expected to explain the variations between the actual and budget figures as regards to the revenue, expenditures and irregular expenditures. In budgetary control, managers should relatively maintain the gap between the actual expenditure and the budgetary figures and must be guided by the monthly cash flow provisions. At the end of the mid-year or the end of the financial year, the municipal manager submits the financial report to the mayor who checks if the budget has been executed according to the SDBIP and if the need be, an adjustment budget and revisions to the SDBIP, in terms of section 28 of the MFMA, is suggested (Pauw *et al.* 2009). The budgetary control in the local municipalities is said to be completed if the legislature or municipal council adopts the audit reports from the Auditor General.

Fourie and Opperman (2010) asserts that budget control in local municipalities is seen as a "watchdog" to ensure that the financial provisions and expenditures in a financial year is actually followed. In this regard, it behoves the municipal managers to implement necessary strategies to avoid irregular expenditures. In the case of occurrence of variances between the budget targets and actual results, reasons need to be provided and the municipal managers need to ensure that it does not affect the service delivery motive of the municipalities, remedial actions should be taken (Van der Walt 2007). According to MFMA, the executive mayor and the executive committee are in charge to check the performance of the municipal administration of in the aspect of budgetary performance and service delivery through the monthly performance progress reports. The Council is also responsible to hold the mayor and senior managers accountable on the basis of quarterly performance and financial reports as well as the annual reports. According to Van Wyk and Kroukamp (2007), budgetary control in local municipalities is difficult to implement without a cost-benefit analysis for all services to know which services are delivered in cost-effective manner and which are not, and without knowledge of the relationship between activities and costs.

Reasons for budget deviations

The reasons for budgetary control is to compare the actual outcome with the budgeted objectives while the reasons for deviations will be identified. According to (Maphiri (2011), the National Treasury (2000) identified four main reasons for the occurrence of budgetary deviations. These are:

- Error occurring in the capturing of transactions into the accounting system and transactions that still have to be captured into the system at the end of the specific monitoring time frame. These causes can be solved by realignment of the data capturing process and better audit of the correctness of the data to be captured.
- Error occurring due to deviation on unforeseen events occurred during the financial year as well as incorrect anticipation of events at the beginning of the year. Unforeseen events are out of the control of management as they are mostly external to the organisation but incorrect anticipation of realised revenue and expenditure is a managerial and political problem, according to Maphiri (2011). Results of internal co-ordination and communication deficiencies are over expenditure or under expenditure of the budget, which are contained in the audit findings.

In order to know the effectiveness of budget utilisation as an internal control tool, management needs to know the following:

- if the proposed budget is competently allocated and if all the transactions are recorded effectively in the right financial period;
- if the revenue and expenditure figures are well estimated for the financial period;
- if actions are taken by the authorities responsible to rectify the deteriorating situation.

Section 28 of the MFMA states that an adjustment budget should be submitted annually at the end of January to the Tswaing local municipality for approval. As indicated in the background of the study, the financial statement of Tswaing local municipality in the 2010/2011 to 2014/2015 recorded more than R91 million irregular expenditure. These findings of the Auditor General indicate that the budgetary control system in Tswaing local municipality is not effectively implemented.

Internal control in local government

Gyüre (2012, 173) asserts that the issue of addressing the unnecessary risks in the municipal financial management should be addressed by the implementation of internal control. Furthermore, Gyüre (2012) posit that the financial risks have reached such a high level that it not only a threat to the local municipalities but a threat to the entire economy.

The objectives of the internal control system include the implementation of efficient and effective operating systems and sustainable financially service delivery (Pricewaterhouse Coopers 2009). Laubscher and Van Straaten (2009) aver that constitutional financial control in local municipalities include external and internal factors, of which preparation of the budget falls within the external component and internal auditing falling in the area of the internal component. Local municipalities must device an efficient internal financial control system in order to be accountable to the public (Laubscher and Van Straaten 2009). The control function in the public sector is a very essential factor to ensure that the financial resources are effectively used to avoid unnecessary wastage. The duty of the internal control section is to ensure that the financial activities of the public are competently accounted and presented (Kakumba and Fourie 2008).

The key to a good financial governance begins with the application of an efficient internal financial control system in the private and public sectors. It is obvious that the community needs service delivery, an efficient internal financial control system will give the necessary information for governance and accountability in the public sector (Fourie 2007). Van der Nest *et al.* (2008) posit that managers needs to implement sound internal control system and sound governance in their various responsibility areas, as it is viewed that increase in accountability is necessary for good democracy as well as for improved service delivery.

Fourie and Opperman (2011) aver that internal control is a process applied by municipal management to give reasonable guarantee of the achievement of the following categories of objectives:

- Internal financial control;
- Accountability and corporate governance;
- Reliability of financial reporting;
- Effectiveness and efficiency of operations;
- Compliance with applicable legislation and regulations.

According to Huefner (2011), the inability to monitor the financial issues as contained in the budget can lead, to fraudulent expenditure, irregular expenditure, waste, loss or ineffective use of the resources of the municipality which may invariably increase the tax burden of the community. Agu (2002) affirms that the actual implementation of internal control measures by the municipal top management prevents fraud in the local government.

The Auditor General expressed the effectiveness of internal control in the 2009–10 Audit Report of the Tswaing local municipality, also indicated that the internal control shortages can be directly linked to the base of the qualification on the financial statements, the findings on the objectives and the compliance with applicable legislation (IDP 2011). Despite the fact that no opinion was expressed in the aspect of over the efficiency of the internal control system of the Tswaing local municipality, it is a point to note that the shortages do exist and that these shortages need to be identified and be corrected to achieve a clean audit.

The North West Province municipalities were advised to implement adequate internal audit measures if they want to achieve a clean audit reports (Auditor General 2011). The municipal management should ensure that basic control measures such as monthly financial reconciliations are executed as they are simply designed to

assist in sound municipal financial management. In this report, the Auditor General stated that the following are necessary to obtain and sustain a clean audit report:

- Excellent leadership;
- Good financial and performance management;
- Exceptional governance.

Tswaing local municipality must therefore implement the basic financial and performance reporting controls as a matter of urgency to avoid incurring irregular expenditure and to achieve a clean audit reports in consequent financial years.

Advantages of benchmarking in Tswaing Municipality

The Centre for Municipal Research and Advice (2010) opines that the most essential advantage obtained in benchmarking with other will encourage the Tswaing municipality to identify unnecessary gaps in their various financial practices, to identify breaches in performance, strengths and weaknesses and to encourage the municipal top management to accept new ideologies, policies and processes to achieve a clean audit report by 2017.

Benchmarking as a management tool in local municipalities can only be fruitful if it has the full support and commitment of the top management, if the municipality understands and knows its own policies and practices, if benchmarking is part of teamwork and if it is done periodically and not just the once (Naidoo and Reddy 2008; Centre for Municipal Research & Advice 2010). In this regard, benchmarking requires the following:

- Periodic review;
- Knowledge of policies and practices;
- Teamwork by the financial municipal workers.

Summary and Conclusion

This paper presents the meaning of financial management and the effective legislations that supports adequate municipal financial management. These legislations include the constitution of South Africa, Municipal Finance Management Act, Municipal Structures Act, White Paper on Local Government and the Municipal Systems Act. This paper also provides the meaning of irregular expenditure and its accounting principles. It also provides the management deviations that result to the incurring of irregular expenditure. Such deviations include inability to conduct effective risk management, deviations in the budget formulation and inability to carry out efficient internal control measures.

This paper on the study that was conducted in Tswaing local municipality which is one of the five local municipalities in the Ngaka Modiri Molema district. Tswaing municipality is made up of 15 wards with major towns such as Sannieshof, Ottosdal and Delareyville which is the capital territory. This paper further investigates the organisational management failures resulting to irregular expenditure in Tswaing municipality of the North West Province, South Africa. The Auditor-General posit that the major causes of irregular expenditure in the public organisations occur during the procurement of goods and services. The Public Finance Management Act, Act 1 of 1999 and the Municipal Finance Management Act, 56 of 2003 posit irregular expenditure as an unauthorised expenditure that is incurred in violation of what is not acceptable with the requirement of the legislations of any applicable legislation. Finally, this paper contributes in establishing a link between organisational and management measures to reduce irregular expenditure in the Tswaing local municipality. Further this paper established a link between organisational and management failures to irregular expenditures in the Tswaing local municipality.

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Assessing the State of Logistics and Ways to Improve the Logistics Management in the Corporate Sector of the Russian Economy

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Abstract.

The article analyzes the efficiency of the Russian logistics on the basis of data from foreign and Russian researches. The tendency of the annual decrease of the greatest part of indicators of the Russian logistics that are natural for a number of post-Soviet countries in the world rating has been revealed. There is an attempt to explain why domestic logistics lags behind the world leaders. The reasons include the crisis phenomena in the economy and its technological underrun as compared with the economy of foreign partners. The results of the sectoral analysis of the current state of domestic logistics are shown. This analysis has revealed the top priority tasks of Russian companies in the logistics area, as well as the dynamics of the main indicators of the logistics activity of Russian companies. General problems and prospects of developing logistics processes of Russian companies are defined. The introduction of innovative technologies and solutions in the logistics processes based on the automation and informatization of logistics operations has been recognized as one of the main directions of development. Stable tendencies in the development of logistics that have an impact on their efficiency are revealed. Recommendations for the sustainable development of the domestic logistics sector are given. Based on analyzing the results of the conducted audit of logistics systems of companies from various sectors of the Russian economy, low values of the efficiency index of logistic systems of the largest Russian industrial holdings are determined, and their main reasons - low level of the logistics management and unsatisfactory condition of the logistics infrastructure – are defined. Main problems in the logistics management of large industrial holdings are characterized, and the ways to solve them are offered.

Keywords: logistics; logistics processes; logistics system; logistics management; management; corporate sector

JEL Classification: C60; C69

Introduction

Today the world is going through the period of the emergence of a fundamentally new economy based on intellect, the use of information and communication technologies, total technologization of all sectors of the economy where new market, sectoral and corporate structures occur and become competitive. One of the characteristic features of the new economy is a considerable increase in the consumption volume in the society and significant minimization of the costs companies bear when producing and selling products and services. The expanding range and increase in the availability of services, goods and distribution channels cause a rapid

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increase in the consumer demand. Under these conditions, a number of advantages of traditional companies - access to customers, technologies, labor power and capital – lose their power because the new economy opens equal access to almost all resources for companies. While in the old economy, to a great degree, the companies' success was predetermined by the knowledge of local market features, the new economy completely eliminates this advantage by introducing business processes automation, products standardization, new formats of communication and data transmission.

The current state of logistics and the prospects for its development directly depend on the development of the entire national economy that undergoes deep transformational processes including those related to managerial approaches to business organization. Many long-standing principles of the top executives' work that came from the old economy - quite acceptable for their time – start breaking the business development and, based on the detailed analysis, require to be reconsidered in favor of innovative solutions, increasing the level of technology and efficiency of business processes, including logistics.

The purpose of this article is to assess the efficiency of the Russian logistics in the context of global and national tendencies, to analyze the state of domestic logistics in the sectoral aspect, as well as to identify the problems of logistics management of large industrial holdings considered as flagships of the development of the Russian national economy under new economic conditions. Special attention is paid to the scientific substantiation of approaches to improving the organization of managing logistics systems of large corporate structures.

The urgency of the work is in the empirical analysis and development of methodological approaches to solving the problem on organizing business based on the concept of logistics, as well as in the full use of its opportunities related to the production and marketing processes. The introduction of the logistics concept will ensure the harmonious progress of the whole set of business processes, increase in the efficiency of the structural units' work, reduction of overall costs, decrease in the cost of production, expanding of the client base, maintaining of the sales market, improvement of the customer service quality, and strengthening of the company's business reputation. Thus, organizing management of material flows on the basis of logistic principles contributes to a 30-50% reduction in the level of reserves, with the time of products distribution reduced by 25-45%.

1. Methods

The research was theoretically based on scientific works on a wide range of problems related to the logistics activity of companies. The authors' conclusions were based on the generalization of the distinguished approaches of foreign researchers: Bowersox Donald J., Closs David J., Donald F. Wood, Barone A., Murphy P., Wardlow Daniel L., Stock James R., Lambert Douglas M. *et al.* The analysis of practical aspects of introducing new approaches to the organization of logistics in Russian companies was based on the works of national academic economists: Golubetskaya N.P., Merzlyak A.V., Plotkin B.K., Pleshits S.G., Sekerina V.D., and Shcherbakova V.V. Scientific works of Russian scientists Gvilia N.A., Demina V.A. *et al.* were used to develop ways on improving logistics management in the corporate sector of the economy.

Along with this, the issues on organizing logistics systems of companies under the conditions of technological production and management processes do not lose their urgency and require theoretical comprehension. Besides, based on assessing the efficiency of logistics, it is necessary to clarify the problematic areas of logistics systems of Russian companies, and above all, large integrated industrial structures. In the context of the economy globalization and extending of integration relations between Russian and foreign companies, the level of developing logistics systems in integrated corporate structures should comply with standard world practices, the ones demonstrated by foreign business partners. Consequently, theoretical analysis of the world's achievements in the area of logistics efficiency and assessment of the state of Russian logistics in the sectoral aspect will make it possible to formulate offers on ways to improve logistics systems of Russian corporations.

Research results were formalized and generalized by using general scientific methods of cognition: the dialectical method, the analogy method, analysis and synthesis, and also by using special methods of empirical cognition: analysis of economic and statistical indicators, comparative analysis and expert assessments.

2. Results

2.1 External assessment of the Russian logistics efficiency

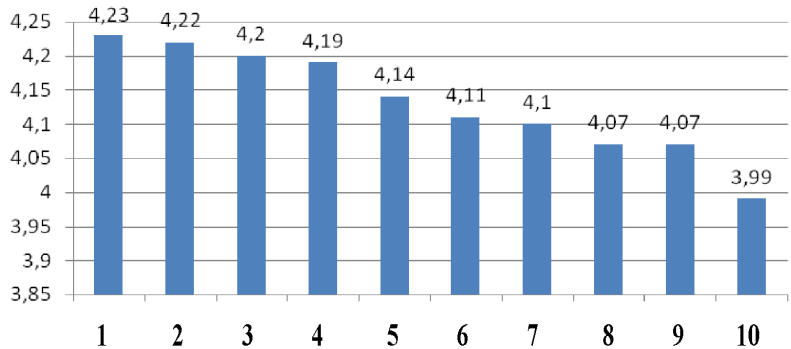
To assess the efficiency of the Russian logistics, it is necessary to turn to the results of the survey made by the World Bank's Logistics Performance Index (LPI) (Index of the Russian Logistics Inefficiency 2016). It was carried

out in 2016 and covered 160 countries. Countries in terms of logistics efficiency are ranked every two years (according to the five-point scale). Ranking is based on the results of a survey of international and national logistics companies assessing the main characteristics of the logistics system: customs clearance, the quality of the logistics infrastructure, simplicity and cost of supply, competence and quality of services, the ability to track and control cargo and deliveries frequency.

We will note that compared to other countries experts specified the worsening of the Russian position in logistics from the logistics infrastructure and to the work of the customs service. Moreover, in terms of the logistics development the arrears of our country from other countries become the annual tendency which inevitably causes the loss of customers by domestic companies.

The top ten leaders of the rating (Figure 1) include mainly European countries - Luxembourg, Sweden, the Netherlands, Austria, as well as Asian states - Singapore and Hong Kong. Germany has been confidently holding the first position since 2007. It also manages to increase the overall LPI level every year - from 4.10 points in 2007 up to 4.23 points in 2016.

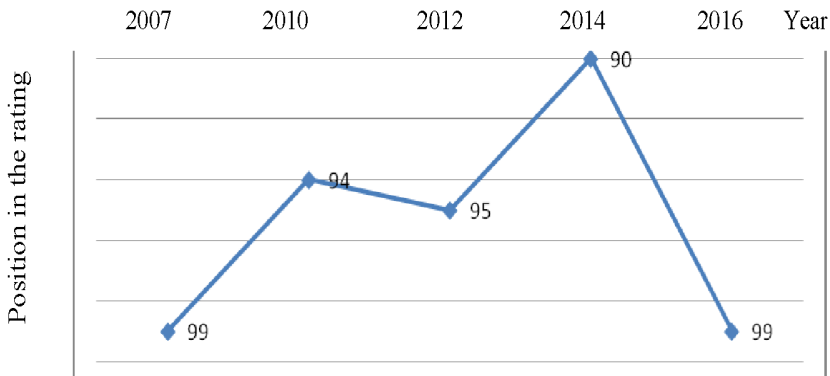
Figure 1. Countries Leading by Index of Logistics Efficiency for 2014-2016: 1 – Germany; 2 – Luxembourg; 3 – Sweden; 4 – Netherlands; 5 – Singapore; 6 – Belgium; 7 – Austria; 8 – Great Britain; 9 – Hong Kong; 10 – USA



The authors of the research note that the gap between the countries that are leaders of the rating and the outsider countries has been increasing every year. It is probably because of the political and economic instability that makes the supply chain unpredictable, increases transportation costs, and creates a lot of risks for suppliers and customers. The top ten of the worst countries for logistics include Syria with an index of 1.6, Haiti (1.72), Somalia (1.75) and Mauritania (1.87).

According to the results of 2016, Russia holds position 99 in the general list, has 2.57 points, and shares low positions with the Comoros, Nigeria, Bosnia and Herzegovina, and Iran. For the assessment to be objective, it is necessary to note the instability of the value of the Russian logistics index: as compared to 2007, in 2016 the indicator increased by 0.2 points (from 2.37 to 2.57), and as compared to 2014, it decreased by 0.12 points (from 2.69 down to 2.57). In other words, as compared to other countries in the 2016 rating, Russia returned to the position of 2007, although in 2014 it held position 90 (Figure 2). At the same time, the experts grouped the countries by their level of income and economic development, and noted that Russia had great potential among other countries of its group but it did not use its capabilities, despite of its rich natural resources.

Figure 2. Dynamics of Positions of Russia in the Rating by the Index of Logistics Efficiency for 2014-2016



The main problem that worsens Russian indicators in almost all rating criteria is still low efficiency of the customs clearance process. According to this indicator, Russia descended from position 133 down to 141 (the point estimation decreased from 2.20 down to 2.01) and is found approximately on the same level as Congo, Turkmenistan, Iraq and Eritrea. The researchers note that temporary and other expenses for border crossing are three times higher in those states that have low indicators of the customs clearance procedures as compared to the top ten countries. Besides, physical inspection of cargo is more common here which is considered an ineffective measure of customs control (Johnson, Wardlow, Wood and Murphy 1999). Moreover, not only the reform of the customs system, but also the improvement of the work of control veterinary and phytosanitary bodies are of great importance. According to the authors, the work of such bodies is often not automated, and the main emphasis is made on improving the work of only border and customs authorities.

It was noted that Russia had worsened its positions by other criteria, too. For example, the level of quality of trade and transport infrastructure decreased (in Russia this indicator descended by 17 points). The organization of international transportation and prices for it (decrease from 102 down to 115) was complicated. The indicators improved only by one criterion - the quality and competence of providing logistics services. The index itself changed slightly - from 2.74 up to 2.76 points, but Russia went down from position 102 to position 115.

Based on the analysis of the data on the time required for the international transportation of goods, Russia displayed some of the worst indicators for delivery terms. According to the respondents' estimates, shipping via sea ports and airports averages 5 days for export and 7 for import, and across the land border - 5 days for export and 14 days for import.

The time for the customs clearance as compared to the estimate of 2014 grew considerably: in 2014 the time for passing the customs without inspection was 1 day and 3 days in case of inspection, and in 2016 they increased up to 3 and 5 days, respectively. Approximately the same indicators are displayed by African countries - Madagascar, Congo, Chad, and Sudan.

The assessment of the level of logistics environment development in different countries showed that in Russia the services of seaports and airports were expensive - the high and very high levels of prices were noted by almost 90% of the respondents. In addition, another 55.6% of the respondents indicated high prices for rail transport.

The respondents did not assess the quality of the Russian infrastructure as high. Thus, 89% of the respondents rated the level of the roads development as low and very low, 56% also estimated the quality of seaports and railways.

It is important to note that in the 2016 rating of logistics efficiency Russia is not the only country that has worsened its positions. The same tendencies are demonstrated by Belarus that due to the customs clearance criterion had descended from position 99 down to 120, as well as Armenia that descended from position 92 down to 141 (due to the customs clearance and complication of the organization of international supplies). At the same time, other Russian partners in the EEA improved their rating positions. First of all, it is necessary to mention Kazakhstan that has ascended from position 88 up to 77 due to the improved efficiency of the customs clearance and improvement of the quality of trade and transport infrastructure. Kyrgyzstan also raised its rating and ascended from position 149 up to 146. Despite of the fact that its indicators had worsened by all criteria, the overall rating was affected by a strong fall in the performance of other countries.

The above results of the research are often a subject of the discussion and criticism from those who do not agree with the rating data based mainly on assessing large companies. At the same time, according to experts, worsening of the rating positions of Russia was expected due to the economic crisis and growth of the tax burden that considerably complicated the life of those who performed foreign economic activity. As a result, the Russian logistics happened to be in the state of stagnation while other countries implement IT technologies into their work, and develop new solutions.

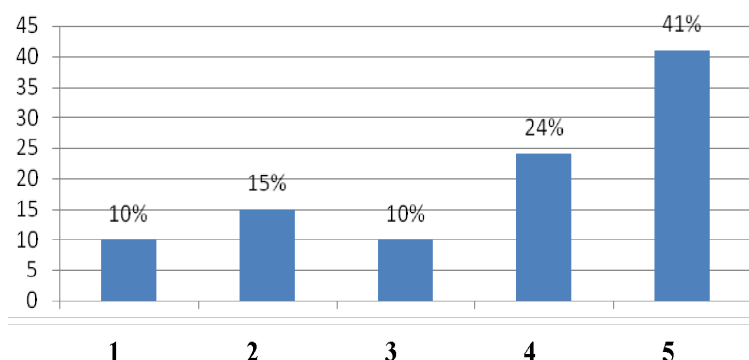
2.2. Modern state of Russian logistics: Sectoral analysis

To analyze the retrospective and to assess the current state of logistics in Russia, as well as to determine prospects for its development, we will turn to the research that was made in 2016 by the Coordination Council for Logistics, together with researchers from the Moscow Road Institute (Demin 2016) and became annual in the last 9 years. The results of the research are based on the analysis of statistical information, expert assessments, as well as data obtained by surveying managers of more than 400 productions, raw materials, trade and logistics companies in the following industries: engineering, energy and oil and gas industry, electronics and

telecommunications, goods of daily demand, food, retail trade, full outsourcing of all logistics processes, transportation, expedition, customs, medicine and pharmaceuticals.

The analysis of the logistics tasks solved by respondent companies made it possible to identify the main of them (Figure 3). First of all, it is necessary to mention the introduction of management systems in companies, such as SCM, ERP, WMS, TMS, as well as the managers' focus on improving the level of logistics services rendered to customers for a set of parameters - timeliness, reliability, stability, and accuracy. At the same time, the priorities of companies dynamically change every year. Thus, in 2013 the majority of companies focused on solving the top priority problem on forming their own logistics infrastructure (creation of lorry fleets, warehouses, distribution centers). The task to optimize the company's expenses was on the second place, and in 2014 it became the most important among the main directions of the companies' development.

Figure 3. Priority of Logistics Tasks in 2015: 1 – Optimization of expenses; 2 – Improvement of the customer logistics services; 3 – Creation of own objects of the logistics infrastructure; 4 – Introduction of management systems; 5 – Miscellaneous

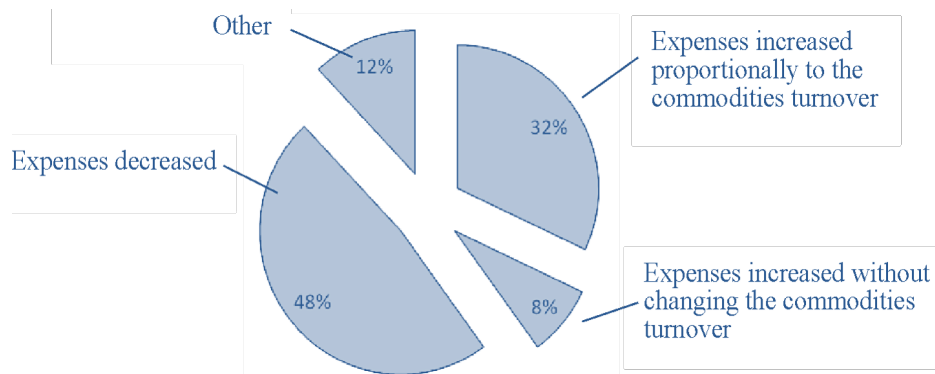


The traditional issue of the research is the change in the number of staff employed in logistics. For the first time over the recent years of the research a negative trend has been revealed. It was in 2015 when 51% of the respondent companies suffered the staff reduction. Thus, up to 20% of the staff was fired in 76% of the respondent companies; from 20% up to 40% of the staff was reduced in 16% of respondent companies, and from 40% up to 60% - in 8% of respondent companies. In 2013-2014 the decrease in the number of staff in respondent companies was considerably lower. We will note that in 2015 the reduction was related not only to employees of the operational level but also to managers. A great part of the respondents specified latent layoff in the form of considerable changes on the level of wages and other working conditions that caused "voluntary" dismissals. In the official statistics such changes cannot be identical to the term "layoff" but in most cases employers have pursued the goal of voluntary dismissal of employees when conditions changed.

According to the results of 2015, the majority of the respondent companies (60%) recorded a decrease in the volume of commodity flow, while 40% noted its increase. The shown negative indicators of 2015 were the first significant decrease in the volume of commodity flows of respondent companies since 2009. The results of the assessment made in 2014 were positive – the companies demonstrated the increase in the commodity flow despite of worsening of macroeconomic indicators. However, despite of the negative tendencies of 2015, the majority of respondents (76%) were optimistic about the nearest and medium term and planned to considerably increase the volume of the commodity flow within 1-2 years. At the same time many companies consider the crisis phenomena in the Russian economy, above all, as an opportunity to expand their market share by strengthening their own competitive advantages and weakening the competitive positions of other actors of the industry.

Along with the decrease in the volume of goods flow, 48% of respondents noted that in 2015 logistics expenses had been reduced (Figure 4).

Figure 4. Changes of Expenses for Logistics in 2015



The estimation of logistics expenses in the products cost allowed stating that in 31% of cases their value is on the level of up to 5%, and 29% of respondents noted the level of logistics expenses from 5 to 10%. According to the research, 45% of respondents indicated that the maximum expenses in the logistics system were allocated to transportation, storage and handling, and 35% of respondents noted that customs clearance made up the minimum expenses.

The majority of respondents noted that in 2016 they intended to increase the volume of using services of logistics operators (46%) or would start using them (9%). However, the majority of respondents also noted that there were a number of problems that prevented from constructive cooperation with logistics operators. The main problems are the following:

- low quality of the provided logistics services in the form of the non-compliance with the terms of services provision, the lack of prompt feedback, the untimely response to inquiries, the under-use of the full potential of cargo flows control systems,
- frequently changing service rates after concluding the contract,
- low transparency of price formation,
- unwillingness to implement new IT solutions,
- stagnancy of the approach to forming offers on servicing companies with non-standard goods, and
- uneven development of the regional infrastructure, which causes different levels of service quality throughout the whole supply chain.

A considerable number of the respondents (81%) specify the introduction of innovative technologies and solutions into logistics processes as the main direction of the company's development. These are implementation of control systems for processes automation that make it possible to reduce their labor intensity and minimize the risk of a human error, implementation of advanced technologies in organizing the work of warehouse units by increasing the products' storage density, speed and accuracy of operations, the implementation of technologies in transportation to improve control and operative administration by moving transport in the context of multifactority of tasks.

The majority of companies (46% of respondents) set the following main task for the nearest two years: to improve the level of logistics service for customers. 21% of the respondents plan to focus their efforts on optimizing expenses and implementing management systems.

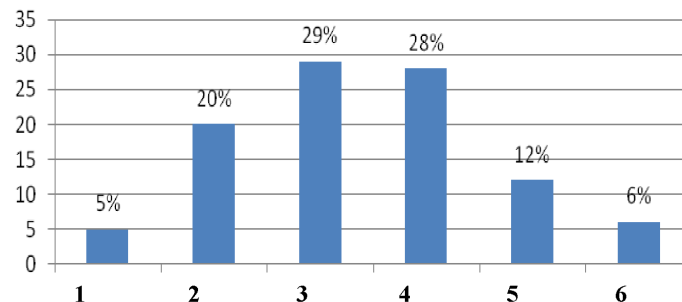
According to the respondents, the optimization of logistics processes is possible on the basis of a comprehensive approach that integrates the automation of logistics processes (SCM, WMS, TMS, etc.), use of outsourcing, introduction of the "Lean Production" concept and innovative technologies, motivation of personnel to improve labor productivity, development of new transport and technological schemes, and centralized management of goods distribution and infrastructure.

The participants of the research noted that the recent years had also seen stable tendencies in the development of logistics (Figure 5), which had a great impact on the efficiency of processes and would continue their impact in the future. The respondents specified the following tendencies:

- Optimization of expenses throughout the supply chain,
- Increase in the customers' requirements to logistics services,
- Improving the quality of PL providers' work,
- Increase in the volume of high quality logistics infrastructure, implementation of TMS and WMS management systems,
- Reduction of import,

- Introduction of new KPI for better control over the situation,
- Surplus of warehouses,
- Control over expenses at all stages of the logistics chain, and
- High competition among carriers.

Figure 5. Main Tendencies in Logistics for 2014-2016: 1 – Outsourcing; 2 – Improvement of PL providers' work quality; 3 – Optimization of expenses in the whole supplies network; 4 – Introduction of the WMS system; 5 – Customized approach to a customer; 6 – Frequent changes in the geography of cargoes transportation



Summarizing the results of surveying respondents and taking into account the opinion of the expert and scientific community (Sekerin 2011, Shcherbakov and Merzlyak 2013), it is possible to identify the main problems affecting the efficiency of logistics processes in the country. Among numerous problems it is necessary to specify the following: instability of the macroeconomic situation on the national and global level; sanctions restrictions and their consequences in the form of the turnover decrease; difficulties in approving the “Platon” system; low level of professional training in logistics; decrease in the level of consumers' and clients' payment capacity; unsatisfactory condition of the logistics and road infrastructure; low level of the cargo safety; high cost of the borrowed funds; low demand for electronic document management in companies; and lack of established rules and standards for the organization of logistics business processes.

Thus, based on the results of the research, it is possible to formulate the main recommendations that are urgent for the sustainable development of the logistics sector. First of all, this is the formation of professional competencies of specialists involved in logistics processes; the relation of KPI to staff motivation; improvement of data quality; introduction of a system of normative-reference information, tariffing logistics operations; comprehensive automation of logistics processes; introduction of “Lean Production”; and optimization of parameters of goods flows and stocks (turnover, irregularity, frequency of lots).

2.3. Problems of logistics management of large industrial holdings and ways to solve them

According to the results of international (Wood, Barone, Murphy and Wardlow, 2002) and Russian researches (Plotkin and Pleschits 2016), the state of logistics systems in Russia does not comply either with the best practitioners or today's requirements. Such statement makes it urgent to raise the issue on improving the efficiency of logistics processes in Russian companies, first of all, in corporate sector companies because they are the first to suffer difficulties when conducting logistics operations on the international market and often in the country. Thus, large industrial holdings of the oil and gas industry, metallurgy, and the chemical industry hold position 10 among 12 different sectors of the Russian economy. They are between the machine-building industry and the agricultural sector and far behind pharmaceuticals industry, aircraft manufacturing, production of auto components and consumer goods.

The audit of logistics systems of a group of the largest Russian industrial holdings (Demin 2015) led to understanding the main reasons for such a low indicator. They can be conditionally structured into 2 groups: a low level of logistics management and unsatisfactory state of the logistics infrastructure. We will analyze the main problems of the logistics management of large industrial holdings and define possible ways to solve them, which can considerably increase the efficiency of the entire company.

The key performance indicators used to assess the state of the companies' logistics management (Bowersox and Closs 1999) include the level of general logistics expenses and the level of logistics service. Both parameters are defined by calculating the low-level performance indicators. Thus, the level of general logistics expenses is assessed by calculating expenses indicators: by types of activity, by separate nomenclature groups, by reducing to the cargo unit, by the location of formation in the logistics chain (purchases, warehousing, transportation, etc.) (Beamon and Ware 1998). The integrated assessment of these indicators has a critical

impact on the general index of logistics systems efficiency in large industrial holding structures that show the low quality of their logistics. Due to this, it is important to define the main reasons of this situation.

First of all, the main reason for the arrears of large industrial holdings according to the general index of logistics systems efficiency is the insufficient level of professional competence of logistics specialists in these companies (Veselovsky, Abrashkin, Aleksakhina and Pogodina 2015). This problem is the most typical for large holding companies of the oil sector and the metallurgical industry. They turn out to form the most conservative segment of the domestic economy. This statement is based on the revealed high degree of resistance to any kind of innovations offered by the operating staff and management of the middle management level. Thus, during the audit it was revealed that in a considerable number of enterprises employees openly criticized on the current difficulties in their divisions and explained them by the low level of their achieved indicators. However, when discussing the introduction of innovative approaches to solving problems, these employees demonstrated strong resistance and referred to the accumulated industry experience (Innovative Management of Logistics Systems, 2010). As a result, the level of managing supply chains and internal logistics of the company slightly exceeds the one that used to be 3 decades ago. Only some logistics processes can be estimated as close to the standard practice. Even considerable transformations made in the organizational structure, modernization of infrastructure and management system that require large investments do not give the expected result. For example, the functionality of such control systems as SAP is often used by 10 to 15% and is reduced mainly to accounting goods distribution and does not cover management and automated planning (Gvilia 2014).

Among the main problems found in the logistics management of large industrial holdings, first of all, it is necessary to single out the problems related to managing the parameters of material flows. Table 1 shows characteristics of these problems (Demin 2015).

Table 1. Problems in Logistics Management of Large Industrial Holdings

Ser. No.	Problem	Characteristics and the impact on the logistics system	Offered ways to solve
1.	Unbalanced interrelations of counteragents in the supply chain	Low level of consistency that is characteristic of the interaction of counteragents and structural subdivisions of the company, reduces the stability and reliability of the supply chain, and increases operating costs.	Implementation of a supply chain management system based on the mechanisms of synchronization and informatization of logistics processes
2.	Unreasonable planning of logistics processes without using standardized information about material flows	Wide nomenclature (tens of thousands titles) of the production holding and, along with this, the many companies' lack of reference books of commodity-material values that include weight dimensions, cause a sharp decrease in the quality of management and planning of logistics processes.	
3.	High irregularity of material flows	In large industrial holding structures, the coefficient of irregularity of material flows is 4, which is much higher than that in other industries. This coefficient is inversely proportional to the load of the service aggregates (transportation means, production and storage equipment, etc.) needed to promote and process the material flow. Thus, if the material flow irregularity factor is 4, the load factor of the service aggregates will be 0.25. It points at the load within 25%, and 75% of the resources are not involved and are in the holding mode.	
4.	Inconsistency of the reserves level with the period of turnover	In the reality ensuring the reliability of the supplies chain is often limited to the creation of such stocks, where the volume is not comparable to the actual needs. In the course of logistics audit, the stock often reveals considerable inventories that have been unclaimed for 1-2 years. At the same time, expenses for maintaining the stock cause a significant increase in the overall logistics expenses. At the same time, the deficit of stocks causes even higher losses. Therefore, it is necessary to balance the excess and deficit of stocks.	Implementation of a stock management system to determine the optimal stock size that is sufficient for uninterrupted production activities and includes the safety resources stock

Ser. No.	Problem	Characteristics and the impact on the logistics system	Offered ways to solve
5.	Groundlessness of decisions on the frequency and size of the lots to be accepted and shipped	One of the reasons for increasing labor intensity and resource intensity is the groundlessness of making decisions on the frequency and size of the lots to be accepted and shipped. Thus, the cost of shipment of 1 m ³ of products from a warehouse will cost the enterprise: about RUB 80 as the whole pallet and up to RUB 800 as individual units.	Feasibility of decision making by calculating the periodicity and optimality of the size of lots to ship, taking into account the needs of end users and total operating costs.
6.	Inefficient configuration of the company's logistics network	Increase in the level of risks in the network structure of supply chains and the growth of operating expenses occur due to the ungrounded decisions on the number and location of suppliers, warehouses, service centers	Use of modern simulation and virtual technologies in modeling the logistic network of the enterprise
7.	The lack of a link between staff motivation and key performance indicators	Increase in expenses and decrease in the level of reliability of the company's logistics system arise from the biased and ungrounded nature of decisions that do not take into account the relation of the staff motivation and key performance indicators	Implementation of a balanced system of staff motivation that takes into account the assessment of key performance indicators and the company's expenditure budget

The survey of problems in the area of logistics activities of large industrial holdings allows us to confirm that their common determinant is the low competence of personnel. Therefore, the improvement of the professional training, first of all, that of decision makers on a wide range of logistics issues will eliminate the existing problems and bring the efficiency of logistics of large industrial holdings to the level of the most advanced industries in this respect. To do this, it is possible to use the following options: to attract new highly qualified specialists to key positions or to improve the level of professional competence among working employees.

The implementation of the first option can be considered as little feasible because in the context of high competition among employers for highly professional specialists, the number of the latter remains limited. Moreover, the entry of a new specialist into an established team that has its own corporate culture often comes with strong opposition to adopting and implementing the offered solutions. In this situation one such new specialist, even highly competent and having powers of the head of a structural unit, is often unable to establish a more efficient operating procedure (Fombrun and Stanley 1990).

It is necessary to recognize the second option as more efficient because it makes it possible to systematically assess the existing problematic area of the company's logistics, to formulate solvable tasks on the basis of using the existing HR potential of the company. To implement this option, it is necessary to carry out rapid diagnostics of the company's logistics system, to define the most acute problems, to prioritize tasks to eliminate or minimize the negative impact of critical factors on achieving high logistics and company performance (Stock and Lambert 2001). In addition, it is necessary to certify personnel to identify "problem areas" in the competence of each employee. The next step should be the organization of corporate training in the form of trainings, seminars, internships and other accessible forms. It will allow shortly changing the mentality of employees that has been developed over long years of work in terms of the methods and techniques used, and mastering and efficient implementing innovative methods and technologies of work, using the company's existing and previously rejected tools.

Thus, the improvement of the efficiency of logistics processes should be based on critical analysis of the achieved indicators, description of the problem area in logistics, the choice of optimal solutions for the company, with the systematic and continuous improvement of the competence of all employees of the company as one of them.

3. Discussion

In the era of globalization, increasing production in the European Union, the North American continent, the Asian region and growing cargo flows between them, the quality of Russian logistics management (Dahlgard-Park 2011) is more and more important. Above all, it is related to the corporate sector that is more integrated into the world economic space.

The conducted research and the results of scientific researches made by a number of scientists (Kyj 1987, Seth, Geshmukh and Vrat 2005) revealed a number of modern tendencies of the customer-oriented logistics that were typical for the Russian and global markets. First of all, it is necessary to single out the following:

- growth of mass goods flows that requires “door-to-door” delivery,
- improvement of the customers’ requirements related to the low level of tariffs, delivery time, efficient use of vehicles during operation, maintaining the safety of goods and their quality when transporting and performing the entire range of operations (reloading, transshipment, storage) of the loads’ movement,
- steady need of clients both for transport services and for comprehensive logistics services, and
- customers’ requirements to quickly provide information about the order status and the cargo location when it is being moved.

The compliance of logistics with the modern trends requires implementation of new innovative approaches to organizing logistics processes. One of them is the introduction of electronic forms of interaction that corresponds to the tasks of forming e-economy in Russia (Veselovsky, Gnezdova, Romanova, Kirova and Idilov 2015). The electronic type of running business becomes a new philosophy of a large corporate sector that requires serious modernization of the management system within the company. The electronic basis of business that covers the logistics system is now interpreted as the most important asset of the company. It makes it possible to manage all its resources (human, financial, marketing, etc.), to model opportunities and development scenarios, to support decision-making, to use a wide range of analytical tools, to improve the customer service and to reduce expenses, to identify new distribution channels, as well as to go beyond the boundaries of the company – to manage supply chains and customers (Sawhney, Wolcott and Arroniz 2006). For Russian companies that have a low level of logistics systems informatization, the transition to the e-business model is a difficult but at the same time vital task, with the solution that allows achieving and maintaining the competitive state of the Russian economy in the global technological economic space.

Conclusion

In the context of deep transformations of the national economy that affect, first of all, its technological basis, as well as its integration into the global economic space, the issue of Russian companies’ survival under the new economic conditions is urgent. Above all, this problem affects the domestic corporate sector, namely large industrial corporate structures that experience a high level of competition on the technologically developing global market. The survival success and sustainable development of corporations are determined by a combination of factors produced both by the external business environment of the company and its internal situation. In the group of internal factors of the company’s success it is necessary to recognize one of the most important ones. This is the rationality of constructing a logistics system that can link together and improve the efficiency of the interaction of basic functional areas of the business organization - supply, production, marketing, distribution, and sales organization. At the same time, well-organized logistics management can solve a wide range of problems related to the synchronization and informatization of logistics processes, optimization of the reserves management system, the feasibility of management solutions, the introduction of electronic logistics operations and a balanced staff motivation system.

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Investment Behavior and Alternatives among Indian Expatriates in Dubai

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Abstract

The aim of this study is to investigate the status of investment behavior and alternatives of Indian expatriates in Dubai, United Arab Emirates and the factors that influence investors ranking the investments. One hundred and ninety-three Indian investors in Dubai were interviewed for the study. A survey was conducted among Indian investors in Dubai by distributing 350 questionnaires, out of which 193 were returned, with a response rate of 55%. Quantitative and qualitative analysis was done with percentage, mean, standard deviation, Friedman Test and Henry Garrett's ranking. The survey result indicated that investment ranking of Indian expatriate investors is innovative economic solutions that drive commercial growth and diversification.

Keywords: investment; ranking; Indian expatriates; Friedman test; Henry Garrett; innovative; solutions; diversification

JEL Classification: E22; G24

Introduction

Rational thinking can lead to irrational decisions in a misperceived or misunderstood world of finance. Added to it are the biases that can cause people to emphasize or discount information, either in the form of inclination on a definitive idea or inability to recognize an investment opportunity. In the study of Hersh Shefrin, he pointed out that bias lead to unexpected decision and inhibits objective thinking. According to famous personality W Buffet, investing is the process of keeping aside money for more productive purposes today to grow and receive more money tomorrow. In its broadest sense, an investment is a sacrifice of current money or other resources for future benefits, and in the long run, investment may be defined as the net addition to a nation's physical stock of capital. Today, numerous opportunities and alternatives of investment are available throughout the world and move money to various locations of the globe for lucrative returns. With all the alternatives given for investment, risk becomes inevitable, and therefore there must be right selection, right asset and at the right time.

The interaction between risks and time horizon influences every investment decision, whether known or unknown. The two key aspects of any investment are time and risk. The time element is the dominant attribute. Research helps to understand an instrument or product and know what are getting into. In some investments, the risk element is the dominant attribute, especially, stock options. In yet other investments both time and risk are important.

This research is a baseline data of the investment alternatives considered by the Indian expatriates in Dubai. It also shows the awareness level of the respondents as regards to investments and class of assets. The demographic profile in terms of socio-economic characteristics such as age, gender, occupation, income, and education was carefully studied as it impacts the pattern of investment of the respondents. Generally, it is of great importance to the Indian investors in Dubai to be akin to investing processes to secure the investments and yield on investments.

1. Statement of the Problem

Research can be defined as a systematic investigation, study of relevant material and sources in order to establish facts and reach new conclusions. A "Statement of the Problem" is a description of a difficulty that needs to be solved or at least researched to see whether a solution can be found. It can also be described as either a *gap or contradiction* between principles and practices. The ultimate goal of a problem statement is to transform a generalized problem something that is not in the right perspective or into a well-defined problem that can be resolved through focused research and appropriate decision-making. The statement of the problem should include the following:

- A. A clear statement that the problem exists,
- B. Evidence that supports the existence of the problem,
- C. Evidence of an existing trend that has led to the problem,
- D. Definitions of major concepts and terms,
- E. A clear description of the setting,
- F. Probable causes related to the problem, and
- G. A specific and feasible statement.

This research is focused on the existing investment alternatives for the Indian Expatriates in Dubai. The study answers the following questions:

1. What is the demographic profile of the respondents in terms of the socio-economic characteristics such as: age, gender and income?
2. What are the available investment alternatives among the respondents given the existing socio-economic-cultural conditions?
3. What are the prevalent investment alternatives and investment behaviors of Indian expatriates based on the secondary sources of data?

As an investor we have a wide array of investment avenues available in Dubai. United Arab Emirates in general and Dubai in particular has no exception in it. But it is more important to know how people are considering these alternatives seriously. We have studied that savings of the people automatically becomes investment. The economic wellbeing of the state depends significantly on how wisely or otherwise people invest their savings. It is a case study which deals with various investment alternatives for Indian expatriates in UAE. Dubai has been taken as a case study for examining people's investment behavior towards various investment opportunities.

2. Objectives of the Study. Methodology

The objectives of the study are:

- To study the propensity to save/invest in the selected population.
- To know more about various investment alternatives.
- To study and analyze the investment behavior of the sample of the selected population.
- To enhance the scope and knowledge of appropriate investment behavior for the selected population.

There can be varied meanings with the term theories and methods in management research. A helpful way to delineate between them is to understand "theories" as representing different ways of characterizing the managerial world when you research it and "methods" as representing different ways of generating and analyzing data about that managerial world. Framed in this way, all empirical management research involves theories and methods, whether they are stated explicitly or not. However, while theories and methods are often related, it is important that as a researcher, to deliberately separate them in order to avoid the theories playing a disproportionate role in shaping what outcomes the chosen methods produce.

Methodology is crucial for this study because an unreliable method produces unreliable results and as a consequence undermines the credibility of interpretations and findings relating to the study in this context. The process used to collect information and data for the purpose of making business decision. It includes research publications, interviews, surveys and other research techniques. In management science, it is important to provide relevant and sufficient information for researchers in the field to adopt the methodology used in this study. The researchers would want to understand on how the new or existing methodology is used in an innovative process.

This study is basically explorative in nature and mainly based on primary and secondary data. The collection of primary data through the field survey method was conducted from different sections of Indians in Dubai representing various sectors such as government, private, manufacturing and service sectors. The secondary data is collected from banks, investment companies and other informal yet reliable sources.

Source of Data

Both primary and secondary data were collected and used for this study primary data were collected from people that belong to different income groups and working areas, who are invested in various alternatives and also from various investment industries. Secondary data were collected from various journals and books.

Primary data for this research article was collected by the researcher through: collection of data through the questionnaire; interviews and observation. Secondary sources are data that already exists: previous research; mass media products; government reports; web information; historical data and information.

3. Survey and analysis

We collected data through 193 questionnaires/interviews of investors belonging to various working/business sectors. Majority of them are interested in long term investments like Fixed Deposits, Gold/Silver, Real Estate Investments and Equities. Investors also approaching Real Estate sector seriously because we know that Indian expatriate population is increasing thus the value of land and buildings will keep an increasing rate.

Indian expatriates in Dubai are not much aware about Public Provident Fund. It's a good opportunity for public to invest in provident fund. But people of Dubai are not showing a confident move to invest in Pension Funds. The investment opportunities like National Saving Certificates infrastructure bonds has not made much influence among people through our survey we could experience it. Because 60% people even did not hear about it.

It was more interesting to know that many of the investors are interested in non-institutional alternatives like Chit Funds, Money Lenders, Builders and etc. People were not ready to reveal the entire investment field where they actually invested. It denotes that non – institutional investment alternatives have become much popular among investors.

Banking sector is very strong in Dubai. There are almost all the branches of important banks in Dubai both public undertaking and private financial institutions. It shows that people in Dubai are more interested in non – marketable financial investments. It also experienced in survey.

Mutual funds are another alternative which has not made much influence among people. In other words people are not much confident to invest in mutual funds.

We have interviewed few share brokers from Dubai in order to know trends in share market investments. The brokers said that the people of Dubai are not showing a positive attitude towards stock market. People below 45 ages are more confident to invest in share market because they expect more return in short period. 95% of investors are male investors. While only 5% are woman investors. People are not confident and also afraid about the short term fluctuations in share market.

Major Investment Alternatives in Dubai:

- Non Marketable Financial Assets: Bank deposits and Life insurance;
- Real Estate: Agricultural land, Semi – urban land, Commercial property, A second house;
- Precious Objects: Gold, Silver, Precious stones.

Investment behavior of Indian expatriates in Dubai. Major Alternatives:

- *Fixed Deposits*: People are more interested to invest in FD because of its long term credibility and investors also seek a good return from the source if there are government undertaking banks, private co – operative banks in Dubai/India.
- *Gold*: The value of gold is stable thus investors showing a positive attitude. There are more woman investors in it and there is a trend in precious stones too.
- *Real Estate*: Land is precious forever because of the increasing trend in population value of land is always stable. Real estate has become a major investment opportunity in Dubai/Singapore/India. There are many Real Estate investors in Dubai.
- *Life Insurance*: People of Dubai always interested to invest in various Insurance Policies. There are almost all the branches of popular Insurance companies in Dubai.

Table 1. Age, gender and income wise distribution of Investment behaviour by the Indian expatriates in Dubai

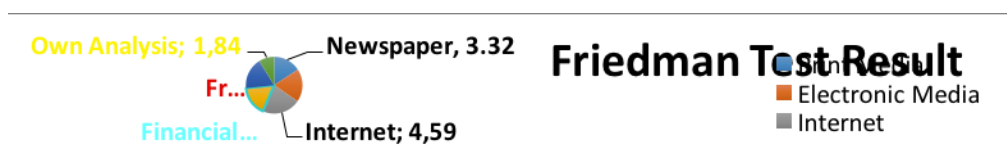
Age of the investors	Gender	Income AED.	Investment behaviour of indian expatriates in Dubai
20 – 35	Males	Less than 10,000	<ul style="list-style-type: none"> ▪ Investing in employee benefits; ▪ Clearing family loans at hometown.
		10,001 to 20,000	<ul style="list-style-type: none"> ▪ Saving for building home(s) at hometown; ▪ Investing in employee benefits;
		Above 20,000	<ul style="list-style-type: none"> ▪ Saving for wealth; ▪ Invest in Business;
	Females	Less than 10,000	<ul style="list-style-type: none"> ▪ Investing in employee benefits;
		10,001 to 20,000	<ul style="list-style-type: none"> ▪ Clearing family loans at hometown;
		Above 20,000	<ul style="list-style-type: none"> ▪ Saving for wealth;

Age of the investors	Gender	Income AED.	Investment behaviour of indian expatriates in Dubai
36 – 50	Males	Less than 10,000	▪ Managing debt locally and hometown;
		10,001 to 20,000	▪ Building equity;
		Above 20,000	▪ Building equity; Diversifying investment portfolio; Saving for wealth;
	Females	Less than 10,000	▪ Helping to manage family debts;
		10,001 to 20,000	▪ Saving for wealth;
		Above 20,000	▪ Diversifying investment portfolio; Saving for wealth;
51 – 65	Males	Less than 10,000	▪ Saving for Retirement;
		10,001 to 20,000	▪ Estate Planning; Reducing Investment Risks;
		Above 20,000	▪ Estate Planning; Expanding business; Saving for wealth;
	Females	Less than 10,000	▪ Saving for Retirement;
		10,001 to 20,000	▪ Estate Planning;
		Above 20,000	▪ Estate Planning; Saving for wealth;
66 – 80	Males	Less than 10,000	▪ Relying on retirement income;
		10,001 to 20,000	▪ Relying on retirement income; Preserving value;
		Above 20,000	▪ Relying on retirement income; Preserving value; Reinvesting capital; Eliminating Risk;
	Females	Less than 10,000	▪ Relying on retirement income;
		10,001 to 20,000	▪ Preserving value;
		Above 20,000	▪ Eliminating Risk.

4. Findings

- The majority of the respondents belong to 41-50 age groups and the majority of the population is males;
- The majority of the respondents married but they live alone in Dubai – Saving potential is high so, investment could be higher;
- The majority of the respondents save AED. 3,000 to AED. 8,000 per month. Therefore, the annual savings are in the range of AED. 36,000 to 96,000;
- The majority of the respondents use borrowed funds from banks and other means.
- The majority of the respondents have an experience of 2-10 years;
- The majority of the respondents save 50 to 75% of their income;
- The front runners for most of the respondents are friends;
- The majority of the respondents are medium term investors;
- The majority of the respondents consider liquidity as the important factor before investing.
- The majority of the respondents consider return as the important investment objective;
- The majority of the respondents monitor their investments weekly;
- The majority of the respondents take the advice of the brokers;
- The respondents had chosen negotiable securities as their first preference. The second place is occupied by non-negotiable securities followed by real assets. The fourth, fifth and sixth places are occupied by Mutual funds, tax sheltered schemes and life insurance respectively;
- The respondents had chosen hedging against inflation as their first preference. The second place is occupied by safety of principal followed by liquidity. The fourth fifth and sixth places are occupied by return, retirement benefits and risk respectively.

Figure 1. Friedman Test Results



To find out the important sources of information considered by an investor before investments, Friedman rank test was employed. The result of Friedman rank test discloses that the majority of investors make use of

Internet for mobilizing investment related information followed by watching television, consulting with friends and peer investors, etc. The result indicates that the investors relying on their own analysis is the lowest due to expert knowledge in the field of investment management. Numerous avenues of investment are available today. Investors should sacrifice their personal earnings for the betterment of their future. The key aspect of any investment are time and risk. If the investors are ready to take risk they can expect a good benefit in future. Time also plays a key role. Investors are always rational in their behaviour.

Table 2. Ranked responses of investment behaviour by the Indian expatriates in Dubai

S. No.	FACTORS	Rank										No. of respondents
		1	2	3	4	5	6	7	8	9	10	
1	Term Deposits – Banks	56	47	42	18	12	4	8	6	0	0	193
2	Savings – Bank A/c	40	38	30	20	20	10	14	16	5	0	193
3	Bonds – Corporate	22	30	20	35	10	28	18	16	8	6	193
4	Securities – Government	12	30	26	18	24	11	31	26	11	4	193
5	Equities / Mutual Funds	63	13	18	17	12	21	10	21	13	5	193
6	Real Estate	71	21	11	14	11	19	17	8	11	10	193
7	Commodities	45	32	9	16	21	7	6	21	22	14	193
8	Metals – Gold / Silver	52	21	25	21	17	12	16	15	14	0	193
9	Life Insurance	38	25	11	11	23	12	18	17	13	25	193
10	Chit Funds	32	22	21	22	12	24	21	12	18	9	193

Source: Primary data collected and computed through the questionnaires

Table 3. Percent value and conversion to Garrett ranking scores of investment behaviour by the Indian expatriates in Dubai

Rank	Formula: $100 (R_{ij} - 0.5) / N_j$	Percent Value	Garrett Score *
1	$100 (1 - 0.5) / 10$	05	82
2	$100 (2 - 0.5) / 10$	15	70
3	$100 (3 - 0.5) / 10$	25	63
4	$100 (4 - 0.5) / 10$	35	58
5	$100 (5 - 0.5) / 10$	45	52
6	$100 (6 - 0.5) / 10$	55	48
7	$100 (7 - 0.5) / 10$	65	42
8	$100 (8 - 0.5) / 10$	75	36
9	$100 (9 - 0.5) / 10$	85	29
10	$100 (10 - 0.5) / 10$	95	18

Diagram 2. Garrett Ranking Scores – Investment Alternatives by the Indian Expatriates in Dubai

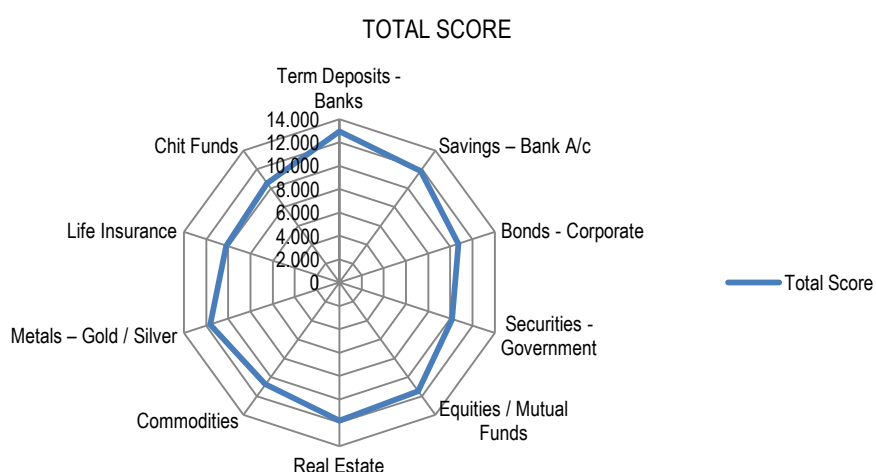


Diagram 3. Mean Scores Garrett Ranking Scores – Investment Alternatives by the Indian Expatriates in Dubai

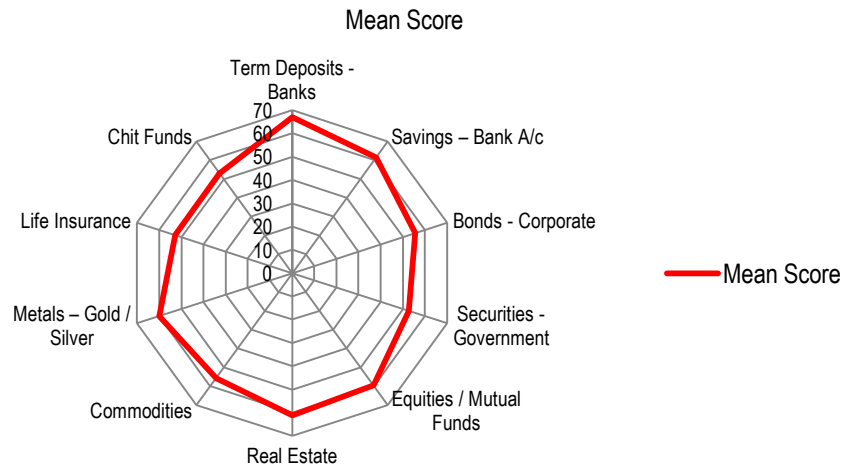
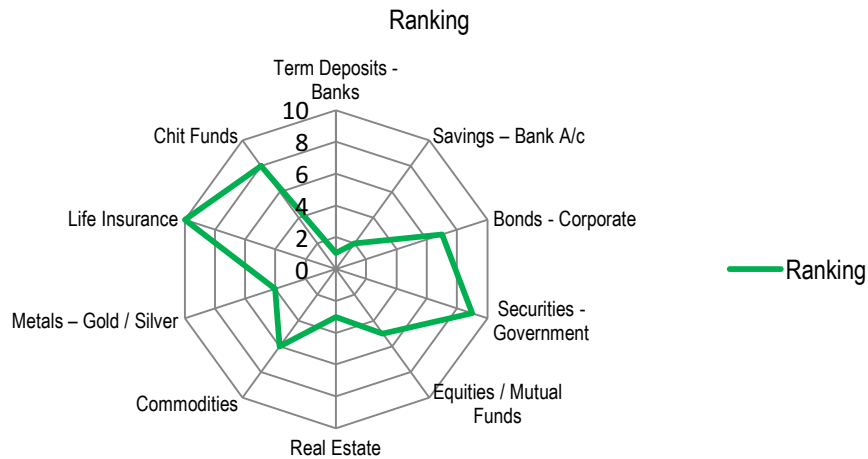


Diagram 4. Rankings of Investment Alternatives by the Indian Expatriates in Dubai



The research of Garrett ranking reveals that respondents prefer to invest in Term Deposits - Banks followed by Savings Bank Accounts, Real Estate Gold, Metals – Gold/Silver, Equities/Mutual Funds, Commodities, Bonds – Corporate, Chit Funds, Securities - Government and Insurance. I could find out the behaviour of investors through the study. Even though it is a research study to analyse the investment behaviour of the people in Dubai, it was my attempt to find out the basic characteristics of an investor. An investor has a relatively longer planning horizon. Its holding period is usually at least one year. I could gather the following information through my observation and data analysis:

- Investors are normally not willing to assume more than moderate risk. Rarely, they knowingly assume higher risk;
- Investors usually seek modest rate of return which commensurate with the limited risk assumed by them;
- Investors attach greater significance to fundamental factors and attempt careful evaluation of the prospects of the firm;
- Typically, as in use they own funds and eschew borrowed funds.

In the case of Indian Expatriates in Dubai investors should be much aware about the various investment fields. Especially about World Stock Market, Pension Funds, National Bonds etc. Majority of the investors are not ready to invest in Stock Market, because of their fear. It is not clear as to why they are afraid about it? Perhaps, the short term fluctuations in the stock market is the major reason while there are good percentage of investors in long term investments because they expect a modest rate of return after a specific maturity period.

The result of the above analysis discloses that investors, before making investment, search for various investment options followed by seeking intermediaries' advice and prefer to invest based on transaction cost and

the like. At the time of investment, the investors ascertain the performance of investments, undertakes the responsibility for their investments, prefers to diversify their investments, etc. Similarly, during the post investment scenario, investors are of the opinion that they will retain their investments till a need arises, wish to make more investments in the same avenue if they receive the expected return from their investments, and agree that they may switch over to other investment sources, when a need arises.

Conclusion

Investment is one of the cornerstones for the economic wellbeing of a country. It plays an important role in the growth and developmental activities of an economy. There are many investment alternatives in Dubai for Indian Expatriate Investors. This research is an attempt to find out the investment behaviour of the Indian Expatriates in Dubai. There are many investment opportunities in Dubai but people are concentrating more of the major long term investments like, Fixed Deposits, Gold, Life Insurance, Real Estate Provident Fund and short term alternatives like Chit Funds and private financial firms. The respondents had chosen hedging against inflation as their first preference. The second place is occupied by safety of principal followed by liquidity. The fourth fifth & sixth places are occupied by return, retirement benefits and risk respectively.

Recommendations

1. From the findings it is inferred that the investors are monitoring their investments on a weekly basis. It is recommended that the investors can monitor their investments within reasonable small intervals.

2. The majority of the investors consider return as the major investment objectives. Rather they can concentrate on other investment objectives like safety of principal, retirement benefits and to hedge against inflation.

3. It is inferred from the study that the majority of the investors are medium term investors. They can even watch the market movements for a longer period of time to reap more benefits.

4. Rather than considering liquidity as the most important factor before investing, they can concentrate other factors as well.

5. Many of the respondents responded that they use borrowed funds. They may add their own funds to reap the benefits.

6. Conceptually speaking, a challenge that nearly all the investors face is the lack of scale for applying modern banking techniques related to issues such as robust and scalable IT systems, management information systems, customer relationship management, risk management and access to financial markets, which is needed for effective financial mediation to Indian expatriate investors in Dubai.

7. Creating a sustainable financial environment is not an end in itself. It is the only way to reach significant scale and impact far beyond what investors can fund. Achieving financial sustainability means reducing transaction costs and offering better products and services that meet Indian expatriate needs in Dubai. This will allow the continued investments of Indian expatriates and the ongoing provision of financial services.

8. India is working hard to provide more services and expertise to attract more UAE investments and facilitate knowledge exchange in various fields. Today, the country is one of the world's largest and fastest growing economies. Therefore, the Indian Expatriate Investors should take this opportunity to invest in Indian economy and grow along.

9. Indian Expatriate Investors should consider innovative economic solutions that drive commercial growth and diversification; and enhancements to the UAE's role in the development of the international economy.

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- *** The circumstances of pain made me look for answers, "Tony shares in a round table with Warren Buffett, San Antonio Mayor Julián Castro and Spanx founder Sara Blakely for the Today Show. Business ideas on Facebook at <https://www.facebook.com> Jan, 2013

The Elaboration, Adoption and Application of the Decisions in the Management Process

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Abstract:

The decision is an essential element of the management, its specific expression instrument being most important. The decision making is the essence of the management. The quality level of the management of an economic entity is manifested most strongly through the developed and applied decisions. The specific role of the decision emerges from the fact that the integration of the organization in the environment depends on the quality of the decisions which are made within it. In the same time, the quality of the decision-making process influences the costs discount, efficiency of the production factors use, profits increasing, generally all the economic-financial results of these. Given that the importance of the decision in the management process, this paper discusses the procedure for elaboration, adoption and application of the decision in the management activity, starting from emphasis of the decision role, presentation of the main elements of the this, classification modality of the decisions, stages in the decision-making process and this paper ends with a case study involving the application of the Bayes-Laplace criterion.

Keywords: strategy; decision-making variant; goal; decision-maker; environment decision-making criteria; management

JEL classification: M54; M53

Introduction

The essential element of the management process, the decision is the act of moving from thought to action. This is to find the most important future actions for ensuring the maximum efficiency of the management actions. The process of the continuously enhancing of the efficiency of management actions requires that any adopted decision be based on a strong scientific substantiation. The decision is the action course which is chosen to achieve one or more goals. Characteristic of the decision is that it is the expression of a rational, coherent act being formulated on the interpretation of information that is processed, in order to choose an alternative for achieving the predetermined goals.

Based on these considerations, the paper focuses on studying the theme of the decision role in achieving the major goals of an organization.

In the beginning we shall present the most important definitions of the concept of decision as found in the specialty literature. We shall discuss about the three basic factors being necessary to make decisions, namely: the decision maker, the environment and the relations between the decision-maker and the environment.

Concerning the relation between the decision-maker and the environment we shall point out that there are three situations in which the decisions can be made: decisions made in certainty conditions; decisions made in risk conditions and decisions made in uncertainty conditions.

We specify the criteria underlying the decision making under uncertainty conditions, namely: Pessimistic or prudent criterion, Optimistic criterion, Hurwicz's criterion, Savage's regret criterion. Unlike the criteria for adopting the above-mentioned decision, which refers to the choice of a strategy under conditions of total uncertainty, the Bayes-Laplace criterion is used to make decisions in the risk conditions.

We present the classification modality of the main types of decisions. Within the economic units, many decisions are made; the decisions differ between them after: the level of management, the degree of time pressure, the frequency with which they are made, the degree of effectiveness, the possibility of foresight, the knowledge degree of the objective conditions that may follow, the importance of decisions, the phases of the management process, after their orientation.

Also, we discuss about the issues being related to the stages of the decision-making process. Due to the fact that the decision-making process is very complex and important, the problem of the stages, through which a decision-making process passes, is treated extensively in a different way by many specialists. With the help of a figure we shall present the six stages of the decision-making process.

The paper concludes with a study case that involves the application of the Bayes-Laplace's criterion to an

agricultural company of animals breeding.

1. The role of the decision in the management process

The experts in the field have formulated the numerous definitions on the concept of decision, some being more broadly expressed, others in a more limited mode.

Gore and Dyson (1984) say that the decision is "the process by which a person makes a choice that affects the other functions holders' behaviour in the company and their contribution to achieving the goals of the unit."

Puiu (2004, 235) considers the decision as "the most representative function of the leadership as well as the most effective tool for adjusting and regulating in a dynamic environment, it involves choosing between two or more possible alternatives, the optimum. The decision represents a person's or people's social, deliberate and rational act through which there are set goals, directions and ways of achieving them, depending on the current needs of economic and social life, on the basis of an analysis and evaluation process of the means, necessary resources and of the consequences of that activity".

According to Dumitrescu (1969) the decision represents "a consciously chosen line of action from a number of possibilities in order to reach a certain result."

According to Verboncu (1999, 271) the decision constitutes "the chosen modality from several possibilities in order to achieve an objective. The decision is the condition for the economic, trade and management success of the company and, at the same time, the most important management product of those who lead". The substantiation and the adoption of the management decisions constitute the work essence of the managers of any organizational echelon, resulting in the managers' an appropriate involvement in providing the top-level quality parameters.

The qualitative level of the management of a company is best manifested by the elaborated and applied decisions.

In the authors Văcărescu Hobeau and Hobeau's opinion, (2013, 140) "the decision can be defined as the most important moment in the management activity, which supposes the choice, consciously, through a process of deliberation of an action line of in more possibilities, in order to achieve a goal or purpose, *i.e.* the choice of the optimal between two or more possible alternatives".

From the mentioned definition it appears that the management decision involves the achievement of three conditions: to be chosen, so from several possible actions, to be chosen one of them through the elimination (the existence of a single alternative does not raise the problems of choice); to be conscious, that is, to be preceded by a deliberation; the choice must be oriented to a goal, aimed at achieving an objective.

The decision means the basic action of the management of any economic agent which determines both directly and indirectly throughout the activity results on the ensemble of the unit and on every structural component of this. After Nicolescu (1980, 199) "the decision is course of action which is chosen in order to achieve one or more objectives".

The role of the decision in the company management is underlined by the fact that through it there is determined the position of every organizational link of the company, the position of every sub-unit and each employee's position to solving the envisaged tasks.

Also, using the decisions there are coordinated in time and space the resources and there is assured the rhythm in carrying out the tasks of plan. Because the decision must reach the goal it is necessary that the decision answers to the certain requirements: the decision must be scientifically substantiated; be empowered and competent; be rationally coordinated and non-contradictory; it must be taken at time, be clear and simple, be effective.

2. The basic factors of the decision

The complex problem being raised by the adoption of a scientifically substantiated decision requires the knowledge of the elements which must be considered in the development of these.

To be able to make decisions, there must be some underlying the factors or elements:

- decision-maker or decision factor;
- environment;
- relations between the decision-maker and the environment.

Decision-maker or decision factor is the one who takes the decision, so a subjective element in the decision-making process, which may be an individual or a community, which means that the decisions can be influenced by some features of the decision-maker.

Văcărescu Hobeau and Hobeau (2013, 137) consider that „to make decisions, it must meet two conditions: to be invested with the necessary authority in this field and to be competent in the approached field”. The growing difficulties in the decisions adoption, the increasing of the complexity degree of the problems which must be resolved, require increasingly more that the decision-maker be a professional in the management.

The decision-maker must have some qualities like: competent, personal identification of own aspirations with the employees and economic agents' objectives, responsiveness to the new, ability to make decisions in the operative way but well thought-out, continuous and quick self-improvement for counterbalancing the wear process of the gained knowledge, it must know to behave with the collaborators and the subordinates and it must draw them into the work and they must have the responsibility of leadership.

The environment consists of all internal and external conditions of the unit, the conditions which influence and are influenced, directly or indirectly, by that decision. The environment represents, therefore, the framework in limits of which the decision maker acts through its had information.

The environment can be: internal (from the unit) and external (national and international). Among the influence factors on the decision belonging to the environment inside of unit, there are: managers' competences; performers' professional and cultural level; used management techniques and methods; information system which is used in the unit; degree of technical equipment *etc.*

The influence factors of the external national environment are: government economic policy: of investments, credit, foreign trade, *etc.*; the legal framework settling the economic agents' status; relationships with other units and with the state; socio-cultural environment; the standard of living, consumers' tastes; technological environment; the rhythm of renewal of the products and technologies, *etc.*

In terms of external international environment, it exerts on the unit an important influence by: currency fluctuations; blockages and embargoes; obligations imposed by international treaties; rates; wars *etc.*

In the present conditions, the main environmental trend is to be always more complex and more dynamic as a result of the changes in its components, of the growth of the number of variables that must be taken into account the elaboration and adoption of the decisions.

The relations between the decision-maker and the environment are expressed in terms of the nature of the relations between the decision and its economic, political, social implications or other nature implications.

In connection with this report there are mainly three situations, namely:

- decision-making in conditions of certainty;
- decision-making in conditions of risk;
- decision-making in conditions of uncertainty.

The decisions being made in terms of certainty means that the existence of complete information on the problem in question which allows the removal of uncertainties. The decisions being made in such conditions may be met in the situations when we suppose that we are dealing only with a single state the objective conditions and we choose a single solution, the decision has all the chances to be exactly achieved, in the case when there are used the methods and the suggested measures are taken. The elements which are involved in making these decisions are of controllable variables type, with the known characteristics and whose evolution can be accurately appreciated. The decisions made in terms of certain conditions can be met especially at the lower levels, the operative management of the production.

The decision-making in terms of risk conditions implies the existence of several states of the objective conditions. These decisions are met when the fixed goal is possible, but the probability of its achievement cannot be specified, being a big uncertainty concerning the most appropriate modalities, in order to achieve it.

The features of the decisions which are made in such conditions are that a big part of factors which conditions the achievement of the proposed objective belongs to the category of the uncontrollable variables in the given situation.

The probabilities theory has the best field of action in this type of decisions; the essential element in the adoption of these decisions is the degree of accuracy in the approximation of the appearance probability of a phenomenon. The difficulty is in the fact that in the phenomena appreciation we work with the estimations and the average values are often based on the statistical methods.

The decisions made under the uncertainty conditions are those whose effect depends entirely on the action of the unforeseen factors, which cannot be estimated, neither even with a low degree of probability. Each of the three categories of the decisions requires the specific methods of substantiation. The decisions which are made in the certainty conditions can be substantiated by very precise means, leaving from simple calculations, of elementary mathematics, until the use of the modern mathematical methods of operational research.

In terms of the substantiation methods of the decisions made in conditions of risk and uncertainty, they are the result of researches from a relatively new branch of a mathematics which is called 'the theory of strategic games'.

The characteristic elements of the theory of the strategic games are: game, match, strategy. The game is a competitive process which takes place between more participants called players, of which at least one is intelligent and prudent, namely he can analyse the situation and decide on his future actions which put him to advantage. The games with two participants have a special importance in shaping the economic processes. The match is the performance of the players' actions, after the certain rules. Every match has an initial state and a final state, the latter causing, basing on the rules, a gain or a loss for each player.

The strategy is a player's collection of actions sequences, every sequence being prepared as a reaction against the strategy of the opponent (which can sometimes be nature), in order to achieve the proposed objective, namely the final state to which the game rules associate the maximum of possible profit.

The representation of a game with two players (partners) can be done in the matrix form (Table 1.).

Table 1. Representation of a game with two players

Players' strategies		B ₁	B ₂	B _n
-player A -	-player B-				
A ₁		a ₁₁	a ₁₂	a _{1n}
A ₂		a ₂₁	a ₂₂	a _{2n}
.	
A _m		a _{m1}	a _{m2}	a _{mn}

Source: Văcărescu Hobeau and Hobeau (2013, 142)

In this table: A represents one of the players (natural or legal persons), B represents the opponent (which can sometimes be "nature"), $\bar{A} = \{A_1, A_2 \dots A_m\}$ is the crowd of the A strategies of A, $\bar{B} = \{B_1, B_2 \dots B_n\}$ is the crowd of the strategies of B, a_{ij} ($i=1,2,\dots,m; j=1,2,\dots,n$) is the appropriate consequence of the adoption of the A_i strategy by the player A and of the adoption of strategy B_j by the player B, *i* represents line, *j* represents the column.

In this game one of the partners is the decision-maker and the other is "nature" that can represent the different states or phenomena which do not depend on human being such as: floods, drought, earthquakes, underground riches, territorial or international waters, at which the economic agent has access *etc.*

The various nature states will be considered the strategies of this. The easiest strategic game is "the game with zero sum between two partners" or "the game point to" in which one of the players loses exactly what the other wins. The rules of this type of game can be found in the activity of economic agents, both in the relations between them as well as in the so-called "game against nature." In the latter game one from the partners is the decision-maker and the other "nature" that can represent the different states or phenomena which do not depend on human being such as: floods, drought, earthquakes, underground riches, territorial or international waters, at which the economic agent has access *etc.*

In the game against the nature there is particular the fact that the "nature" is not an aware opponent that could have the benefits from his partner – the human being's wrong decisions. The decision-maker, in the case of the wrong orientation, he strongly reproached himself he did not work enough to know sufficiently well the "nature". Starting from a simple way of putting the problem of the decision, the creators of the theory of strategic games made a series of criteria after that there may be led the game partners in the adoption of most convenient decision.

Making decisions in the uncertainty conditions has at the base the following most commonly used criteria:

- a) Pessimistic or Prudent criteria formulated by A. Wald, according to which in adopting the decisions we must start to take into account the most unfavourable situations, when all the involved factors would be hostile, which require the provision of minimal results. Considering that the player A is the decision-maker and B is its opponent which may even be the nature, using a matrix of gains in the conditions of the pessimistic criterion there will be determined the minimum utilities (values) on the matrix lines, choosing between these the maximum utility. If in the matrix there are the achievable gains in the different states of the nature, then there will be chosen the strategy which will ensure the maximum of benefits from the minimum benefits permitted by the nature, hence the name which is sometimes used for the maximum criterion.

- b) Optimistic criterion, proceeds contrary to the Pessimistic criterion, believing that the situations, conditions and factors of influence are favourable, choosing the strategy which ensures the getting of maximum benefit from the greatest possible benefits (the maximax criterion).
- c) Hurwicz's criterion. According to the author, the pessimistic criterion is too cautious, and the optimistic criterion is too risky, so it seems more logical that at the choice of the strategy there be adopted a compromise position, through the orientation towards a benefit which must be between the maximum benefit and minimum benefit hence the name of criterion of Prudent Optimum. According to this criterion, the strategy (A_i), which should be adopted, can be according to the equation (1), maximizing the function:

$$f(A_i) = \langle C_i + (1-\langle)c_i \tag{1}$$

where: C_i and c_i – the maximum earning and respectively the minimum earning corresponding to the strategy A_i ; \langle – the coefficient expressing the optimism of the one who decide. The \langle coefficient can take values between 0 and 1. It is obvious that if the $\langle=0$, $f(A_i)=c_i$, which means that decision-maker is led after the pessimistic (maximin) criterion and it will choose the strategy which provides the maximum from the lowest possible benefits, and if $\langle = 1$, $f(A_i) = C_i$, the orientation is done after the optimistic (maximax) criterion. As a rule, for \langle there will be chosen an intermediate value ($0 < \langle < 1$).

- d) Savage's regret criterion leaves from the idea that the decision-man, after taking a particular decision, finds that the result obtained (benefit) may be greater than if it had chosen another strategy. Hence derives the requirement that minimize regret in the future through a better understanding of the conditions and situations (as well as the opportunities arising therefrom) which allow choosing the best strategies and thus enhancing the results (the benefit). Savage's criterion consists in the application of the severe maximax so-called "matrix of remorse" or "alternative" loss matrix. This is made up by comparing the outcome expected according to a certain strategy with the strategy which should be adopted if you would know with certainty the State of nature.
- e) Bayes-Laplace criterion is used to making decisions in terms of risk, *i.e.* the conditions under which the various possible States of nature can be appreciated with a certain degree of probability. The risk, as it considers a range of quantifiable uncertainty represents researchers. If the equation (2) there is noted with p -the probability of the appearance of a certain nature states, then:

$$p_1 + p_2 + \dots + p_n = 1 \quad \text{or} \quad \sum_{j=1}^n p_j = 1 \tag{2}$$

With these probabilities there is weighted each of the values corresponding to the possible states of the nature, determining in this way "the hope" Mathematics (E_i) of the expected result when applying the A_i strategy, as well as in the equation (3).

$$E_i = \sum_{j=1}^n c_j p_j \tag{3}$$

where: c - the result which is appropriate to A_i strategy, if the state of nature is B_j ; p – the probability of the apparition of the B_j state.

3. The classification of the management decisions

In the framework of the economic units there is taken a number of decisions, which differ by: sphere of including, the perspective at which it refers, the hierarchical level at which the decision is made, the scope of analysis and thought process that it requires, the amount of required information, *etc.*

The optimal decision making process, its shortening, the determination of the hierarchical level of competence to which there have to be made the certain decisions and the specific problems that arise in each type of decision make the knowledge and the classification of these be necessary. The best-known classifications are as follows:

- a) After the management level at which the decisions are made (the management echelon), the decisions can be classified into:
- top level decisions, adopted by managers in the superior echelon;
 - middle level decisions, adopted by managers of the certain operational and functional compartments;

- lower level decisions, adopted by managers from the inferior sample of the management.
- b) After the degree of temporary pressure there are:
- pressing or alert decisions;
 - decisions which can be approached in time intervals with more flexible limits.
- c) After the frequency with which the decisions may be made, there are:
- random decisions, decisions being adopted according to the emergence of the problems requiring the manager's intervention;
 - unique decisions, decisions being made once in life of the company;
 - regular decisions, decisions being adopted at regular intervals.
- d) After analysing the degree of effectiveness:
- possible decisions;
 - optimal decisions.
- e) After the number of decision-making criteria, the decisions may be:
- multicriterial, when the decision-making problem which must be solved has at the base a multitude of criteria;
 - uni-criterial, when the decision is made according to a single decision making criterion
- f) After the extent of the decision-maker competences, we have two types of decisions:
- approved, which may not be operationalized without some managers' consent from at a higher level in a hierarchical structure;
 - unauthorized (independent), specific to the manager, the individual or group, with the full decision-making autonomy
- g) After the extent of the decision-maker, we have:
- individual decisions made by individual managers, located on different hierarchical levels;
 - decisions of group, adopted by the participatory management bodies.
- h) Depending on the nature of the involved variables and the anticipation possibilities of the results, or in other words after the degree of knowledge, the decisions are: certain; uncertain; of risk.
- i) After the time horizon and the implications on the company:
- strategic decisions, with the big time horizons, low degree of detailing of the goals and impact directly upon the company, as a whole, contribute directly to the achievement of the fundamental objectives;
 - tactical decisions, with variable time horizons, from one month to one year, detail degree of the objectives which is in inverse proportion with the time horizon, contribute directly to the achievement of the derived objectives;
 - current (operational) decisions with small time horizons and impact on a procedural or structural components of the company, contribute to the achievement of specific individual objectives.
- j) After their orientation, the decisions can be classified as follows:
- decisions on risk-taking objectives;
 - decisions on the attainment of the objectives;
 - preparatory decisions in order to adapt permanently the unit to the conditions that occur in the environment (the decisions of correction).

In conclusion, by approaching the classification of decisions and presenting the main types of decisions there can be found complexity, different nature of the decisions that the leadership of any level has to make permanently, importance of some of these decisions over others, the specific problems of each of them.

4. The stages of the decision-making process

Petrescu (2007, 88) considers that "the decisional act refers to the decision situations of reduced complexity or when the situation has a repetitive character, the involved variables being very well known by the decision-maker, there is no need for a gathering of information and an analysis of them".

The experience and the managers' intuition are to the basis of the decision-making. The decision-making process consists of all the stages through which the management decision is prepared, adopted, applied and evaluated. The adoption of the viable management decisions involves the organization and the systematizing of the managers' work, so that the work is carried out in a logical sequence. This is imposed in a very acute manner in the current stage, when at the level of the economic entities, a growing amount of resources and information is concentrated, as a result of the process of European integration of the agriculture.

The running of the decision-making process requires the achievement of certain stages to which certain

phases correspond. The complexity of the decision-making process, as well as the special importance of these, makes the problem of the stages, through which a decision-making process is going, be widely treated by the specialists and in a quite different way.

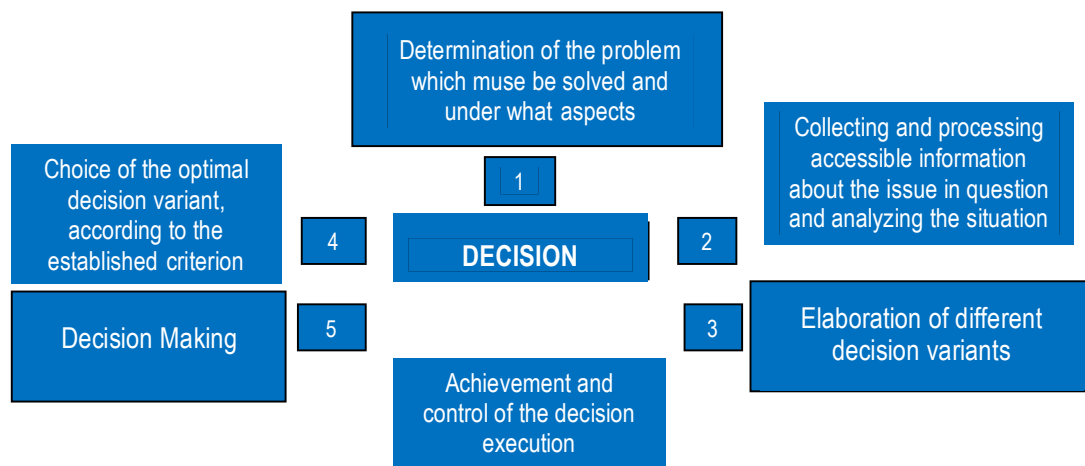
Thus, after Drucker (1977) there are five distinct stages, namely: definition of the problem; analysis of the problem; searching for various possible solutions; choice of the best solution; application of the decision.

According to Gore and Dyson (1984), the decision-making process consists of the following stages: recognizing of the problem; definition and delimitation of the problem; analysis and evaluation of the problem; establishing the criteria by which the solution will be assessed as acceptable and appropriate; the choice of data; formulating and selecting the solution; application of the selected solution.

Concerns on this line also belong to a number of Romanian specialists, including: Dumitrescu M., Vagu P., Nicolescu O., Mihaș I., Zorlențan T., Verboncu I. etc. Considering that the different opinions of the specialists derive from the complexity of the decision-making process, we appreciate that the logical stages of the decision-making process are as follows:

- determination of the problem which must be solved and under what aspects;
- collecting and processing the accessible information about the issue in question and analysing the situation;
- elaboration of the different decision variants;
- choice of the optimal decision variant according to the established criterion;
- making of the decision;
- achievement and control of the decision execution.

Figure 1. Stages of the decision-making process



Source: Authors

a) *The first stage, the determination of the problem which must be solved and under what aspects,* consists of finding out and specifying the problem which must be solved and under what aspects, as well as establishing the goal and the rules which must be observed. In the establishment of the problem, there is important the direct, conscious character which is oriented to a goal of the management.

The importance of the just determination of the problem, the purpose, results from the fact that all the attributes of the management, to a large extent, are determined by the goal and the tasks being formulated in the made decisions.

The manager's attention must therefore be channelled into knowing the real and essential problems that need to be solved in order to achieve a particular goal. In practice, the elements that seem at first sight to be the basis of the problem are not always the decisive factors. The appearances can be, at most, the simple clues, they can deceive. This is explained by the fact that the essence of the economic phenomena does not always appear on the surface, hence the need for science, research.

In order to better understand this stage, we suppose the following situation. The products of a company which were well-appreciated on the foreign market, from a certain point of time, they begin to be less and less demanded. The decreases in sales may be due to several reasons: the product no longer meets the consumers' requirements; there is another product that meets the same need but is cheaper on that market; the product entered in the declining phase; the price is too high; the market reached the saturation, etc. If the decrease in the sale was caused by the fact that the product entered in the declining phase and the manager of the company

considered that the sale had fallen because of the price too high, he would look for a number of solutions that would lower the sales price.

Even if there is the best solution to reduce the sales price, however, the product can not be kept for a long time on the market, because the real problem was not solved. If the real problem had been defined, there would probably have been made the decision to upgrade the product or replace it with another product. The specialists appreciate that it is more disadvantageous to give a good answer to a wrongly defined problem than to give a less good answer to a well-placed problem.

It follows that the first consideration in the decision-making must be given to finding the real problem and under these aspects it needs to be resolved. A sufficient time must be devoted to this stage. In reality, it is not performed in this way. In order to properly solve the problem which must be solved, it is necessary to start by researching the "critical factor", that is to say the main cause that determines it. This is done through a series of questions about the pursued purpose. It is important to correctly differentiate the goals of the means of achieving them.

In the economic field, we are dealing with a true goal-means chain, in that the partial goals are only means for achieving higher-level goals. For example, the staff training (goal) becomes a mean for raising the products quality and for increasing its efficiency (primary goal). We can conclude that the first stage in the decision making process is to find the real problem which must be solved and under what aspects.

b) Collection and processing of the accessible information and the analysis of the situation.

The problem of the information is an essential issue in making and achieving the right decision. The best decision-makers are usually the best-informed. It is particularly important to establish with the highest precision: what are the essential data that characterize the phenomenon; what information is valid; *i.e* it reflects the essence of the problem; what additional information is required. It is not always possible for the decision-maker to have all the data or a complete information he or she needs. More often, the decision-maker has to rely on an incomplete knowledge, whether it does not have data, or that its acquisition would cost too much money or time.

The problem is: what is the needed amount of information to make an optimal decision? Here, the contradiction between precision comes, which increases with the volume of information and the costs which are involved in increasing the number of information.

It can be statistically determined which costs correspond to the different degrees of accuracy of the information, but only the decision maker can determine what degree of precision he can afford to pay under the given conditions.

A complete information is not absolutely necessary or possible in many cases, but it is important to know what data is missing in order to assess the security degree of the adopted decision. It is often more important for the decision-maker to know how to have access to certain knowledge than to possess it.

First of all, it must be established: what are the details of the normative acts in relation to the problem on which the decision is to be made; the legal side of the various aspects being raised by the respective problem must not be forgotten (for example obligations, rights); it is not to be overlooked the normative materials as well as the data being provided by the science and the contemporary technology.

At the same time, it is necessary to study the experience of other units, to know the level being reached in the field which is given by the others, with what material, human efforts and what difficulties had to be eliminated in the implementation of similar decisions and what results have been obtained. It is necessary to evaluate the possibilities that the unit can support, the resources it has to make the decision.

Parallel with the use of all the available information at this stage of the decision-making process, there must be taken in consideration proposals, suggestions, solutions which can be given by the counsellors, the consultants, the specialists who know very well the problem. It is advisable there be consulted both the followers and those who disagree with the final goal of the discussed problem.

The successful achievement of this stage also depends on the information system of the unit, its degree of endowment with the modern means of collecting and processing information.

c) The development of the multiple solutions variants

In order to choose the optimal variant of decision, logically, there must be several possible variants or solutions, because only in this case there is the problem of choice. Their careful examination, the evaluation of each and the comparison of their consequences are an essential moment of the decision making.

This is a rational activity that is best suited to a logical and systematic treatment. The operational research is the most valuable tool that can be used. At this stage the decision maker has the opportunity to prove to what extent the problem is mastered, which are its creative ability and the degree to which it is sufficiently objective.

d) The choice of the optimal variant of decision.

The notion of optimal variant refers to the best possible solution to achieve; it aims at the practical realizable goals, not at the ideal perfections which are impossible to achieve under the existing conditions. Appreciated as the decisive stage of the decision-making process, it also depends on how the specific tasks have been resolved in the previous stages.

To analyse the decision variants, it is necessary to know the main factors of influence within each variant, to have as much data as possible on these factors. The taking into account of the several variants complicates the decision problem, makes it harder and more expensive. But the choice of the optimal variant from a larger number of possible solutions usually reach to a more advantageous result than when the choice is made from a smaller number.

Leaving aside the case where one of the variants appears clearly, from the beginning, as advantageous, it can be said that the elaboration of the variants and the choice of the optimal variant require the justified expenses, as far as the chosen solution ensures the realization of the proposed goal in the best condition.

The grouping of variants according to the nature of their consequences which determine them makes easier the choice of the optimal variant by gradually eliminating the variants that satisfy to a lesser extent the most important criteria of appreciation. For example, in the choice of the optimal variant of investments, the criteria of appreciation may be: obtaining a specific investments as low as possible, or a shorter recovery period.

In this way, the criteria of appreciation turn into the decision rules. These rules also have the role of restrictive conditions or limit conditions in which any decision variant is situated. From the beginning, there will be removed the variants that do not meet the limit rules. The choice will be made from the rest of the variants, taking into consideration the variant that will fit better in the established rules and offer more advantages over the others. When there are several criteria for one and the same solution, it is necessary to rank them using a "matrix of the option or selection criteria" for this goal, according to the following model (Table 2)

Table 2. Matrix of option or selection criteria

Criterion	A	B	C	D	Sum of points	Order of importance
A	0	1	1	1	3	1
B	0	0	1	0	1	3
C	0	0	0	0	0	4
D	0	1	1	0	2	2

Source: Văcărescu Hobeau, Hobeau (2013, 173)

There is compared, for example, the criterion A with B. If A is more important than B, the A line and in the column B, there is the number 1, and on the B line and in the column A, number 0. The figures thus indicate the report of importance between the compared criteria. Then there is continued the comparison of the Criterion A with the other criteria C, D and then it proceeds with Criteria B, C and D. At the point of intersection of the line with the corresponding column to each of the criteria (A with A, B with B and so on), the whole number 0 or 1 passes without any influence on the result.

Finally, the points obtained by line of each criterion are summed up and, depending on their size, the criteria are ranked according to their importance, and the most important criterion, in our example A, will become the rule of decision. In choosing the optimal variant of decision, the use of modern statistical and mathematical methods and electronic computing technique has a particular importance for the quantitative aspects. It is recommended that there be considered the following elements which ensure that the optimal variant selection from the possible variants:

- the risk which is involved in every decision-making: a good manager must know how to weigh the risks of each line of action according to the benefits he expects;
- economy of efforts: it is considered as optimal variant the one that offers the obtaining of the best results, with the least effort;
- time factor: the variant that leads to the achievement of the goal in the shortest time is preferred;
- use of the available resources.

e) The making of the decision

Being established all the possible ways of action, the manager, the respective problem being from his tasks, is called to make the choice for one of them. The decision itself can be easily adopted, since the elements of influence of the decision-making phenomenon are quantified and accurately evaluated, and the decisions being made in the certainty conditions.

In the most cases, the things are different. It is known that the most important decisions of the superior

management - the strategic ones - that affect the entire system of the life of the unit, include, besides the quantifiable factors (the cost, the volume of production, etc.), the elements that can only be approximated or even impossible quantified (emotional states, traditions, experience, personal attributes, working climate, etc.).

The decision making by choosing the optimal solution, from many possible variants, is the most commonly used method. However, some specialists are right to draw attention to the fact that alternative solutions are not a guarantee of the optimal solution. They only warn the manager about the mistakes that he could make, if there were only one solution. The method of the choice of the optimal variant from several possible solutions only has the role of stimulating the scientific and analytical thinking. However, it must be taken into account that the adopted optimal solution is optimal in relation to others which are taken in the analysis, and if they are below the existing possibilities and the "optimal" solution will be inferior.

One way to reduce the risk, in the decisions of major importance, is to experiment, on a smaller scale and then to generalize the adopted solution, if the experiment leads to the positive conclusions. Once the decision has been adopted, the question is if through this the decision-making process ended.

According to some authors, this would seem in that way, their argument being: the adoption of the decision is the goal and reason of the decision-making process. The question is the following: is the decision limited to its adoption, is it an end in itself, or is it a mean of triggering the human actions in order to achieve the goals in the optimum conditions? The answer can only be the following: the decision-making process does not end once the decision is adopted - but it continues with the implementation of the decision. The adopted solution must therefore be applied in practice and not filed with the archive.

f) *At the stage of the decision making*, the following activities are usually carried out: firstly, the decision will have to be legalized in the form of a provision or an order. Only after this operation the decision becomes normative. The next activity is to prepare the psychological climate, the explanation of the decision role to the team of execution, how to fulfil it, so that it is widely supported.

If the decision is made at the level of the management of the unit and it establishes the tasks of importance for the sections, then it is necessary to elaborate in the programs of technical-organizational measures being meant to ensure the realization of the decision, the programs in which there are showed how the tasks are accomplished, by what means, when and where there should be begun the action to achieve the decision immediately and when this action should be completed.

The results, that the economic unity will obtain, are dependent on the way in which the decision is made, the content and clarity of its formulation. The content of a decision differs, of course, after cases, but regardless of nature of the decision there must be specified: the main goal and the secondary goals; the means of realization and the optimal way of action; the tasks and the responsibilities of each compartment; execution time limit.

At the same time, there are established the forms and the methods of control over the executors and the information system on the performance of the decision execution.

In conclusion, the decision-making process with the presented stages should not be a rigid model of practical action; each process which is applied in the concrete conditions involves the adaptations to the solving features of the problems. It is important that the decision factors know and follow the logic of the stages of the decision-making process and organize the work in its spirit.

5. The case study concerning the application of the Bayes – Laplace criterion

You are the manager of an animal husbandry company. Being known that the most efficient capitalization of meat is ensured by preparing cans, you decide to build a canned food line. You are in front of an uncertain situation regarding the capacity of the line whereas from the the multiannual data resulting the variations between 150.000-300.000 tonnes.

More commonly there are occurred four states of nature (B1-B4) that you appreciate that they will keep the following probabilities: $P_1=0,1$; $P_2=0,4$; $P_3=0,3$; $P_4=0,2$. Admitting that the annual benefits (thousand lei) corresponding to the different possible strategies to be adopted (A) and according to the different possible states of nature (B) are those contained in Table 3, which will be the processing ability of the tins line which ensures the maximum benefits?

It will be taken into account that if the annual production exceeds the capacity of the line, the surplus will be improved as raw meat, this will affect the benefit per tonne of products, and thus decreasing it, and if the annual harvest is less than the ability of the line processing, the benefit will also be lower, because the cost of production per ton of products would be encumbered by a larger share of the conventionally constant costs (the repaying of the equipment, the current maintenance and its repair, etc.).

Table 3. The possible strategies for obtaining the maximum benefits

B – thousand tons	B1	B2	B3	B4 300 thousand tons
A	150 thousand tons	210 thousand tons	260 thousand tons	
A1	800	1.000	1.200	1.400
A2	770	1.330	1.500	1.720
A3	720	1.260	1.800	2.000
A4	690	1.230	1.680	2.150

We apply the Bayes – Laplace criterion:

$$E_i = \sum_{j=1}^n c_j p_j \tag{4}$$

where: E_i- hope Mathematics; c - the appropriate result of the A_i strategy, if the nature state is B_j; meaning that the adequate annual benefits of every strategy (A) and nature states (B); p - appearance probability of the state B_j. or in other words the appearance probability of a certain nature state

Table 4. Application of the Bayes – Laplace criterion - phase A

Probabilities	0,1	0,4	0,3	0,2
B – thousand tons	B1	B2	B3	B4 300 thousand tons
A	150 thousand tons	210 thousand tons	260 thousand tons	
A1	800	1.000	1.200	1.400
A2	770	1.330	1.500	1.720
A3	720	1.260	1.800	2.000
A4	690	1.230	1.680	2.150

The achievement probabilities of each of the nature states (B) are as follows: B1=0.1; B2=0.4; B3=0.3; B4=0.2. There shall be weighted (multiplied by) the corresponding value of every strategy (A) with the probability of the achievement of the nature moods (B1-B4).

Table 5. Application of the Bayes – Laplace criterion - phase B

B – thousand tons	B1	B2	B3	B4
A	150 thousand tons	210 thousand tons	260 thousand tons	300 thousand tons
A1	800X0,1	1.000X0,4	1.200X0,3	1.400X0,2
A2	770X0,1	1.330X0,4	1.500X0,3	1.720X0,2
A3	720X0,1	1.260X0,4	1.800X0,3	2.000X0,2
A4	690X0,1	1.230X0,4	1.680X0,3	2.150X0,2

Table 6. Application of the Bayes – Laplace criterion - phase C

B – thousand tons	B1	B2	B3	B4	max aij (on line)
A	150 thousand tons	210 thousand tons	260 thousand tons	300 thousand tons	
A1	80	400	360	280	400
A2	77	532	450	344	532
A3	72	504	540	400	540
A4	69	492	504	430	504

We note that the value of 532 is very close to 540, (B2 corresponds to 532 and B3 corresponds to 540), so this fact leads to the choice of a capacity of the line of average tins: 210 thousand tons (B2) +260 thousand tons (B3) = 470:2 = 235 thousand tons. So there will be chosen A3/B3 (540), and the capacity is 235 thousand tons.

Conclusion

The paper approaches the most important aspects of the decision role in the management process, starting with the presentation of the definitions being given to this concept by many authors, continuing with the three basic factors which are necessary in the decision making process: the decision maker or the decision factor, the environment, the relations between the decision-maker and the environment, focusing on the criteria underlying the the decision making under the uncertainty conditions, namely: pessimistic or cautious criterion being formulated by Wald, optimistic criterion, criterion of Hurwicz's criterion, Savage's regret criterion and Bayes-

Laplace's criterion which are be used for the decision-making in the risk conditions, continuing with the classification of the main types of decisions and with the presentation of the six stages of the decision-making process and ending with a case study involving the use of Bayes-Laplace's criterion.

The conclusions which are drawn from the present paper emphasize the importance of decisions for the efficiency of the management activity.

The decision is the whole process of changing the nature and content of the system resources, contributing to the modification of the objective system of needs and pursuing the achievement of its economic and social optimum. The working of the economy in consensus with the needs of the economic and social optimum is closely dependent on the quality of the decision-making process. Starting from the idea that the management process focuses on the development, adoption and implementation of the decisions, and the efficiency of the managers' activity depends on their quality, we can say that the decision is the essential moment of the management.

In the management process with the help of the decisions there are established the goals being derived from the plan and the ways of achieving them, the corresponding programs, there are established the actions and behaviors of the performers, the necessary corrections are made for the efficient performance of the activity in the economic entities.

The decision has a strong operational character through the profound and efficient involvement of the (execution and management) staff in the accomplishment of its tasks. Depending on the level at which it is exercised, the decision represents the leader's conscious intervention, depending on it the future evolution of the managed system. After a thorough analysis of a significant information base, a good manager chooses the most favorable decision for the achievement of the goals of his organization.

The management of any economic agent must make decisions which determine the results of the activity on the whole of the unit and on each structural component of this. As a decisive moment of the management, the decision must be scientifically underlain, competently adopted and appropriately, creatively applied.

The decision-making is a rational process, a process of knowledge, of preparation and decision-making. The decision is considered to be the main instrument of operationalization of the management process, as the result of the decision-making process is found in every management function.

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Control and Analytical Management Aspects of Debtor and Credit Deposit of Enterprises

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Abstract

The issues of internal organization and control analysis of account receivable and account payable are disclosed in the article. The study of the Russian industrial enterprises of receivables and payable status has been conducted. The checking program of the industrial enterprise's receivables has been developed. A grouping of receivables by the terms of formation is proposed for the analysis generalization results of the status and movement of accounts receivable, which will allow making administrative decisions in the field of settlement operations. A set of measures for strengthening the settlement and payment discipline and timely repayment of receivables was developed by the authors of this article. The authors also reflected the typical errors that make responsible accountants. They take into account the state and movement of accounts payable on its main components: in calculations with suppliers and contractors; according to wage calculations; on estimates of taxes and duties; on calculations for social insurance and maintenance and other types of settlements with different creditors. These mistakes and violations lead to the formation of unreliable information on this kind of obligation, which makes the data of accounting financial statements not suitable for working analysis and management decisions. Therefore, a program of internal audit of payable was developed by the main criteria of accounting financial statements to prevent these deficiencies. This article is not only scientific, but also practical. Therefore, the results of the research will be useful for both students, and accountants, managers, and managers of business entities.

Keywords: indebtedness; industrial enterprises; accounts payable; receivables; logical rules; management

JEL Classification: L20; H81

Introduction

The vital problem of the control of the receivables arises in the conditions of the financial crisis because the timely receipt of proceeds from the sale of products (works, services) is a pledge for the further production and commercial activity of any industrial enterprise. The crisis has led to insolvency and bankruptcy of many companies in the industrial sector, which were contractors for other economic entities. Analysis of accounts receivable should be considered in conjunction with the payable of enterprises to understand the cash inflows and outflows of the company. Excessive turnover of payables compared with the receivables leads to a shortage of cash resources of the business, the foundation of aggressive monetary policy. Therefore, the liquidity and solvency of any enterprise depend on the efficient organization and management of the state and movement of both the receivables and accounts payable.

1. Methods

The theoretical and methodological basis of the study is the work of national and foreign scientists on the theory, methodology of accounting, control, management and other economic sciences, legislative and regulatory acts that regulates the accounting of sales and financial results, budgetary control and audit in the Russian Federation. Materials of statistical bodies, normative-planned and reference information of industrial organizations was used for the analysis.

In the course of the research, the following methods were used: modeling, analysis, synthesis, abstract-logical, monographic, computer-constructive, economic-statistics, methods of systematization and generalization of the research results.

2. Results

The analysis of receivables and accounts payable is based on the statistical reporting data of the Federal Service for State Statistics (Table 1):

Table 1. Indebtedness of industrial organizations (Industry of Russia: Federal Service of State Statistics, n. d.).

	2005		2014		2015	
	million rub	% of total	million rub.	% of total	million rub.	% of total
Commitment debt	12.178.969	100,0	75.182.475	100,0	89.014.617	100,0
Including overdue	1.032.064	100,0	2.137.882	100,0	2.824.692	100,0
From total debt obligations: accounts payable	6.389.304	52,5	33.173.617	44,1	38.925.596	43,7
Including late	956.356	92,7	1.881.316	88,0	2.428.757	86,0
Debt on loans to banks and loans	5.789.665	47,5	42.008.858	55,9	50.089.021	56,3
Including overdue	75.708	7,3	256.566	12,0	395.935	14,0
Accounts receivable	6.331.251	100,0	31.013.596	100,0	35.736.421	100,0
Including late	855.998	13,5	2.015.920	6,5	2.275.556	6,4

After examining the data of Table 1, it can be settled that the total debts under liabilities in 2015 increased by 13.832.142 million rubles or by 18,4% over the earlier period. Substantial changes occurred in the structure of total debt in the retrospective of 2015 and 2005 an increase of 76.835.648 million rubles or 7,3 times. The share of payable declined from 52,5% in 2005 to 43,7% in 2015, including overdue from 92,7% to 86%, respectively. Some receivables decreased by 2015 from 13,5% to 6,4%. The payable and receivables of organizations by the economic activity types in 2015 will be presented in Table 2.

Table 2. Accounts payable and receivables from industrial enterprises, 2015 (Industry of Russia: Federal Service of State Statistics. (n. d.))

	Accounts payable, mln. rub. including overdue Accounts receivable, mln. rub. including overdue	Accounts payable, mln. rub. including overdue Accounts receivable, mln. rub. including overdue		Accounts payable, mln. rub. including overdue Accounts receivable, mln. rub. including overdue	Accounts payable, mln. rub. including overdue Accounts receivable, mln. rub. including overdue	
		mln. rub. %	mln. rub. %		mln. rub. %	mln. rub. %
Total in economy	38,925,596	2,428,757	6.2	35,736,421	2,275,556	6.4
Mining operations	2,887,940	167,333	5.8	3,819,166	477,965	12.5
Processing industries	11,908,617	1,017,669	8.5	10,213,976	416,672	4.1
Production and distribution of electricity, gas and water	2,228,670	444,325	19.9	1,929,259	492,592	25.5

According to Table 2, it can be seen that in 2015 some accounts payable in the extracting sector are below the averaged index of the economy by 0.4%, in the processing and regenerating segments this figure is higher and was 8.5% and 19.9%. Accounts receivable, in contrast, in the processing sector are below the average of 2.3%. When in the extracting and regenerating areas this indicator was 12.5% and 25.5%, respectively, which is 2 and four times higher than the average value. Both the liquidity of its balance sheet and its financial condition depends on the active organization of the internal. Therefore, the structure of effective internal control of this area of accounting should be approached with all responsibility. Purpose of internal control

of accounts receivable is to show the legality and effectiveness of settlement transactions in time and strengthen the settlement and payment discipline of the economy (Borodin 2015). The goals of internal control over accounts receivable are an identification of the availability, legality, and reality of the occurrence, completeness and accuracy of the reflection in the accounting and reporting of the balance of one or other debt, as well as the definition of a set of measures to strengthen the settlement and payment discipline and repayment of accounts receivable. We recommend conducting internal control over accounts receivable by our program of checking accounts receivable (Table 3).

First of all, internal control over accounts receivable should begin from the legal assessment of contracts of buyers and customers, suppliers and contractors according to the Civil Code. Also, it is necessary to find out whether there are appropriate sanctions (fines, penalties) for untimely execution or non-execution of the clauses of contracts for the payment of goods, works and services (Moschenko 2012). The legally qualified contract is a guarantee of a favorable outcome of a court case for an organization that is a plaintiff. The control of the proper organization of primary accounts receivable helps to strengthen the system of internal control of the enterprise. Thus, such as adequately executed contracts is one of the requirements in the case of sale of receivables under the agreement of assignment of the right of claim (concession), and improper registration of invoices lead to severe problems with the tax authorities (Belov 2005). The control of the status of receivables should begin with a general assessment of the dynamics of its volume as a whole and in the section of its articles. The quantitative analysis of receivables will allow us to do a qualitative analysis of its state. A qualitative study of receivables will enable us to decide the dynamics of absolute and relative amounts of overdue short-term and long-term receivables. It is expedient to compile a table in which the accounts receivable will be classified according to the timing of the analysis (Table 4). A similar grouping of accounts receivable will allow you to make managerial decisions in the field of settlement operations. The control of the correctness of the reflection in the accounting of accounts receivable by its constituent elements involves conducting a check on the correctness of accounting for settlement operations on synthetic accounts 60, 62, 68, 69, 70, 71, 73, 75, 76 in the part where there is a receivable.

Table 4. Analysis of receivables according to the terms of formation

Articles receivable	Total in the end of the period, thousand rubles.	Including the terms of formation					
		Up to 1 month	From 1 to 3 months	From 3 to 6 months.	From 6 to 9 months	From 9 to 12 months	More than 1 year

It is necessary to take into account that the enterprise organizes the exchange of information between the internal control service and the management body of the company. Since the results of internal control themselves indicate mistakes and violations, but they are not a guarantee of their correction. It is necessary to find out what actions are being taken by the management after the internal control of the deficiencies identified by the service in the accounting system.

Table 3. Checking receivables program

No	The section of the program and the list of control procedures	Information source	Controlling measures
1. Legal assessment of contracts			
1.1	Examination of contracts with suppliers and contractors	Purchase, sale, supply, leasing and other agreements on the supply of material resources and contract work.	Control examination of documents
1.2	Examination of an agreement with buyers and customers	Purchase and sale contracts, contracts and other sales agreements.	
2. Control of the proper organization of primary accounts receivable			
2.1	Control over the legality of transactions and the creation of primary documents	Invoices, invoices, contracts, certificates of acceptance, advance reports, inventory acts and other primary documents on account of receivables, schedules of documents, organizational and administrative documents on issues of storage and access to PUD, etc.	Review of documents, survey of officials, written inquiries from individual organizations
2.2	Conformity control is the primary documentation of registered operational facts		
2.3	Formal verification of primary documents for the presence of mandatory requisites		
2.4	Control of completeness, accuracy and timeliness of registration and		

No	The section of the program and the list of control procedures	Information source	Controlling measures
	processing of primary documents		
2.5	Checking compliance with the schedule of document flow		
2.6	Checking information protection against unauthorized access		
2.7	Checking organization of document storage		
3. Checking the receivables status			
3.1	Checking of the accounts receivable reality	Magazines of the order №6, №7, №8, №11, acts of candles, court decisions, correspondence with organizations.	Debt inventory, survey of officials, document control study.
3.2	Checking of the write-off of bad debts correctness		
4. Control over the correctness of reflection in the accounting of accounts receivable by its constituent elements			
4.1	Checking settlements with suppliers and contractors in the part of "Advances issued	Contracts, payment orders, correspondence with organizations, journal-order number 6, statements of analytical account in account 60.	Co-ordinated study of documents and their counter-reconciliation, tracking of accounts for the reflection of settlements with suppliers and contractors, surveys of officials, written inquiries of individual organizations.
4.2	Checking the settlements with buyers and customers	Primary documents for the sale of agricultural products, sales contracts, magazine-order №11, statements of analytical account at the account 62, correspondence with buyers and customers.	The same applies to calculations with buyers and customers
4.3	Checking for social insurance and security, as well as for taxes and duties and for overpayments	Tax declarations and calculations, tax registers, primary documents on the reflection of transactions related to the formation of the tax base for individual taxes and fees, journal-order number 8, statements of analytical account on accounts 69, 68 and 19, payment orders, bank statements.	Checklist of the tax base for individual taxes and fees, control examination of documents and their counter-reconciliation, tracking accounts for the reflection of transactions related to the formation of the tax base and the payment of taxes and fees, contributions to extra-budgetary funds, the comparison of accounting data with these tax declarations by individual taxes and fees, contributions to extrabudgetary funds.
4.4	Checking settlements with accountable persons	Advance reports, cash book orders, journal-order No. 7, machine reports on the account 71.	Control examination of documents and their counter-reconciliation, tracking of records on reflection of settlements with accountable persons, polls of officials.
4.5	Checking the calculation of compensation for material damage	Inventory acts, detailed notes, loss calculations and other documents for identifying material damage, journal-order No. 8-AIC, statements of analytical accounts on accounts 94, 73.	The same applies to calculations for the compensation of material damage
4.6	Checking settlements with founders in part of over-paid amounts	The founding agreement, the charter and other constituent documents, primary on the reflection of settlements with the founders, forms №1 and №2, the journal-order number 8, the statement of the analytical account in	The same applies to calculations with founders

No	The section of the program and the list of control procedures	Information source	Controlling measures
		the account 75.	
4.7	Checking payments with staff for remuneration in the part of overpayment	Personnel schedule, wage payment regulations, labor contracts, settlement and payment statements, primary documents on work records and work performed, analytical and synthetic account data in the account 70, payment orders, bank statements.	Control examination of documents and their reconciliation, tracking of accounts, comparison of actual payments of labor with the position on payment of wages, control measurements of individual works
4.8	Checking settlements with other debtors	Primary documents on settlement of settlements with other debtors and creditors, journal-order No. 8-AIC, statement of analytical account on accounts 76, 73, 79.	Control examination of documents and their counter-reconciliation, tracking accounts for the reflection of settlements with other debtors and creditors, surveys of officials.

In our opinion, the development of the set of activities presented in Table 5 contributes to strengthening the settlement and payment discipline and timely repayment of receivables.

Table 5. A set of measures to strengthen settlement and payment discipline and timely repayment of receivables

Goals	Measures
1. Strengthening of the settlement and payment discipline	1.1. Establishing a limit for receivables
	1.2. Analysis of the financial condition of buyers and customers according to their financial statements for the last 3 years in order to identify their solvency
	1.3. Entering into contracts of purchase, sale, contracting and other contracts of corresponding sanctions for violation of terms of payment and shipment of products (works, services)
	1.4. Claiming for breach of contract terms
	1.5. Creation of reserves for doubtful debts
2. Improvement of the accounts receivable	2.1. Timely direction to debtors that violates the deadline for paying notice of arrears
	2.2. Operational awareness of the personnel responsible for shipment of products, on current accounts receivable
	2.3. Putting on a package of documents on the sale of products a note on the verification of receivables from the buyer
	2.4. Immediate payment of accompanying exonerating documents after signing a payment order
	2.5. Monthly reconciliation of accounts receivable by directing buyers to reconciliation calculations
3. Relief of receivables	3.1. Settlement of offsets
	3.2. Sale under a contract of assignment of a claim right (cession)
	3.3. Carrying out a one-way offset
	3.4. Commodity exchange
	3.5. Barter
	3.6. Demand for debt on bills
	3.7. Write-off for losses of bad debts

An analysis of the turnover rate of accounts receivable will help to verify the economic efficiency of internal control over accounts receivable after conducting recommended measures on such indicators as: turnover of receivables; turnover duration; share of receivables in the total volume of current assets; the share of doubtful receivables in the overall composition of receivables; the percentage of receivables in the amount of sales. It is necessary to find the absolute deviations of these indicators, calculated for periods after and before the introduction of a set of measures to improve accounting, control over accounts receivable. A total definite difference will indicate the effectiveness of the measures developed.

The analysis of receivables should be carried out in conjunction with the study of accounts payable.

3. Discussion

In general, statements payable is an indebtedness of the entity (enterprise, organization, individual) to other persons, which this body is obliged to pay off.

Accounts payable include indicators for the following items: suppliers and contractors; bills to pay; debt to subsidiaries and affiliated companies; debt to the organization's staff; debt to the budget and extrabudgetary

funds; debt to participants (founders) on payment of income; advances received; other lenders. And the degree of accurate reflection of the indicators of accounts payable in the accounting financial statements will depend on the results of the analysis. For example, an audit practice shows, basically, all problems connected with a reliable reflection of the information on the state and movement of accounts payable are reduced to the observance of normative-legal regulation of this type of liability. The ignorance of the central legislative and regulatory framework for the accounting of accounts payable leads to distortion of these financial statements and, as a result of this makes it difficult to make operational management decisions.

Non-compliance with the regulatory, legal regulation of accounts payable leads to the following problems related to the reliable reflection in the accounting financial statements of accounts payable: the absence of contracts (employment contract, civil-law nature), primary accounting documents, confirming the existence of debt; counting errors in fixing an operational fact (when measuring quantity, weight, size, *etc.*); non-compliance of contracts with the requirements of the Civil, Tax, Labor Code and other normative acts; lack of necessary requisites, which make the document legally useful; absence of workflow schedules for accounts payable; errors in document registration (quantitative or qualitative divergences when transferring data from the report to the register of registers, as well as late registration); violation of the terms of storage of documentation in the archive; destruction of primary papers without an act on the allocation of materials for damage; violation of the accounting methodology in part of incorrectly compiled correspondence accounts; absence of laws of settlements; not conducting an assessment of obligations; the discrepancy between the data of the synthetic and analytical accounting; and in consequence of which the distortion of accounting financial statements in view of the misuse of the methodology of accounting.

Let's consider the specific mistakes of accounts payable on its constituent elements. So, when conducting an audit of payments to suppliers and contractors, the auditor may find the following errors and violations that occurred when accounting for these calculations:

- price discrepancies in the received documents with the terms of the contract;
- the non-conformity of the quality of the delivered values to the standards or technical conditions;
- improper organization of primary accounting;
- ignorance of the book of purchases;
- the absence of the invoice registration log;
- untimely debt write-off with expired limitation period;
- the absence of correction for the write-offs for expenses of the TMC (works, services), previously reflected as non-deliverable deliveries, documents which have been received and have inconsistencies with previously recorded indicators;
- refund of incoming VAT on deliveries provided by the entity's own promissory notes issued by the organization;
- counting errors in the calculation of exchange rate differences;
- the reflection of the sum differences in the accounts of other incomes and expenses, and not in the accounts of inventories and expenses;
- unlawful recognition of unclaimed debts and write-offs from other income expenses;
- lack of analytical accounting for suppliers, for non-refined deliveries, advances issued, issued bills, overdue payment of bills, received commercial loans, *etc.* (Podolsky, Savin, Sotnikov *et al.* 2006).

When conducting an audit of payments with personnel for the amount of work, the auditor may find the following mistakes and violations that arose during the accounting of labor and wages:

- non-observance of the working conditions stipulated by the Labor Code of the Russian Federation (not granting of holidays or provision of less fixed duration, coercion for overtime work, non-payment of wages in due time);
- the inconsistency of the company's staffing schedule;
- the absence of mandatory system documents related to payment of salary (Regulations on an amount of wages, provisions on remuneration, staffing, orders, labor contracts, workbooks, *etc.*);
- lack of job descriptions;
- non-compliance with the accrued wage or incentive payments to the conditions of employment contracts operating in the organization's provisions;
- wrong calculation of wages based on the systems and forms of salaries used;
- incorrect charging of surcharges established by the Labor Code;
- mistakes made when paying out payments

Table 6. Internal control of accounts payable in accordance with the main criteria of accounting financial statements

Audit criterion of accounting report	Audit procedures	Audit Methods
Existence	Checking the actual availability of accounts payable	Inspection, request, confirmation, documentary analysis
Completeness	Checking the completeness of repayment of accounts payable in accounting	Inspection, request, confirmation, documentary analysis
Rights and responsibilities	Verification of conformity of the used forms of primary documents with the authorization of operations	Inspection, normative analysis, documentary analysis
	Checking the validity of recognition and write-off of accounts payable	
Appraisal	Verification of the primary documents for accounting of accounts payable on the correctness of the formation of the amount of obligations in accordance with the terms of the contract	Inspection, normative analysis, arithmetic checking
	Verification of the correctness of the formation of the amount of liabilities to creditors in accordance with the accounting policy	Inspection, normative analysis, accounting analysis, arithmetic checking
Reporting period Differentiation	Checking the timeliness of recognition of accounts payable	Inspection, documentary and regulatory analyses
	Checking timeliness of write-off of accounts payable	
Accuracy	Checking the correctness of the revaluation of accounts payable	Inspection, normative analysis, arithmetic check
Disclosure	Verification of the identity of the data of the registers of accounting and indicators of accounting reporting	Inspection, documentary and regulatory analyses
	Checking whether the debt is short-term or long-term (overdue or urgent)	

We recommend following to the general principles of verification of this type of liability based on the established criteria for auditing financial accounting (Table 6) in order to avoid assuming such errors in the accounting of accounts payable, which in turn lead to distortion of accounting reporting

This program, of course, has a general approach to internal control of accounts payable, therefore, the company needs to develop programs of verification of each component part: settlements with suppliers and contractors, with buyers and customers (in part of issued advances), with staff on payment of wages *etc.*

Prediction of payables is one of the most important methods of managing the financial and business activities of the enterprise. It is necessary constantly:

- to monitor the ratio of accounts payable and receivables (a significant excess of receivables poses a threat to the financial stability of the enterprise, making it necessary to attract additional payables to pay off the accounts payable);
- to control the state of settlements by terms;
- to expand the system of advance payments (in the conditions of inflation, any delay in payment leads to the fact that the organization actually receives only part of the cost of the work performed);
- timely identification of unacceptable types of accounts payable (overdue debts to the budget, over-indebtedness on stable liabilities, *etc.*) (Kevorkova 2017, Ionova 2013, Melnik 2006, Tikhonova 2008).

For relations with creditors to maximally meet the goals of ensuring financial stability (security) of the company and increasing its profitability and competitiveness, the management of the company needs to develop a clear strategic line regarding the nature of attracting and using borrowed capital (Chuev and Chuyeva 2006).

Conclusion

Thus, one can conclude that the correctness of making administrative decisions depends on a reliable reflection of the accounts state and movement of receivables and payables in the financial statements of the enterprise. As auditor practice shows, there are specific problems related to the true reflection of these types of obligations in the economic entities reporting, which reduced to typical mistakes are made by accountants in the reflecting both book-keeping accounts receivable and payables (Khosiev 2009a, Khosiev 2009b). As preventive monitoring, the

authors of this article developed programs for internal control of accounts receivable and payables, as well as a set of measures to strengthen settlement and payment discipline and timely repayment of receivables.

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Modification of Universal Toolset for Evaluation of Financial Sustainability of Corporations in their Strategic Planning

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Abstract

Current study stipulates the need to evaluate financial sustainability of corporations both at the appointed moment and in longer perspective. That implies taking into account the category of "financial stability" as a long-term attribute. Special Excel-VBA software complex was used to identify a modified indicator of financial sustainability / ownership / independence / liquidity control in the long term. That entails expansion of financial sustainability indicator spectre which can be applied not only to assess financial stability, but also to monitor liquidity, evaluate strategic target structure of capital, and also be used as a tool to create scenarios to see development of financial situation in future considering possible trends, which also predetermines complex use of the indicator for financial sustainability of corporations. Testing of the universal evaluation tool was carried out in trading corporations of the Stavropol Territory, including in the corporation "Opt-Torg".

Keywords: strategy; financial sustainability; independence; ownership; liquidity; universal

JEL Classification: G32; Q01

Introduction

Evaluation of financial status of corporation highlights one of the main performance indicators, which is the ratio of corporation's own and total capital. Most of domestic scientists and economists, such as: Balabanov (2008), Basovsky (2013), Bocharov (2006), Kovalev (2015), Kolchina, Polyak (2012) associate its definition with evaluation of financial sustainability of the corporation through ratio estimation of sovereignty to financial independence (own capital to final balance). In other cases, it can be found as "own capital sufficiency", sometimes an identical alternative term for the indicator is ownership ratio.

Assuming that the best measure for the category is an indicator identified in strict accordance with theoretical concept it is interesting that most scientists in economics: Balabanov (2008), Basovsky (2013), Bocharov (2006), Kovalev (2015), Kolchina, Portugalova, Makeeva (2015) apply financial sustainability ratio to evaluate financial situation at the appointed moment, at the same time not taking into account long-term and permanent nature of the financial sustainability category.

The purpose of the study is to recommend a tool for evaluation of financial sustainability/independence/ownership/liquidity control in corporation in longer perspective including the guidelines for the tool application. The goals of the research are: to study the economic content of the concept "financial sustainability" of a

corporation identifying the author's position on this issue; determine the indicator for financial sustainability/independence/ownership/liquidity management in a corporation at the appointed moment, justify and apply the tool for evaluation of corporations' financial stability/independence/ownership/liquidity management in the long-term period.

Theory and methodological foundation of the research is based on the works of Russian and international scientists and practitioners as well as publications in periodicals devoted to evaluation of financial sustainability/independence/ownership/liquidity control in corporations. Methodological foundation of the research includes logical, case-based and scientific approaches to the evaluation of financial sustainability/independence/ownership/liquidity control in corporations. The tool for evaluation of corporations' financial stability/independence/ownership/liquidity control in the long-term period was developed and tested with attraction of generally accepted scientific methods, such as: inductive, deductive, analysis, synthesis, detail break down and generalization, data grouping, analogy, systematic thinking, analytical, graphic, comparative, economics and statistics based; and also ratio analysis and the software developed by the authors for both: basic Excel and special Excel-VBA.

Working hypothesis of the research is founded in the conceptual statement proving that the indicator of financial sustainability/independence/ownership/liquidity control should be calculated as of the moment and in the long-term period using stochastic modeling. This implies clearing up the economic conceptual characteristic of corporations' financial sustainability and developing evaluation tool to apply it for the latter in the long-term period.

Theoretical significance of the research is to expand and deepen scientific understanding on creation of the tool for evaluation of corporations' financial stability/independence/ownership/liquidity control in the long-term period. The areas of practical application of evaluation results were identified. Practical value of the research supports development and application of specific models and practical recommendations that provide for methodological and practical foundation in developing modern tools for evaluating financial sustainability/independence/ownership/liquidity control as of the moment and in the long-term period.

1. Method. Creation of universal methodological tools for evaluating financial sustainability/independence/ownership/liquidity control in corporations

1.1. Researching the concept of "financial sustainability"

Financial sustainability is a part of overall sustainability of a corporation. Sustainability of an economic system means its capability to perform its activities in the long period of time. Petrenko (2006) when characterizing micro-economic issues of sustainable development of an entity stipulates that sustainability usually reflects firmness and reliability of production system elements, vertical and horizontal links, ability to sustain key functional parameters in variable external and internal environment.

Barkanov (2005) connects definition of sustainability of an entity with its available innovation potential for sustainable development and its efficient implementation in order to exclude external influences and destabilization factors of the market environment.

Definitions by Petrenko (2006) and Barkanov (2005) suggest that sustainability of business entities should be stipulated as of the appointed moment in time and in the longer-term perspective.

Kucheryavy, Lyasnikov, Shemetov (2005) directly link sustainability with long-term development of an entity viewing it as economic category that defines ability of an entity to efficiently utilize its production resources and other ways to both: obtain profit and meet the needs of the clients, increase the value of the own capital in the longer-term period. They define sustainability of an entity as "ability... of the system to maintain its integrity and stability according to the established vector of development in the long term period in the environment of a volatile external environment".

Nechepurenko (2006) distinguishes between current and strategic sustainability, noting that an entity has a short-term stability, if its solvency and long-term sustainability are attained and when the pace of development of the entity corresponds to the pace of market development. Sometimes it is believed that short-term sustainability is unreal stability but long-term sustainability lasts over a long period and does not depend on the changes in business cycle and management. Considering the above the undersigned suggest that financial sustainability is a permanent category. Genuine financial sustainability of a business entity is ensured only in the long-term period. That suggests the need to evaluate financial sustainability as of the moment and in the longer-term strategic period.

1.2. Evaluation of liquidity regulation based on the ratio of own and total capitals of corporations

Hygson (2012) defines independence indicator as the most important one when characterizing the capital structure, showing the "pillow volume" provided by the owners to protect creditors and indicating its high values of 30% - 50%. He defines authorized share capital of an entity as a kind of cushion for creditors that performs a function of guarantor for its financial sustainability, noting that most of industrial companies in the world usually aggregate quite thick cushions within their authorized share capital.

According to Sinky (2016) if an entity doesn't apply a system of ensuring deposits it should afford having a larger share of capital.

German economists Beger, Kruszwitz, Raznik, Rast (2003) identify function of capital of industrial entities as a buffer for the time of probable losses. The function of capital clearly represents a buffer against losses in cash flow, *i.e.* when buyers and customers cease to fulfill their obligations to pay for goods withdrawal of funds stay unchanged. An entity remains solvent when the inflow exceeds the outflow. As the capital reduces mandatory cash outflows it represents a buffer or a shock absorber which prevents decrease of real value of assets; it is strategic reserve that provides for development of the corporations.

Based on that it is clear that a business entity should keep part of its resources in cash/non-profit funds and reserves, *i.e.* in highly liquid assets that represent a buffer against bankruptcy. The most stable and reliable source of those for the entity in the face of growing financial difficulties is own capital represented in such elements as authorized capital and reserves. At the same time, ratio of own capital to the total capital can be a key indicator of liquidity control (ensuring liquidity is the minimum condition for the financial stability of an entity), which is explained and supported by the following.

Entity is exposed to the risk of liquidity loss when high immobilization of own capital and the inadequacy of available funds to cover liabilities in the recession phase is evident (Table 1 and Table 2). These indicators reflect a manifested risk of liquidity loss by the entity. The highest immobilization of the corporation's equity capital is in the recession of 2016 and, in general, its values are very high.

Table 1. Assessment of risk level for liquidity loss in "Opt-Torg" corporation based on evaluation of indicators for liabilities coverage and own capital immobilization

Indicators - thousand rubl	YY							
	2009	2010	2011	2012	2013	2014	2015	2016
1. Own capital	98,077	104,821	95,204	134,181	151,978	148,876	152,933	28.404
2. Available monetary fund (monetary fund and equivalents + investments)	62,664	48,908	73,867	120,927	76,734	68,334	36,112	15,269
3. Liabilities (long-term and short term)	2,240,563	2,490,271	2,735,133	3,073,220	2,936,851	2,864,545	2,709,138	1,914,243
4. Liabilities coverage, % (line 2 /3)	2,8	2,0	2,7	3,9	2,6	2,4	1,3	0,8
5. Immobilized assets	1,437,757	1,546,529	1,546,841	1,563,851	1,633,904	1,738,344	1,694,340	1,505,495
6. Immobilized own capital (line5/1), %	1,465.9	1,475.4	1,624.8	1,165.5	1,075.1	1,167.6	1,107.9	5,300.3

Source: calculated by authors

Table 2. Values of indicators for evaluating the degree of liquidity loss risk in corporation "Opt-Torg"

YY	Phases of economic cycle*	Values, %	
		Coverage of obligations	Immobilization of the corporation's equity capital
2009	Recovery	2,8	1.465,9
2010	Expansion	2,0	1.475,4
2011		2,7	1.624,8
2012	Peak	3,9	1.165,5
2013	Recession	2,6	1.075,1
2014		2,4	1.167,6
2015		1,3	1.107,9
2016		0,8	5.300,3

Source: prepared by authors

Note: * Midterm development cycle of the Russian economy (Tyapkina, Mongush and Akimova 2014)

It should be noted that formation of capital in non-credit commercial corporations if compared to banks is very specific and designates that amount of own capital should be minimum 50% of its total capital, which is mainly explained by the following:

- under normal operating conditions, these institutions have a lower financial gearing compared to credit institutions since they do not stand as mediators in the financial markets due to the fact that they accumulate large amount of attracted capital;
- their assets represented in material objects (equipment, buildings, commodity stocks, etc.) are generally less liquid and marketable than the assets of credit institutions, it limits their ability to quickly mobilize monetary resources, thereby increasing the need for their own capital;
- there is an absence of a mechanism guaranteeing repayment of obligations by creditors, which could reduce the need for own capital.

In practice it is true that in "Opt-Torg" corporation (3, 4) (Official site of the Federal State Statistics Service for the Stavropol Territory), liquidity gaps are noted between receipts for the most liquid assets and most urgent liabilities ($A_2 > P_1$); discrepancy is noted between the conditions ($A_2 > P_2$) in 2010 expansion phases, the 2012 peak, the 2014-2016 recession. Time-consuming sales of assets are not covered by long-term liabilities (except 2012), condition $A_4 \leq n_4$ is violated.

Table 3. Evaluation of meeting terms and conditions for balance liquidity in "Opt-Torg" corporation, % to the totals of balance sheet

Indicators in thousand rubles	2009	2010	2011	2012	2013	2014	2015	2016
	Recovery	Expansion		Peak	Recession			
Most liquid assets (A ₁) (monetary fund and equivalents + investments)	62664	48908	73867	120927	76734	68334	36112	15269
Quick liquid assets (A ₂) (short-term receivables)	183867	257991	243665	512366	276239	202930	160698	25284
Slow liquid assets (A ₃) (stock + VAT for purchased valuables + long-term receivable + other current assets)	654352	741664	965964	1010257	1101952	1003813	970921	396599
Difficult to sell assets (A ₄) (fixed assets)	1437757	1546529	1546841	1563851	1633904	1738344	1694340	1505495
Total assets	2338640	2595092	2830337	3207401	3088829	3013421	2862071	1942647
Most urgent liabilities (L ₁) (accounts payable)	649556	771219	873402	1194429	1106851	1034545	672251	412573
Sort-term liabilities (L ₂) (short-term borrowings + other short-term sources)	0	352500	0	1878791	0	330000	579906	309073
Long-term liabilities (L ₃) (long-term borrowings + other long-term sources + future revenues)	1591007	1366552	1861731	0	1830000	1500000	1456981	1192597
Constant liabilities (L ₄) (capital and reserves)	98077	104821	95204	134181	151978	148876	152933	28404
Total liabilities	2338640	2595092	2830337	3207401	3088829	3013421	2862071	1942647
A ₁ – L ₁ (Difference between corresponding groups of assets and liabilities (A _n – L _n), % to the totals in balance sheet)	- 586892 - 25,1	- 722311 - 27,9	- 799535 - 28,2	- 1073502 - 33,5	- 1030117 - 33,3	- 966211 - 32,1	- 636139 - 22,3	- 397304 - 20,4

Indicators in thousand rubles	2009	2010	2011	2012	2013	2014	2015	2016
	Recovery	Expansion		Peak	Recession			
(+,-)								
A2 – L2	+183867 + 7,9	- 94509 - 3,7	+243665 + 8,6	- 1366425 - 42,6	+ 276239 +8,9	- 127070 - 4,2	- 419208 - 14,6	- 283789 - 14,6
A3 – L3	- 936655 - 40,1	- 624888 - 24,1	- 895767 - 31,6	+1010257 +31,5	- 728048 - 23,6	- 496187 - 16,5	- 486060 - 17,0	- 795998 - 41,0
A4 – L4	+ 1339680 +57,3	+ 1441708 +55,7	+ 1451637 + 51,2	+ 1429670 + 44,6	+1481926 +48,0	+ 1589468 +52,8	+ 1541407 +53,9	+ 1477091 + 76,0

Source: calculated by authors

Table 4. Assessment of accounting liquidity terms and conditions in "Opt-Torg" corporation, % to the difference between the most liquid assets and fixed liabilities, % of the balance sheet total

Indicators	2009	2010	2011	2012	2013	2014	2015	2016
	Recovery	Expansion		Peak	Recession			
Difference between the most liquid assets and fixed liabilities, % to balance sheet total	- 25,1	- 27,9	- 28,2	- 33,5	- 33,3	- 32,1	- 22,3	- 20,4
Difference between liquid assets and short-term liabilities, % to balance sheet total	+ 7,9	- 3,7	+ 8,6	- 42,6	+8,9	- 4,2	- 14,6	- 14,6
Difference between slow sales assets and long-term liabilities, % to balance sheet total	- 40,1	- 24,1	- 31,6	+31,5	- 23,6	- 16,5	- 17,0	- 41,0
The difference between low liquid assets and constant liabilities, % to balance sheet total	+57,3	+55,7	+ 51,2	+ 44,6	+48,0	+52,8	+53,9	+ 76,0

Source: compiled by authors

"Opt-Torg" corporation (Table 5) availability of monetary reserves does not correspond to the normative level of 0.2-0.7 units, and the company is not able to repay current liabilities by means of available cash in the short term. Quick liquidity ratio in "Opt-Torg" corporation during the period of research does not meet the requirements between 0.7-1. Current liquidity indicator changes stochastically and in general does not correspond to the criterion level - 2, which cannot ensure stable financing of the corporation. The corporation did not allocate a reserve cushion to cover losses that may occur during liquidation of all current assets (excluding cash). Corporation's financial capabilities to settle accounts with debtors in due time, arrange favourable sales of produce and other working capital items are limited.

It attracts attention that wholesale and retail trade corporations in general show better results in net working capital, absolute, quick liquidity, except for 2016. In 2015 in wholesale and retail corporations' relative liquidity ratios significantly exceed their benchmark values. *I.e.* in 2015, the corporation under research, unlike wholesale and retail corporations in general, did not allocate a stock of highly liquid assets designed to protect it in suddenly deteriorating situation and continue its operation under economic stress. Payments forecast for this corporation in respect of timely accounts settlement with its debtors is unsatisfactory.

Table 5. Assessment of liquidity factor in trade corporations of Stavropol Territory

Indicators in thousand rubles	2009	2010	2011	2012	2013	2014	2015	2016
	Recovery	Expansion		Peak	Recession			
"Opt-Torg" corporation								
1. Current assets,	900883	1048563	1283496	1643550	1454925	1275077	1167731	437152
2. Short-term sources	649556	1123719	873402	3073220	1106851	1364545	1252157	721646
3. Future revenues	-	-	-	-	-	-	-	-
4. Short term sources excluding future revenues	649556	1123719	873402	3073220	1106851	1364545	1252157	721646
5. Net working capital (line 1 – 4)	+251327	-75156	+410094	-1429670	+348074	-89468	- 84426	- 284494
6. Available finance (monetary fund and	62664	48908	73867	120927	76734	68334	36112	15269

Indicators in thousand rubles	2009	2010	2011	2012	2013	2014	2015	2016
	Recovery	Expansion		Peak	Recession			
	"Opt-Torg" corporation							
equivalents + investments)								
7. Absolute liquidity (line 6 / line 4), units	0,097	0,044	0,085	0,040	0,070	0,05	0,029	0,021
8. Long-term receivables	–	–	–	–	–	–	–	–
9. Current liquidity (line 1 – 8 / 4), units	1,387	0,934	1,470	0,535	1,315	0,935	0,933	0,606
10. Stock	619931	739814	958456	978692	1054159	962176	912612	345567
11. VAT for purchased valuables	34421	1850	823	3582	11300	10769	12109	13428
12. Other current assets	0	0	6685	27983	36493	30868	46200	37604
13. Quick liquidity (line 1 – line 8 – line 10 – line 11 – line 12) / line 4	0,380	0,274	0,364	0,206	0,319	0,199	0,158	0,056
Wholesale and retail trade								
1. Current assets	60872926	79488274	68156034	29692076	39947073	34648106	47450243	235472995
2. Short-term sources	50970150	64403516	49576513	27082079	36787945	34214358	13833271	161458014
3. Net working capital (line 1 – 2)	9902776	15084758	18579521	2609997	3159128	433748	33616972	74014981
4. Available finance (monetary fund and equivalents + investments)	6254843	12927074	10080101	1328101	1626533	2000042	14842487	1480159
5. Absolute liquidity (line 4 / line 2), in units	0,123	0,201	0,204	0,049	0,045	0,059	1,073	0,009
6. Current liquidity (line 1 / 2), in units	1,195	1,235	1,375	1,097	1,086	1,013	3,430	1,458
7. Stock, in thousand rubles	20660909	24042622	29539305	13165597	17461144	13963189	18986140	70225926
8. Other current asset	461369	592108	1369883	15198378	20859396	18684875	13621616	163766910
9. Quick liquidity ((line 1 – line 7 – line 8) / line 2)), in units	0,780	0,852	0,752	0,049	0,045	0,059	1,073	0,009

Source: calculated by authors

It is true that non-credit corporations apply management of highly liquid assets as the main tool to refine process of capital formation. A significant buffer stock of highly liquid assets when it exceeds its lower level provides for safety of corporation's own capital and increases its role as a safety mechanism. At the same time, corporation's own capital formally (as per method of balance sheet construction) covers losses of corporation and compensates for balance, rather than real losses, directly showing its defensive role when protecting against the risk of liquidity failure. Provided that the entity has lack of own capital, liabilities are equivalent to assets, *i.e.* 100% of demand equals to 100% of liabilities, that certainly requires that liabilities and assets are balanced and are related as 1:1. It is obvious that decrease of own capital entails risk of liquidity failure in a corporation affecting its ability to obtain additional liquidity and, ultimately, restricting access to financial market, which in turn may cause a number of operational problems. Accordingly, it is fair to state that the larger is the share of liquid assets in overall assets volume, the lower is the cost of bankruptcy and the higher is the value of financial gearing. Also the greater is the volume of own capital, the higher is liquidity of the entity. In this case, own capital restricts impulsive growth and minimizes the risk by limiting the amount of new assets that a corporation can acquire using borrowed resources. In the end, own capital reflects the highest degree of liquidity and acts as the best form of financial losses amortization.

As a result, the ratio of own capital and total assets can act as an index of liquidity regulation in commercial corporate non-credit organizations, since own capital is the initial source of own capital generation.

1.3. Traditional application practice for the indicator of financial sustainability/independence/ownership in corporations

Financial sustainability/independence/ownership in corporations is assessed as per current moment (Table 6).

Table 6. Dynamics of financial sustainability/independence/ownership in trade corporations of Stavropol Territory

YY	Phases of economic cycle	Values, %	
		Wholesale and retail trade	"Opt-Torg" corporation
2009	Recovery	13,7	4,2
2010	Expansion	13,5	4,0
2011		21,2	3,3
2012	Peak	18,3	4,2
2013	Recession	15,4	5,0
2014		11,7	4,9
2015		14,2	5,3
2016		24,5	1,5
Variations (+,-)		+ 10,8	- 2,7

Source: calculated by authors

1.4. Traditional application practice for the indicator of financial sustainability/independence/ownership in corporations

The values of indicator for financial stability/property independence in the trade corporations of Stavropol Territory are higher than in "Opt-Torg" corporation; however, the smallest 11.7% and the highest 24.5% are recorded in the recession phase. If we consider the values of the ratio for financial stability/independence/ownership in "Opt-Torg" corporation across the phases of the economic cycle they seem to match the phases of the economic cycle, because in the recession of 2013-2015 the share of own capital in total capital insignificantly increases - 4.9% - 5.3%, and in 2016 unfortunately it hits the lowest mark. The indicator values do not fully conform to critically established boundary in the national financial management practice of 50%. At the same time, application of its values does not make it possible to evaluate financial stability/independence of the corporation, reduction of financial risks in the long-term period, improvement of repayments of obligations.

1.5. Implementation of a forecast model to evaluate financial stability/independence/ownership/liquidity control in the long-term period

As external business environment tends to constantly change the structure of liabilities and assets of corporations should show reaction to the changes in the external environment. Changes of the indicator for financial stability/independence/ownership/liquidity control are determined by the dynamics of the influential factors. Manuylenko, Kabardokova (2017a, 2017b) introduce an indicator for strategic target structure of capital, applied when the financial stability/independence/property index is determined with the help of special software package Excel-VBA (VBA programming language) "Software for determining strategic target structure of financial resources in commercial corporate organizations" (computer software), that incorporates methods of extrapolation (moving average) and Monte-Carlo modes (Jackson and Staunton 2006), and allows to calculate modified indicators of financial stability/independence/ownership/control of liquidity and own capital in the long-term period.

The goal of application of the strategic indicators for financial stability/independence/ownership/liquidity control is to achieve financial equilibrium that ensures sufficient financial and long-term sustainability of corporations.

It should be noted that implementation of Monte Carlo method implies that selected random variable is the main ratio of financial stability/independence/ownership, description of the capital structure and liquidity control. The degree of risk level is determined by volatility of ratio for financial stability/independence/ownership/liquidity control, its deviation below the established level of 0.5 to 0.66 as corresponding percent of its normal distribution function.

The results of 30,000 Monte Carlo experiments make it possible to construct an empirical distribution function for own capital (Figure 1 and Figure 2).

Table 7. Modeled indicator for financial stability/independence/ownership/liquidity control in the long-term period for corporations of wholesale and retail trade corporations of Stavropol territory

Indicators	Own modified capital, in thousand rubles	Modeled ratio for financial stability/independence/ownership/liquidity control, %
2009	39.100.620,73	51,73942709
2010	48.888.340,47	51,86227804
2011	43.078.190,9	51,87607992
2012	29.740.715,26	51,55657279
2013	33.680.860,67	51,71184665
2014	37.281.533,33	51,53424722
2015	43.729.263,45	51,55520487
2016	135.900.890,6	51,83740407
2017	148.913.094,1	51,55840075
2018	163.113.213,7	51,70308787

Source: developed by authors V. V. Manuylenko, L A. Kabardakova

Figure 1 - Distribution of values for absolute capacity of own capital, modeled as per the years, in thousand rubles

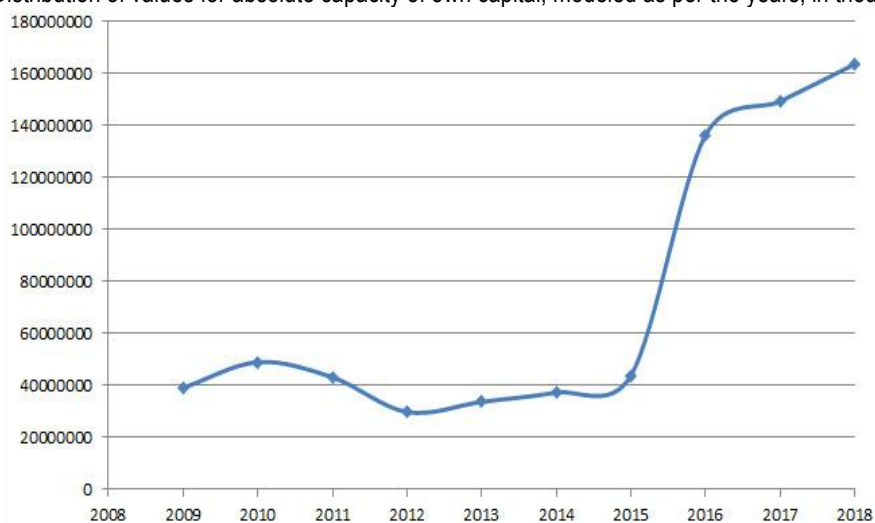
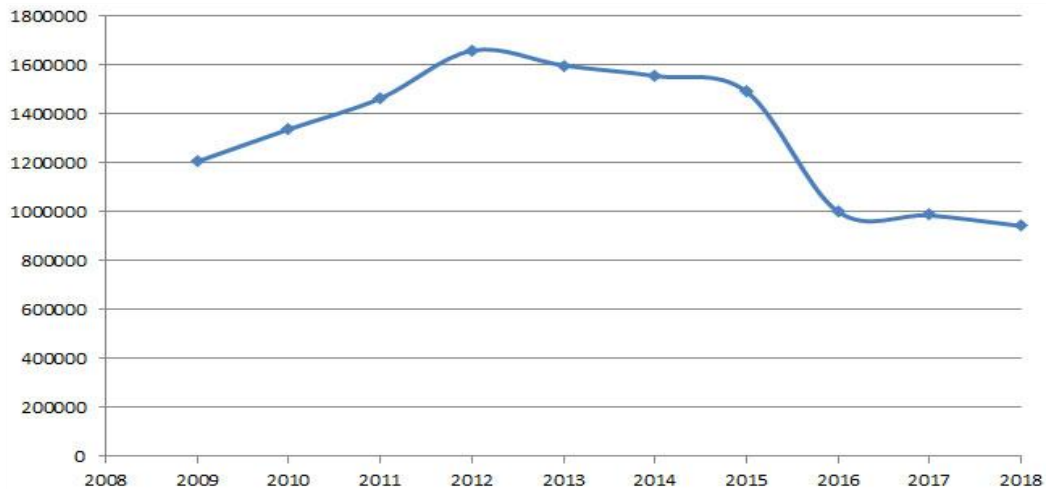


Table 8. Modeled indicator for financial stability/independence/ownership/liquidity control in the long-term period for “Opt-Torg” corporation”

Indicators	Own modified capital, in thousand rubles	Modeled ratio for financial stability / independence / ownership / liquidity control, %
2009	39.100.620,73	51,73942709
2010	48.888.340,47	51,86227804
2011	43.078.190,9	51,87607992
2012	29.740.715,26	51,55657279
2013	33.680.860,67	51,71184665
2014	37.281.533,33	51,53424722
2015	43.729.263,45	51,55520487
2016	135.900.890,6	51,83740407
2017	148.913.094,1	51,55840075
2018	163.113.213,7	51,70308787

Source: Authors V. V. Manuylenko, L A. Kabardakova

Figure 2 - Distribution of values for absolute capacity of own capital, modeled as per the years, in thousand rubles



It is encouraging that according to Monte Carlo method ratio optimality boundary showing financial stability, structure of financial resources and corporation's liquidity is of an interval nature. *For example*, point-by-point values of indicators are determined by phases of business cycle and corporation's life cycle stages. As a result, using Monte Carlo method it is possible to perform stress testing applying alternative scenarios with variable coefficient of financial stability/independence/ownership/liquidity control, and own capital within business cycle phases, *i.e.* the need in own capital is determined based on the use of stress input data. Varying parameters obtained by means of Monte Carlo method should be constantly monitored and periodically updated.

Evaluation is reasonably concluded with a statement on actual and strategic values of the financial stability/independence/ownership/liquidity control/strategic target structure. Ambiguity of the criteria for making financial decisions based on the results of the simulation assessment justifies the need to apply a reasoned conclusion about strategic significance of financial stability/independence/ownership/liquidity control of the corporation. After interpreting the results, financial managers set the targets for the strategic values of any particular indicator, which may be included in the system of strategic goals of corporations.

2. Results

In theoretical field of the research:

- it was specified that financial stability is an economic category of permanent nature; real financial stability of corporations can be proved only in the long-term period, which necessitates its evaluation in the particular moment in time as well as in the long-term strategic perspective;
- universal purpose was identified for the ratio of own capital to total capital, proving its application as an indicator of financial stability / independence / ownership, as well as liquidity control and in description of capital structure.

In practical field of the research:

- discrepancy between identification/formation of capital sources and business cycle phases of trade corporations was shown;
- necessity to consider long-term component when evaluating financial stability/independence/ownership/liquidity control of the corporation is justified, since it serves better evaluation of financial stability/independence of the corporation, reduction of financial risks in time perspective.

In methodological field of the research:

- forecast model was applied to determine financial stability/independence/ownership/liquidity control in strategic perspective, which was aimed to determine a modified coefficient of financial stability/independence/ownership/liquidity control and volume of own capital, that in overall formalized description of uncertainty by means of Monte Carlo method and appointed total indicators both forecast (prospective), and modified;
- comparative assessment (Table 7) of obtained both modeled and actual (for the appointed moment in time) strategic values of indicator for financial stability/independence/ownership/liquidity control was completed; ultimately it should support relevant decisions made by financial managers on financial

stability, liquidity and capital structure; still financial managers should be aware of a wide range of possible performance results of corporations.

Table 9. Comparison of actual and strategic values of indicator for financial stability/independence/ownership/liquidity control in trade corporations of Stavropol Territory, %

YY	Actual value	Strategic value	Difference between strategic and actual coefficient
Wholesale and retail trade corporations			
2009	13,7	51,739	+ 38,039
2010	13,5	51,862	+ 38,362
2011	21,2	51,876	+ 30,676
2012	18,3	51,557	+ 33,257
2013	15,4	51,712	+ 36,312
2014	11,7	51,534	+ 39,834
2015	14,2	51,555	+ 37,355
2016	24,5	51,837	+ 27,337
2017 _{progn.}		51,558	
2018 _{progn.}		51,703	
"Opt-Torg" Corporation			
2009	4,2	51,583	+ 47,383
2010	4,0	51,547	+ 47,547
2011	3,3	51,712	+ 48,412
2012	4,2	51,665	+ 47,465
2013	5,0	51,696	+ 46,696
2014	4,9	51,576	+ 46,676
2015	5,3	52,057	+ 46,757
2016	1,5	51,552	+ 50,052
2017 _{progn.}		52,320	
2018 _{progn.}		51,586	

Source: compiled by authors

Significant excess of actual values is noted for strategic indicators in the researched wholesale and retail trade corporations whereas coefficient for financial stability/independence/ownership/liquidity slightly exceeds its minimum mark of 50%. Its strategic value indicates "cushion thickness" provided by the owners to protect creditors. As a result, under regular change of macro-, meso- and micro business environment the goal to increase coefficient of financial stability/independence/ownership/control of liquidity to its maximum becomes quite dynamic.

Conclusions

Current research can be further developed provided that financial stability/independence/ownership/liquidity monitoring tool is suggested in future. Modified indicator for financial stability/independence/ownership/liquidity control is a key reference point identifying development of corporations, it can be subsequently incorporated into corporations' business planning on capital structure and other financial indicators.

Suggested evaluation tool:

- identifies and evaluates a number of scenarios for own capital development in corporations, which can be consequently followed by development of strategy for capital formation and identification of appropriate methods for formation and evaluation which shall depend on the business cycle phases. Along with the above, development of various insurance instruments become crucially important, as per Rusetskaya, Rusetskiy, Rybina, Rybina, Sazhneva (2015), Rusetskaja, Rusetskiy, Rybina, Chuvilova (2016).
- is distinguished with its universal nature, as it is used in the systems of financial risk management, strategic information management and for creation and evaluation of possible behavioural scenarios of competitors and partners in the financial market.

Universal forecast model was tested in financial management system of "Opt-Torg" corporation.

Evaluation results shall become foundation for the sound financial solutions that should support selection of alternative methodological tools to evaluate financial sustainability of corporations.

The authors suggest that implementation of the universal tool for evaluation of corporations' financial sustainability/independence/ownership/liquidity control in strategic perspective definitely involves consideration of variations between actual and forecast values of the indicator. That may entail elaboration of list for obligatory actions to minimize/eliminate deviations in the system of strategic financial management. Repetitive assessment of forecast results should allow evaluation of deviations, thus taking role of a back testing via comparison of the obtained data in different forecast periods with planned and actual data.

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Effective Microcredit Banking for Growth and Development of Small Business and Improve the Poverty Condition in Bangladesh

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Abstract

The research focuses on the assessment of the MFIs (Micro Financial Institutes) & Small Business in Bangladesh; it focuses on the impacts of microcredit for growth & development of small businesses and improves poverty condition. Bangladesh is one of the poorest countries in the world with low GDP/capita and minimum purchasing power. Almost a third of the total population (165 million) of the country lives below the national poverty line (\$2/day). Growth & development of sustainable level of small businesses, which create employments for low & semi-skilled workers, mainly self-employments, are considered one of the most effective ways to lift the nation out of the vicious cycle of poverty, are target & attention of the country. To pave the way for MFIs since 1970s, especially during the new wave of microcredit in the 1990s, has come to be seen as an important development policy and a poverty alleviation tool in Bangladesh. The aim of the paper is to analyse existence MFIs and its microcredit policies and propose effective microcredit policies for growth & development of small businesses and socio-economic development. The researcher undergoes a field survey using a semi-structured questionnaires and a scheduled face-to-face interview in Bangladesh. These analyses and the concept of the method of assessment of the impacts of microcredit determine the research methodology, research questions and the hypotheses which form the ideological basis of the research dissertation as well as its scientific contribution.

Keywords: co-operative society micro-saving bank; innovative small business model; economic growth; poverty alleviation; socio-economic development

JEL Classification: D04: G21

Introduction

Poverty is one of the most remarkable national issues in Bangladesh. Almost a third of the total population (164.8 million) of the country lives below the national poverty line (bdnews24.com: 2015-09-16 23:40:56.0). Lifting the vast population out of the vicious cycle of poverty and ensuring the sustainable economic growth are the major challenges of the country. To pave the way for first and foremost task is either to create direct employment or create condition to create employment to reduce the unemployment rate and accelerate the source and level of disposable income. Having predominance of agro-based economic activities, low level of technology presence and lack of availability of highly skilled laborers, small scale businesses, which create employment for non-skills and semi-skills workers, specially self-employment, have been most suitable for sustainable economic growth and improve poverty condition in Bangladesh, are the main target and attention of the country. But the ways for growth and development of small businesses are not smooth enough in Bangladesh. They are frequently confronted with infrastructural, financial, entrepreneurial as well as social challenges.

To prevent the impediments, the government of Bangladesh has taken various initiatives including, policy advocacy and intervention for growth of small business, facilitating financial supports for small business investors, providing skill development and capacity building training, facilitating adaptation with appropriate technologies and access to ICT, and providing business support services through the SME Foundation created under the ministry of industry in 2007. Together with these, many NGOs (Non-government Organizations) and private

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organizations, especially MFIs since 1974, have been offering collateral free loans to the impoverished investors to involve them in entrepreneurial and various financial activities to lift them out of the impoverished condition.

Despite these initiatives, growth and development of desired scale of small business is still lagging behind, as the ministry of industry's SME Foundation 2007 is yet to make any noticeable progress in identified areas for action and MFIs in Bangladesh are not effective enough to reach the economic growth and poverty alleviation goals due to their ineffective policies and high interest rate of loan capital.

To get the real development, actual needs of small business are required to be addressed and effective policies are needed to be adopted including good micro economic policy, entrepreneurial knowledge and training to entrepreneurs, SMEs development programs and use of changing pattern of technology. The aim of the paper is to analyze existence MFIs and its microcredit policies and propose effective microcredit policies for growth & development of small businesses and socio-economic development.

1. Literature Review

In this section, the literature on role of small business in socio-economic development and impacts of microcredit for growth and development of small businesses is reviewed. It also includes the conceptual and theoretical framework of assessment of small business and microcredit in Bangladesh and beyond. The researcher includes the result of past impact assessment studies of small scale businesses introduced by microcredit of MFIs in Bangladesh and other countries in the world.

According to the empirical studies, almost all of the researchers have been converged to the point that small business is very significant for the growth of national economy, employment generation and poverty alleviation for all of the various countries and microcredit plays a very significant role for growth and development of small business. All of the researchers have been indisputably agreed with the factors that easy accessible financial services to small business sector accelerate the growth of small businesses and microcredit play a tremendous role in the sphere through providing initiative investment capital without collateral to the impoverished investors. But they have been disputed over the success rate of small business entering in the new market, mostly introduced by microcredit.

According to Diagne and Zeller (2013), small businesses are very effective tool to dynamic and diversify the national economy. But lack of access to the financial services by the poor below or above the poverty line may have serious negative effect for the growth of small business and overall welfare. Access to microcredit eventually accelerates the growth of small business and employment generation. With these arguments, microcredit is assumed to improve disposable income, accelerate purchasing capability, improve consumption level and overall welfare of the poor people.

Back, Kunt and Levine (2012), evaluated the importance of small business in national economic growth and poverty alleviation, has found a strong correlation between microcredit and growth of small business. Small business needs low capital investment. MFIs boost financial services ranging from micro lending, saving to money transfer services to boost the growth and development of small business to meet the development needs.

According to Hiedhues (2013), Small businesses are essential component for a strong local economy. It not only creates employments, but also delivers vital goods and services, generate sales tax revenue, and contribute to the unique character and livability of neighborhoods while microcredit is considered to be an important tool in increasing the growth of small business in developing countries through credit augments level, micro saving and micro leasing which enables the poor people to overcome their liquidity constraints and undertake investment.

According to Wydic and Kevan (2011), the role of small business is enormous in sustainable economic growth, employment generation and battling poverty and microcredit plays a paramount significant role for growth and development of small business in developing countries. The provision of microcredit to the poor, serves for a couple of purposes- firstly, borrowed capital is invested in small enterprises, which often results in noticeable short-term enhance in household expenditure and welfare, and finally, microcredit encourages economic growth in informal sectors through promoting capitalization in existence businesses, employment creation, and long-term income growth (Wydic and Kevan 2011).

The Organization for Economic Cooperation and Development (OECD-2012), emphasis the role of small business on national economic growth and importance of microcredit on the way to growth of small business, bearing the statement that small business plays a vital role in alleviating poverty and increasing employment attributed to their promotion of competition and dynamism and MFIs provide small investment capital to startup small business by the impoverished investors who are unable to receive loan from conventional banks due to lack of collateral and other paper works.

According to Ngehneu and Nimbo (2013), Small businesses are accepted globally as a tool for empowering the citizens and economic growth and microfinance plays a strongly effective role as a development component for the growth of small business, providing financial services such as small credits, savings, micro-leasing, micro-insurance and money transfer to assist the exceptionally poor investors.

According to Mahjabeen (2012), across the developing countries, small businesses, which are considered as effective components for sustainable economic growth and employment generation, are turning to MFIs for financial services. This trend is because MFIs provide necessary startup investment capital without collateral to the impoverished investors who are unable to secure loan from the formal financial institutes. Sustainable financial services enable the poor investors to startup businesses, increase income, augment assets, and minimize their vulnerability to external shocks (Mahjabeen 2012).

According to Yehuala, accessibility to a well financial service is considered as an engine for sustainable growth and development of small business and various income generation activities. Microcredit provides good financial services to the impoverished investors to introduce small business and other income generation activities. Microcredit increase 1/3 of new business every year. But it is a matter of fact that 2/3 of small businesses which are introduced by microcredit of MFIs cannot sustain longer than one year. (Yehuala 2012, The Case of Metema Woreda, North Gondar, Ethiopia).

Same result was found by the study conducted by Bharti *et al.* (2013), argue that small business is very important for national economic growth and poverty alleviation and microfinance plays an important role in growth and development of small business. MFIs provide necessary financial services to the impoverished investors. But 75% of businesses which are startup by microcredit taken from MFIs can't survive longer than 1 year as they are not profitable enough to pay back.

Another study, conducted by Abhijit Banerjee of MIT poverty action lab in slum in Hyderabad, has first been evaluated the impacts of microcredit in new markets in 2012, assessed the role, lacking and needs of microcredit for sustainable development. He found that microcredit increased the number of new businesses by 1/3 although 2/3 of them are not very profitable and ended up long before of their first anniversary due to low market share and poor customer volume. The study summed up that microcredit is a very significant component to accelerate the growth and development of small business. But some other factors are needed to address including entrepreneurial enhancement of impoverished borrowers and others.

Enormous empirical and explicit studies have been conducted on the impacts of small businesses on economic spheres and role of microcredit on growth and development of small business. The researchers undisputedly acknowledged the tremendous role of small businesses for overall economic growth and poverty alleviation through generating employments, accelerating disposable income and augment of sale taxes revenue in national level. In this growth potentiality, microcredit play a colossal role through providing collateral free investment capital which is one of the most remarkable impediment for growth and development of small business by impoverished investors who don't secure formal bank loan from conventional bank due to lack of collateral, steady employment and various credit histories. MFIs provide them startup investment capital with other services including, saving and money transferring. But some researchers are concern about the success rate of small businesses which are debuted by microcredit of MFIs. Researchers Avhijit Banerjee (2012), Ngehneu and Nimbo (2013) and Bharti *at et.* (2013), found that microcredit increases 1/3 of new small business every year but 2/3 of them are ended up before their first anniversary.

It is the fact that the role of small business is very impressive for economic growth and employment generation and microcredit is a very significant component for growth and development of small business but it doesn't work itself. How and when economy would be benefited by growth and development of small businesses through microcredit, depends among the other things on whether and how successfully micro-credit program address the real constraints faced by the small businesses in a certain context and area and how effective measures are taken for productivity and surpass the constrains. Most of the small businesses established by microcredit are failed due to low customer volume, low market shares and low profitability in the initiative stage. Lack of entrepreneurial and managerial knowledge as well as insufficient business ideas and experiences of small business entrepreneurs, unplanned business startup and non-effective business operation policy are outright accountable for this. Moreover, high interest rate of MFIs and ineffective loan giving and pay back strategy are also triggering the high small business failure rate.

2. Materials and method

The research was started with literature review focused on impact of small business on national economic growth and role of microcredit on growth and development of small business. Research journals, books, articles and

reports from internet and newspapers on microcredit and small businesses were the primary source of data. The principle method which was applied for the study was a field survey using a semi-structured questionnaires scheduled and face-to-face interview. The study was conducted in seven villages of three sub districts in Kushtia district in the southwest region in Bangladesh. The studied sub districts and villages were selected based on availability of small businesses and microcredit activities. Both female and male microcredit recipients of MFIs of Bangladesh were taken under the study areas. The whole set of individuals under the study were estimated to be 900, of them 700 credit recipients and 200 non-recipients (control group). Respondents were randomly selected using proportionate random sampling procedure considering the proportion of small businesses and microcredit in each of the village. A reserve list was maintained to fill in the gap in case any respondent in original list is found missing.

Data was collected in two phases from the same respondents through questionnaires and face-face interview. At first time (May 2015) data was gathered from control group. In second time (May 2016) data was collected from the same respondents after one year. Along with semi-structured interview schedule, a checklist was also used to collect qualitative data that helped justifying the data authenticity. Nevertheless, several focus group discussions (FGDs) were organized as another method and technique in order to cross verifying the collected information and data through questionnaire. All of the filled in schedules were edited and coded before processing by computer software.

Data were processed through SPSS computer software. Statistical measures like multiple regression analysis, Chi-square test, etc. were performed using same computer software. Data were presented in table, traps, and diagrams as well as bar chards where applicable.

3. Results and Discussions

The Impacts of Microcredit on Growth of Small Business and Socio-economic Development

The impacts of microcredit on growth and development of small businesses and socio-economic progress were measured by considering five dimensions: introduction of small business, poverty alleviation, women empowerment, employment creation and child education. To measure the each dimension, several parallel parameters were used, such as growth of small businesses was measured by introduction of new small businesses and development of existence businesses by the credit recipients; poverty alleviation was measured by considering the following factors: changing in income, changing in farm and household assets and changing in living standard; women empowerment was measured by considering the following factors: involvement of women in financial activities, household decision making, assets possess and transfer right and involvement in outdoor activities; employment creation was measured by considering the number of jobs created before and after joining credit program and child education was measured by considering the factors: school attendance and school dropout rate as well as children's extended time duration in school.

Changing in income

Microcredit respondents earned money by undertaking different financial activities utilizing capital received from MFIs. The principle sources of their income were revenue from small businesses, animals farming, fisheries etc. Change score was computed by considering changes of productive activities that were converted to a value of taka (USD1=BDT 78). On the basis of monthly income, income activities and assets such as lands or businesses, the respondents (credit recipients and control group) were classified into four categories: group A, B, C & D. Group (A) low income-1 (up to BDT 6,000 with no other income sources excluding the recipient's earning from credit utilization and no other assets); Group (B) low income-2 (up to BDT 6,000 with one earning member and no assets); Group (C) Middle income (from BDT 6,001 up to BDT 13,000 with at least one earning member and some arable lands); and Group (D) high income (from BDT 13,001 to above with at least one earning member and others assets)

Distribution of microcredit to respondents according to the income groups indicates that 20% of the recipients who received microcredit from MFIs were category "A", whereas overwhelming majority of 43% of the recipients were category "B", respondents of categories "C" & "D" were 26.7% and 10% respectively.

After joining the credit program, group A ended up totally into extreme poverty. They have been confined into loan trap or several loans cycles or sold off their livestock, households' utilities such as tines of houses, land of homes and even body organs such as kidneys or levers to repay the loan. The conditions of group B were more or less like group A. Only 1% of them were able to lift them out of poverty cycle while the rest of them became poorer due to accepting loan. 6% of the respondent from Group C increased their income whereas the conditions of rest of the recipients were unchanged. For Group D, 8% of the recipients were benefited by

microcredit whereas the conditions of rest of the recipients were unchanged.

Almost the same results were found by studies conducted by Kathrin Hartmann (2012) and Milford Bateman (2010). But no considerable change in income took place in respect of control group members during the period. It may be due to unavailability of capital for initial investment.

Analyzing Group A & B: receiving credit from microcredit program, group A & B recipients spent it either for non-productive purposes such as to purchase essential goods, built up comparatively better houses etc. or invested in list profitable sectors such as to introduce new businesses like micro scale retailing but ended up in 7-9 months of debut due to low return on investment. To payback, they sold the new houses they built, take loan from other MFIs or other persons, sold out livestock, household utilities and body organs in extreme conditions.

Analyzing Group C & D: C and D groups' respondents invested their capital to introduce small businesses and invested in farming or agricultural activities. They were benefited and increased their income and assets by the microcredit when they utilized and managed it effectively. The recipients, who invested for longer time and didn't depended only on the business revenue to payback and for daily household expenditures rather get money from other sources too, succeed and increased assets.

Growth of Small Businesses

Microcredit recipients set up small businesses by microcredit received from MFIs. 70% of the first time microcredit borrowers invested the credit to introduce small business and microcredit increases 1/3 of new small business in Bangladesh every year. The predominant categories of small businesses introduced by the microcredit recipients are: little groceries, hair dresser saloon, poultry farming etc. But vast majority of small businesses which were introduced by microcredit of MFIs were low profitable and ended up within 6-9 months of debut.

The businesses, which were introduced by the credit recipients of Group 'A', were ended up within 6 months of starting. The conditions of small businesses introduced by group 'B' were almost the same of Group A; their businesses were ended up within 7-9 month of debuting. Group 'D' was the most successful group to operate their businesses and increased the assets followed by group C. Their business success rate was 15% and 10% respectively. The record was taken for the businesses which survived at least for a couple of years from debut. Same result was found by the studies conducted by Avijit Banerjee (2012)

But there were no considerable changes for the control group in respect of their growth and development of small businesses during the study periods (from May 2015 to May 2016). It may be due to unavailability of capital for initial investment.

Analyzing Group A & B: the businesses which were started by the credit recipients of Groups 'A' & 'B' were without any plan, outline or framework and they didn't receive business consultancy from anywhere before introducing businesses. They pulled back money from the businesses to payback loan and to maintain the daily households' expenditures. As a result, their businesses ended up between 6 and 9 month of set out and they were confined into loan trap or several loan cycles as they took second loan to clear the first loan.

Analyzing Group A & B: the business success rate for group 'C' and 'D' were far better than their counterparts group 'A' and 'B' as the formers had other sources of income apart from the businesses revenues and they didn't depend only on the business revenue to payback and to maintain daily household expenditures. Moreover, their entrepreneurial knowledge and working skills were better than that of their counterparts and some of them received business consultancy before introducing businesses.

Changing in farm and household assets: Household assets in this study includes furniture, farm implement, poultry, livestock, radio, TV, mobile phone etc. By considering changes in number of mentioned assets, change scores were computed. After joining the credit program, it is noticed that, farm and household assets increased for almost all of the credit recipients (sofa set from 4 to 12 pcs, bed from 92 pcs-124 pcs, mobile phone from 25 to 257 pcs, electronic fan from 35 to 75 pcs, hen/duck from 153 to 335 pcs, goat from 50 to 253 pcs, cattle from 42 to 154 pcs, radio from 10 to 40 pcs and TV from 15 to 63 pcs)

Similar findings also noticed by Haque and Masahiro (2009) by conducting "NGOs-MFIs Members Impact Assessment Survey". They found that 98.88% borrowers had some kind of physical assets while the rest could not increase due to some unexplained reasons.

Table1. Distribution of Number of Assets of Credit Respondents and Control Group Members According to their Farm and Household Assets

Groups/ Segments	Sofa set	Mobile phone	Electric fan	Hen/duck	Goat	cattle	Radio	TV
Before taking loan	4	25	35	153	50	42	10	15
After taking loan	12	257	105	335	253	154	40	63
Control group-2015	2	10	10	97	15	13	7	5
Control group-2016	4	31	40	250	45	28	15	7

Source: Field survey by the author 2015-2016

But it is a matter of fact that in 7-9 months of receiving credit, 97% of the recipients of group A & B sold their newly bought household assets at significantly discount rate to repay the loan taken from the NGO-MFIs.

Nicholas Kristofer, a Pulitzer Prize winner quoted that loans which are received from microcredit lenders are very often invested in non-productive sectors, for example to buy durable goods, to build houses or to give marriage of children. And to repay the loan they are to sell out their cattle, houses utilities, lands and even the body organs Nicholas Kristofer (2009). But there was no considerable change for the control group in respect of their increase in household assets during the study periods (from May 2015 to May 2016)

4. Microcredit and relevant scenarios in Bangladesh

With a view to lift the vast population out of the vicious cycle of poverty through involving them in income generation activities, Dr. Muhammed Yunus, a professor of economics at Chittagong University then, initiated a microcredit program named "Grameen Bank" in Bangladesh in 1974, to provide initial investment capital without collateral to underprivileged, primarily targeting the poorest of the society.

The major objectives of microcredit schemes are:

- A. To provide microcredit to poor people at relatively low interest rate compare with formal lenders;
- B. To finance economically and socially durable projects which are not financed otherwise;
- C. To provide small credit without collateral to the impoverished investors who can't secure loan from conventional banks;
- D. To empower women through involving them in economic activities;
- E. To accelerate economic growth activities and employment opportunities;
- F. To reduce poverty, accelerate growth and promote the living standards on sustainable basis.

Now, microcredit is a widespread program in Bangladesh and household name. As an income generation activities of Bangladeshi poor, microcredit emerges as a unique innovation of credit delivery system for last three decades.

Table 2. Microcredit Sector in Bangladesh (Basic Activities)

Particulars	June-11	June-12	June-13	June-14	June-15
No. of NGO-MFIs	576.00	590.00	649.00	742.00	753.00
No. of Branches	18,066.00	17,977.00	14,674.00	14,730.00	15,609.00
No. of Employees	111,828.00	108,654.00	110,734.00	109,628.00	110,781.00
No. of Clients (million)	26.08	24.64	24.60	25.11	26.00
Total Borrowers (million)	20.65	19.31	19.27	19.42	20.35
Loan Disbursement BDT (Billion)	303.18	456.02	432.28	462.00	634.00
Loan Outstanding BDT (billion)	173.79	211.32	257.01	282.20	352.41
Amount of Saving BDT (billion)	63.30	75.25	93.99	106.99	135.43
Loan Recovery BDT (billion)	271.83	314.11	375.07	447.89	522.47
Recovery Rate	95.52	97.74	97.69	95.64	96.02

Source: MRA-MIS 2015

For various reasons, obtaining loan from formal financial institutes is very difficult for the impoverished and it is an emerging agenda for development in Bangladesh to have access to credit.

MFIs provide easy accessible small credit to the underprivileged to introduce small businesses or other income generation activities. As of May 2015, 753 licensed NGO-MFIs are operative in Bangladesh with BDT 634 billion disbursed loan and serving around 26 million poor whereas government sector serves 12 million poor (MRA 2015). An increasing trend was noticed in the number of licensed NGO-MFIs and their clients as well as volume of loan disbursement and outstanding loan over the period between 2011 and 2015, shown in Table 3

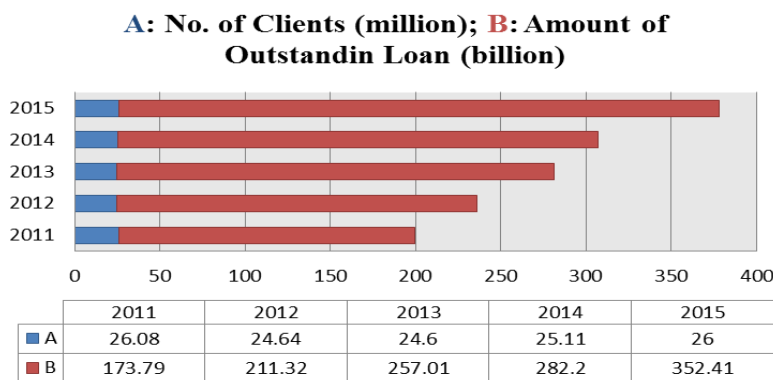
Figure 1 below.

Table 3. Statistic of no. of NGO-MFIs & amount of disbursed loan

Year	2011	2012	2013	2014	2015
No. of licensed NGO-MFIs	576.0	590.00	649.00	742.00	753.00
Total disbursed loan (Tk. Billion)	303.8	456.02	432.28	462.00	634.00

Source: MRA-MIS 2015

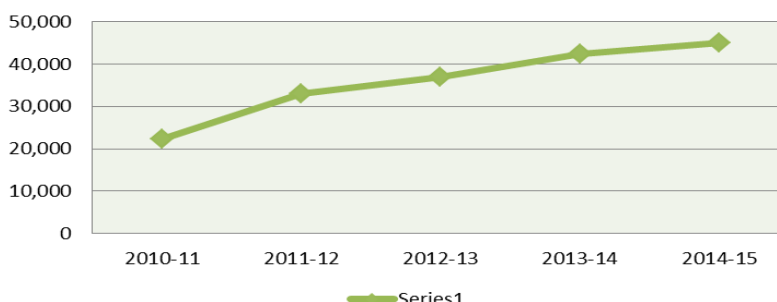
Figure 1. Raising no. of MFIs' clients & amount of outstanding loan 2011-2015



Source: MRA-MIS 2015

The main obstacle for impoverished individuals and small enterprises to access formal financial service is the credit with collateral which has turned their attention to MFIs. MFIs provide easy accessible loan to the impoverished investors without collateral. As of 2015, 42,000 SMEs has come to the loan programs of MFIs. The growing trend of SMEs to MFIs' loan facility between the FY 2010-11 & 2014-15 is shown in Figure 2.

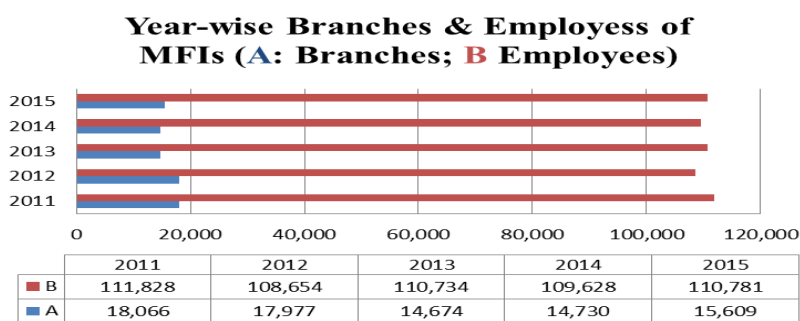
Figure 2. Shows the growing no. of SMEs are accessing to credit program from 2010-15



Source: MRA 2015

MFIs have spread their operation throughout the country and created direct and indirect employments during last 4 decades. As of June 2015, in their countrywide 15,609 branches, the sector has created jobs for 110,781 people. Of them 80% is male 20% is female. The figure 3 shows the accelerated number of branches and employments created by MFIs between 2011 and 2015.

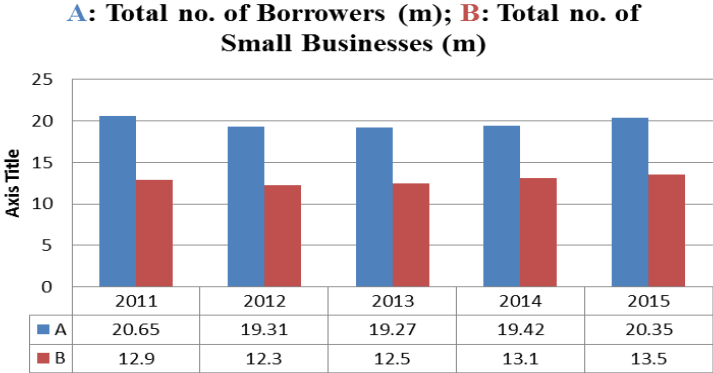
Figure 3. Shows the increased number of Branches and employments 2011-2015



Source: MRA-MIS 2015

The sector has created opportunities to establish micro and small scale businesses and indirect employments, basically self-employments through BDT 634 billion loan disbursement (MRA 2015) to its 20.35 million borrowers. As of 2015, 13.5 million small businesses were created by the microcredit of MFIs which created self-employments for the business owners and employment for almost the same number of others who were employed in those businesses.

Figure 4. Shows raising trend of borrowers and small businesses between 2011 and 2015



Source: MRA-MIS 2015

Microcredit has become to be seen as an important development policy and enabler for growth and development of SMEs and various income generation activities through easy accessible credit programs, as only below 10% of adult population in Bangladesh has bank accounts and literally has access to formal financial services. Microcredit programs of MFIs prevent the impoverished investors' liquidity constraints and make them more active in financial activities.

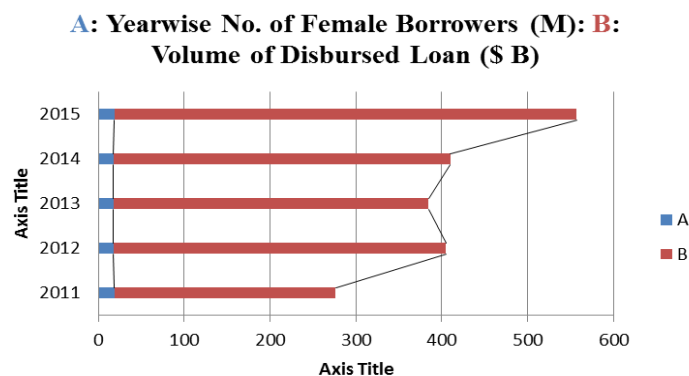
An empirical study conducted by Chowdhury (2009), on 2500 microcredit recipients of Grameen Bank in Bangladesh over the period 2007-2008, pointed out that microcredit has positive impacts on income, productivity and employment, particularly in rural non-formal sectors. The study simply indicated that the increase in self-employment among the poor with access to credit has resulted in an increase in rural wages.

A widely cited study conducted by Khandker (2010) found that by borrowing from microfinance institutes, up to 5% participants were able to lift their family out of poverty in Bangladesh. Khandker's survey was mainly on three major MFIs-BRAC, Grameen Bank & RD-12. The finding of follow-up survey conducted by Khandker reported that microcredit borrower did better in per capita income, per capita expenditure and household net worth in both 2007/2008 and 2008/2009 (Khandker 2010). The survey also noted that the programs were spillover effects on local economy, but impacts were very small (Khandker 2010, 13). The positive impacts of microcredit in economic sustainability are also found by studies conducted by Hashemi *et al.* (1996), Montgomery *et al.* (1996), Morduce (2000) and Husain *et al.* (1996), imposed on MFIs and microcredit recipients in rural and urban areas of Bangladesh, noted that microcredit accelerate small and micro scale businesses, diversify income-earning sources and build up assets.

One of the significant roles that microfinance has in local economies is providing credit to low-income and poor families to set out financial activities with the means to become financially stable that helps breaking the cycle of poverty in the current generation and work toward ending poverty for the future generation. A study conducted by Khandker and Shahidur (2005), imposed on 1000 microcredit recipients of three major MFIs of Bangladesh (ASA, BRAC & Grameen Bank) between 2003 and 2004, noticed that clients who join and stay in microcredit program have better economic condition than non-clients, suggesting that programs contribute to these improvements.

Microcredit has a great impact to women empowerment. In Bangladesh where women are neglected due to their dependability on male partners, microcredit provides them with beneficial banking they need to start up business ventures and actively participate in economy (Pitt and Khandker 2010). As of 2015 23.6 million women come to MFIs loan facilities with BDT 538.9 billion loan disbursement. Let's overlook on women's financial support by MFIs and other formal financial institutes in Figure 8 and Table 4.

Figure 5. Shows the no. of female borrowers and amount of outstanding loan



Source: MRA-MIS 2015

Table 4. Women’s Businesses financed by Banks and Financial Institutes

No.	Year	No. of SMEs
1	2010	13.233
2	2011	16.697
3	2012	17.362
4	2013	41.719
5	2014	42.730
6	2015	188.233

Source: Bangladesh Bank 2016

Hashemi (1996), found positive impacts of microcredit on female empowerment by the comparative research conducted on 570 Bangladeshi married women who received loan from two major microcredit programs - Grameen Bank and BRAC and same number of women who didn't receive loan from any where between 1992 and 1995, noticed a greater empowerment of women by their mobility, ability to make household decisions, ownership of assets and political awareness who received loan than that of women who didn't accepted loan (Hashemi *et al.* 1996).

Almost the same result was found by the study conducted by Kabeer (2001), Goetz and Sen Gupta (1996), Bhattacharaya, Helme and Mont Gomery (1996).

The impact of microcredit on child education in Bangladesh is also remarkable. Microcredit has overall positive impacts on child’s education of households who have access to microcredit.

A study conducted by Khandker (2010), found positive impacts of microcredit on child’s education. In the comparative analysis, he examined 250 households before and after receiving microcredit from Grameen Bank of Bangladesh during the period between 2008 and 2009, noticed that households after receiving loan sending more children to primary school.

Almost the same result was found by the study conducted by Tazul Islam (2010), operated on 500 respondents who received microcredit from several MFIs and same number of (500) respondents who didn't accept credit from any MFIs in rural areas in Bangladesh between 2008 and 2009, indicated that respondents who received microcredit were in better economic condition and able to send more children to school for longer period and to make greater investments in their children's education than that of their non-credit recipients counterpart.

Negative Impacts of MFIs in Bangladesh

Despite these positive evidences, the real impacts of microcredit on economic growth and poverty alleviation are highly a debatable issue in Bangladesh. Since its debut, microcredit has not had very positive impacts rather have led many borrowers into debt trap or in some cases leading suicide or selling organs (Milford 2010 and Kathrin 2012). Prof. Mohammad Yunus, the founder of Grameen Bank in Bangladesh, believes that 5% of Grameen Bank’s clients exist from poverty each year but there is no credible evidence (Anis Chowdhury 2009).

A study conveyed by Wastover and Khandaker noticed that among six representatives, five found no evidence that microfinance reduces poverty though they found other positive impacts, for example women empowerment and child education. Study selected from sample of more than 100 studies as being methodically sound (Wastover and Khandker 2008).

Tazul Islam (2010), evaluated the credit program of Grameen Bank of Bangladesh by his empirical study conducted on 270 credit recipients who received microcredit from the micro financial institute, summarized that a high percentage of poor who join the program often drop out into loan trap of several loan cycle as loan amount to be exceed their repayment capacity (Tazul Islam 2010).

Kathrina Hartman, the German Journalist, told about the trapping in debt of women whom she met in 2012 at Kurigram district in Bangladesh. The rural women who were the borrowers of microcredit told her about the brutal methods of enforcing debt repayment, including the forced to sale of cattle, house utensils and lands. In order to repay the loans children are dropped out of school to earn money and food expenditures are cut down significantly.

In order to be able to repay loan, newly indebted men and women even sold their kidneys, as discovered by the police in summer 2011 (The daily Jonokhonto 5 July, 2011). Mohammad Mehedi Hasan 24, from Molagari village in Bangladesh sold his liver at \$9690 to repay the loan which was taken from a microfinance institution in 2010 (The Daily Star 09.12. 2011).

Professor Mohammad Moniruzzaman from the department of Anthropology at Michigan State University has been researching the organ trade in Bangladesh since 1990, stated that such a selling organ is to make repayment and they felt no choice but to sell a body part (Mohammad Moniruzzaman 2010).

The primary goal and mission of microfinance is to alleviate the poverty and promote the quality of living through various income generation activities and creation of employments. But they are very far from the target as many borrowers have been driven into debt trap or several loan cycles, even in some cases have been leaded to suicide (Bateman 2010, Hartmann 2012).

Milford Bateman, the author of 'why doesn't Microcredit Work?' argues that microcredit offers only an "illusive of poverty reduction". "As in any lottery and game of chance, few in poverty do manage to establish microenterprises that produce a decent living". He argues that "these isolated and often temporary positives are swamped by the large overlook negatives".

Why microcredit doesn't work?

MFIs provide collateral free loan to underprivileged to introduce businesses or other income generation activities. A large volume of small business is introduced by the microcredit of MFIs in Bangladesh every year but vast majority of the small businesses which are introduced by microcredit of MFIs can't sustain longer and the investors are fallen into deep poverty due to accepting loan. Moreover, credit is very often invested in non-productive sectors, for example to buy goods, built houses and to repay the loan they are to sell cattle, houses and even body organs.

An empirical study conducted by Islam (2010), imposed on 550 small-scale businesses initiated by microcredit taken from several MFIs of Bangladesh between 2008 and 2009, found that microcredit accelerates 1/3 of new business each year but 2/3 of them are ended up before their first anniversary which push the clients from poor to ultra-poor due to receiving loan.

Almost the same result was found by the study conducted by Mia (2000), examine the effectiveness of microcredit in Bangladesh on the poor recipients to generating new business and developing existence businesses, indicated that microcredit plays a remarkable role to enhance small business but in the regard of survival rate, there is a big question mark as most of the newly initiated small businesses (above 70%) introduced by micro-credit are ended up within 7-9 months of operation, create tremendous problems in clients' households livelihood and social spheres.

Goetz and R Sen Gupta (1996), examined 150 selected women entrepreneurs and their micro-scale enterprises started by microcredit loan provided by several MFIs in Bangladesh, found that 47 out of 150 women entrepreneurs were successful and increased their property through successful and profitable businesses ventures but the rest of the entrepreneurs were ended up poorer due to unsuccessful businesses which were lasted 7-9 months from set out.

Another study conducted by Westover (2008), on 200 small scale businesses started by microcredit taken from 3 major MFIs of Bangladesh-BRAC, Grameen Bank and ASA, found that microcredit plays a tremendous role to growth small businesses, solving impoverished entrepreneur's financial impediments. But vast majority (70-75%) of them were not profitable enough to payback and ended up before their first anniversary as they (investors) pullback money from the business to payback and to maintain the daily expenditures.

The Common Causes Why Microcredit is not effective in Bangladesh

There are many reasons which are accountable for the failure of high rate of small business initiated by

microcredit of MFIs. Some of the remarkable reasons are:

1. Lack of entrepreneurial and managerial knowledge of entrepreneurs. Microcredit borrowers, who do not have necessary requirements to receive loan from the conventional banks, are marginal and disadvantage inhabitants of the society. They can't utilize the loan capital effectively and manage the newly introduced financial institutes perfectly, lead high rate of investment failure.

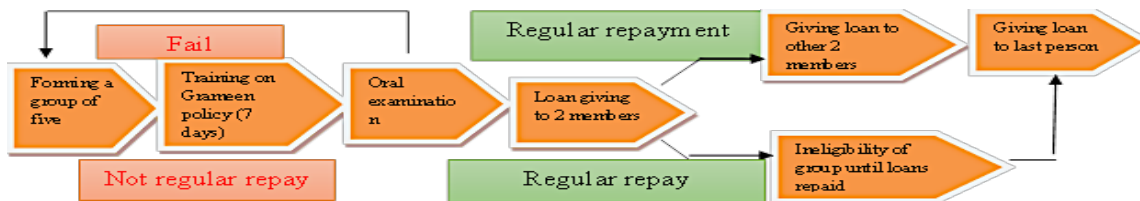
A study conducted by Abhijit Banerjee of MIT poverty action lab in slum in Hyderabad has first been evaluated the impact of microcredit in new markets in 2012 indicated that microcredit increased the number of businesses by 1/3 but 2/3 of them are not very profitable and cannot survive longer than six months due to lack of entrepreneurial knowledge of impoverished investors and non-effective investment.

2. Ineffective investment. As the microfinance borrowers are marginal and lack of entrepreneurial and managerial knowledge and experience, they don't know how and which sectors the capital should be invested in for well rate of return. Most often, the borrowed money are invested either in list profitable or non-profitable sectors to earn a well return on investment, results drop down of borrowers into loan traps or several loan cycles, as they take 2nd loan to clear the 1st one.

Nicholas Kristofer, a Pulitzer Prize winner quoted that loans which are received from microcredit lenders are very often invested in non-productive sectors, for example to buy durable goods, to build houses or to give marriage of children. To repay the loan, they are to sell out their cattle, houses utilities, lands and even the body organs (Nicholas, Kristofer 2009).

3. Ineffective Credit giving and repayment policies. Loan functions of existent MFIs in Bangladesh are ineffective. MFIs in Bangladesh form a group of five potential borrowers and train them how to receive and repay the loan instead of providing entrepreneurial, managerial and bookkeeping knowledge and training to create them successful entrepreneurs; bring no basic changes but high rate of investment failure and drop down of large number of borrowers into tremendous poverty and loan trap every year. Figure 9 shows the non-effective character of MFIs loan function in Bangladesh.

Figure 9. Shows the loan functions of first modern micro-credit institute 'Grameen Bank'



Source: Computation by the Author 2015

4. High interest rate. Interest rate of existence MFIs are relatively high, which limits its effectiveness to growth and development of small business and fight against poverty. For microcredit, 27% is the average interest rate (Financial Time 11.10.2010, MRA 2013). At 27% interest rate does means that if borrowers don't manage to earn at list 27% rate of return, may eventually ended up poorer as a result of accepting loans that is very common scenarios in Bangladesh.

This is the fact that borrowers very often don't know what is interest rate and which interest rate they are being charged by and they are not aware of the consequences of having multiple loans as they receive 2nd loan to clear the 1st one (Tucker, Jeffrey, November 2012).

5. Inconvenient Repayment structures. Repayment policy of NGO-MFIs in Bangladesh is also not effective for growth of small business and fight against poverty rather it is a kind of debt trap. MFIs take their loan back with 46 installations in a year. First installation is started on 15th day of receiving loan then every week subsequently. It is too little time to invest the small investment capital to a profitable sector to get return on investment. If borrowers can't manage to earn at least 27% rate of return every week, they are confined into loan traps or several loan cycles.

Table 5. Major Causes for small business failure

Major cause	Percentage of Failure
Incompetence	43%
Lack of managerial experience	28%
Lack of experiences in line of goods & services	28%
Neglect, fraud, disaster	1%

Source: Statistic Brain Research Institute, USA (2016)

Major causes for SMES failure rate has been shown in Table 5. Incompetence is the most remarkable cause for vast majority of SMEs failure which account for 43% business failure, followed by lack of managerial experience, lack of experiences in line of goods and services and neglect, fraud, disaster that are account for 28%, 28% and 1% respectively.

Women empowerment illusion

Women, almost half of the total workforce of Bangladesh [49.586(f): 50.414 (m)], are not usually allowed to involve in outdoor financial activities due to religious and cultural restriction (World Population Prospective-2017). As of 2013, 32.9% of the female workforce is active in economic activities compared with 81.7% of their male workforce counterpart (BBS 2014). In connection with ownership in businesses, the ratio of female and male business ownership is 7.2:92.8 (BBS 2014). The low participation of women in financial activities is accountable for permanent economic downturn and social depression.

Table 6. Contribution to GDP by women owners

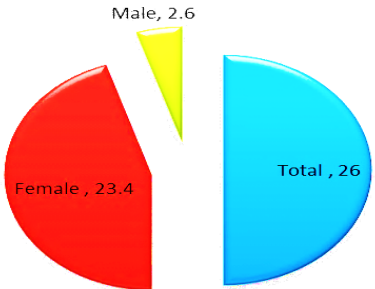
Particular	Total contribution of GDP (in million)	Percentage of total contribution
Agriculture	4,993.70	18
Fishing	94.28	3
Manufacturing	1,397.36	50
Whole sale. Retail trade	4,227.38	15
Real state, business activities, education	514.19	2
Health and social works	338.54	1
Other services	308.54	1
TOTAL	14,309.17	100

Source: BBS (2014)

The low contribution of GDP by females owned enterprises is illustrated by the Table 6. The contribution of female entrepreneurs from the manufacturing enterprises was the highest with 50% compares with agriculture 18%, retail trade 15% and hotel restaurant 8%.

One of the most significant targets of MFIs in Bangladesh is to lift the women from the lagging areas and involving them in income generation activities through providing initiative investment capital (microcredit). As of 2015, MFIs provided microcredits to 26 million clients overwhelming majority (90%) of them are female. The figure 6 shows the ratio of female and male MFIs clients.

Figure 6. MFIs Clients millions of individuals (Dec. 2015)



Source: MRA-MIS 2015

But it is a matter of fact that, according to the empirical study conducted by Bhattacharya *et al.* 1996, only 13% of the female borrowers who received credit from several MFIs of Bangladesh had control over loan capital and active on it whereas the vast majority of 87% of the credit recipients lost their control over loan to their male partners which impedes the women empowerment and achieve gender equality through microcredit.

Likewise, Goetz and Sen Gupta (1996) studied the effects of microcredit on women empowerment by field survey using a semi-structured questionnaires and a scheduled face-to-face interview with 253 women who accepted credit from BRAC and Grameen Bank of Bangladesh, found the same result.

How Microcredit will succeed?

Microcredit is a very effective tool for growth and development of micro and small scale business and alleviates poverty. But it doesn't work itself. Just providing loan to its clients is not well enough to reach the poverty

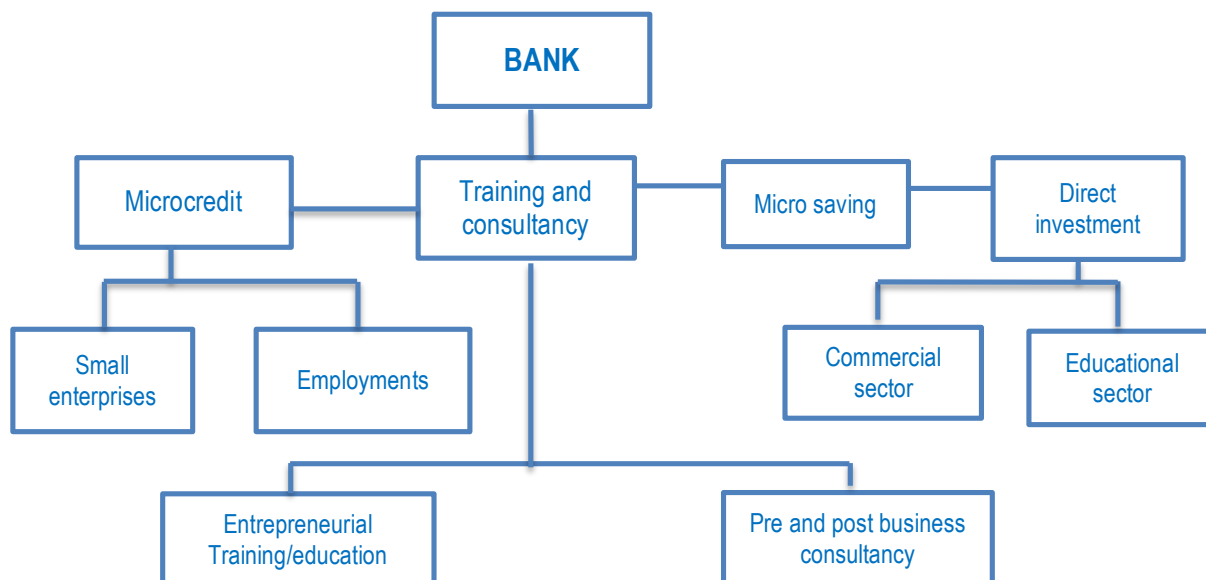
alleviation and socio-economic development goals. To reach its economic growth and poverty alleviation goals, microcredit policies are needed to be implemented and managed effectively and services are needed to be designed to meet the needs of clients, thereby not just only clients but also their families and the wider communities can be benefited.

The most important task is to find the ways how banking and investing can: strength local community, support good green business, lift families out of poverty and how can it be started effectively today. When loans are associated with an increase in assets and money liquidity is accelerated effectively, when borrowers are encouraged to invest in low risk income generation activities and when very poor are encouraged to save; the vulnerability of the poor people is reduced and improved of the poverty condition (Humal and Mosley 1998). So, together with credit, other complementary factors are vital including selection and motivation of entrepreneurs, identification of livelihood opportunities, business and technical training, establishment of market linkage etc. to reach the poverty alleviation goal.

The following reformation of MFIs could be a potential breakthrough to reach its economic growth and poverty alleviation goals:

1. Banking Structure. The main objective and focus of MFIs is to lift the impoverished population out of the vicious cycle of poverty through growth and development of small businesses and various income generation activities and involving them in entrepreneurial activities. To pave the way for effective banking structure and investment policy are predominantly significant. The recommended banking structure of MFIs could be viable alternative to reach its economic growth and poverty alleviation goals.

Figure 7. Recommended Banking Structure



Source: Computation by the Author 2015

Collateral free loan programs

Access to easy financial services is very significant for growth and development of small business (Chowdhury 2009, Mahjabeen 2012). But access to formal financial services is one of the most remarkable constraints for small business investors to set out entrepreneurial activities (Mia 2000, ADB 2013, IMF 2013). Less than 20% of small businesses in Bangladesh have access to institutional financial services (IMF 2013). The main obstacle to access to institutional finance by small entrepreneurs is the credit with collateral (IMF 2013).

If MFIs introduce collateral free micro credit program with effective credit giving and payback principle to reduce the financial access interruption of underprivileged entrepreneurs, it will be a potential breakthrough to enhance the growth and development of small enterprises and diversify the income activities in Bangladesh.

Credit giving policy

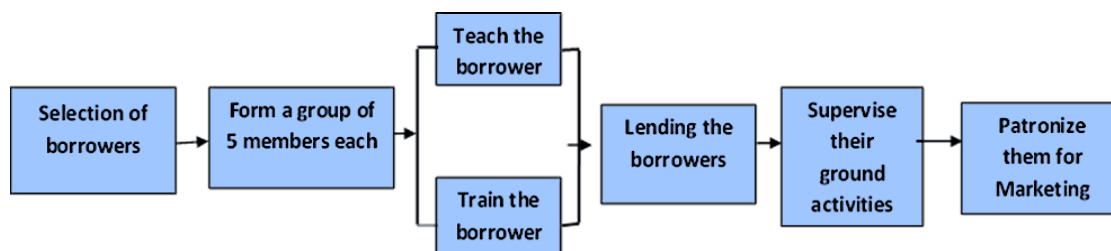
The ultimate goal of MFIs is to accelerate the economic growth activities and to lift the impoverished people and areas out of the vicious cycle of poverty through growth and development small businesses and various income generation activities and involving them in the growth potentiality through providing them low interest loan for entrepreneurial activities. As loan giving policy, if MFIs first surveillances the projects of the loan applicants and

provides knowledge and training in the areas including entrepreneurial, managerial, marketing and bookkeeping spheres, it'll be effective to accelerate the small business's growth potentiality and success rate and minimize the small business failure rate.

For effective utilization of loan capital and maximization of output of credit functions, MFIs can pursue the following pre and post credit allocation policy:

1. Forming a group of five potential borrowers (credit recipients);
2. Surveillances their planned projects and projects' survival and growth potentiality;
3. Effective entrepreneurial and managerial training;
4. Pre and post investment and business oriented consultancy;
5. Allocated loan capital ranging from \$2000-\$10,000.

Figure 8. Recommended loan giving structure of MFIs



Source: Computation by the Author 2015

Low interest rate

Access complexity and high interest rate of SME loan are the most remarkable impediments for growth and development of SMEs (Khandakar and Shahidur 2005, 2010). The state and private commercial banks impose average 13% annual interest rate for SMEs (Bangladesh Bank 2017) whereas interest rate of MFIs for SMEs is 27%/annum (Financial Time 11.10.2010, MRA 2013). The high interest rate of SME loan curbs the SMEs growth and survival rate remarkably.

If MFIs minimize the annual interest rate to 7-8% and explain them about the entire system including credit, interest rate and repayment procedures, they will be knowledgeable about it and stimulated to invest effectively (effective investment) for well return on investment.

Credit giving and repayment reformation

Credit giving policy and repayment structure of existence MFIs are ineffective for permanent economic growth by marginal entrepreneurs and improve the poverty conditions. MFIs receive their loan back with 46 instalments in a year and 1st instalment is started on 15th day of receiving loan then every week subsequently. It is type of 'cat-and-mouse game' as it is too little time to invest a micro credit to profitable sector for well return on investment.

A reformation on loan functions and repayment structure of MFIs is mandatory to reach its economic growth and poverty alleviation goal. If MFIs diversify the loan functions to Short term and Long term credit programs, and introduce different interest rates and repayment strategies for different loan functions, it will be more effective.

Short term credit: For short term credit, if MFIs impose 5% annual interest rate and applies flexible instalment based repayment principle, it will bring positive outcome. The MFIs will get the loan back with monthly basis 12 instalments during a year and first instalment will be started after a month of receiving loan.

Long term credit: For long term loan if MFIs impose 10% annual interest rate and get the total loan back with interest rate in single instalment after a year of receiving loan it will be very positive.

The low interest rates will minimize the pressure on credit recipients and payback principle will enlarge the time to invest and make profit which will accelerate the small business's growth potentiality and sustainability. The Borrowers of both categories also have to have options to open saving and deposit account in the bank.

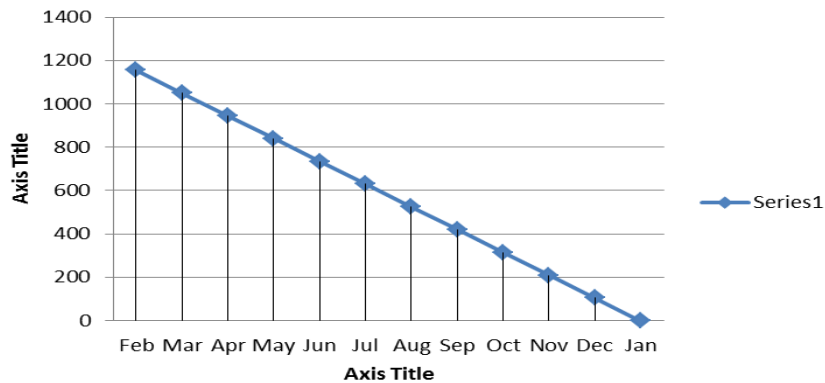
In Bangladesh, impoverished investors invest in mainly 2 types of income generation activities: to introduce small businesses wherefrom revenue and profit comes daily basis and to introduce farming including cattle fostering, poultry farming, fisheries etc. which take 9-12 months to get return on investment. Due to the investment faatures of the small investors in Bangladesh, the MFIs should pursue the different loan functions for better outcome.

Short term loan's repayment sample:

$$\text{Repayment instalment} = \text{total loan capital with interest}/12$$

If a client receives \$1200 loan on 1st of January, from the 1st of February his/her instalment will be started and instalment capital will be \$105 ($\$1260/12=\105)/month till January of the following year.

Figure 9. The line graph shows low payback instalments (for short term loan)



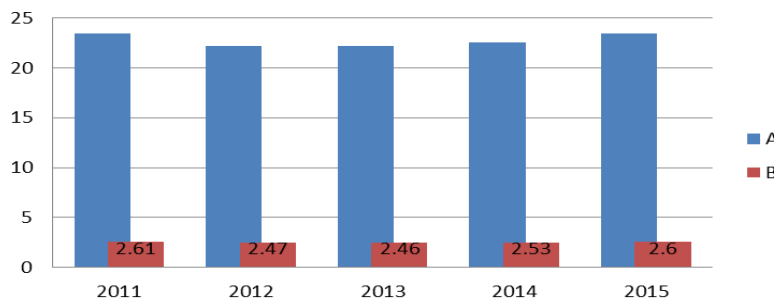
Source: Computation by the Author 2015

Women empowerment

One of the most significant targets of MFIs in Bangladesh is to lift the women from the lagging areas and involving them in income generation activities through providing initiative investment capital. Overwhelming majority of 90% of NGO-MFIs' clients are female in Bangladesh.

Figure 10. Shows year-wise no. of female and male MFIs' clients

Yearwise Female (A) & Male (B) MFIs' Clients (million)



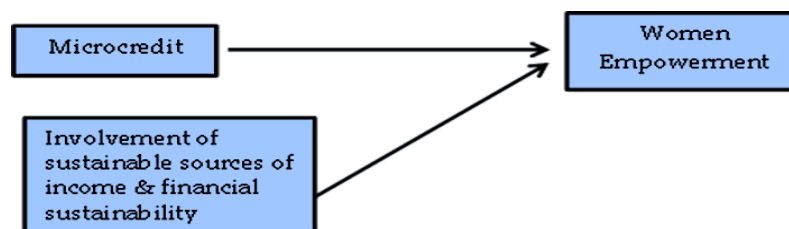
Source: MRA-MIS 2015

But it is commonly seen that female credit recipients lose their control over loan to male partners which hindered women empowerment (Bhattacharya *et al.* 1996, and Goetz and Sen Gupta 1996).

MFIs have to take effective initiatives against the backdrop. When MFIs allocates credit to women, extra care, proper training, guideline and encouragement have to be given together with credit to be established their own ventures and invested in low risk income generation activities to get financial basement and not to lose their control over loan capital.

Just access to microcredit to women doesn't empower them automatically; rather loan improves their status and makes them more active in decision- making, greater accession to financial resources, greater social network and greater freedom of mobility thus encourage gender equality.

Figure 11. Women's empowerment



Source: Computation by the author 2015

Entrepreneurial training

Every year 1/3 of new small business is introduced by the microcredit of MFIs in Bangladesh but 2/3 of them can't survive longer than 1 year because of low market share and low profitability (Avijit Banerjee 2012). These are due to lack of entrepreneurial, managerial, marketing and bookkeeping knowledge and experience of small business investors (Mia 2000, Begum 2013, Rahman SM, 2012, IMF 2013). Most of the small businesses in Bangladesh are introduced without any plan, outline or framework which lead high rate of small business failure. A survey conducted by Bangladesh Bank (2012), showed that 89% owners of small businesses practically done the business plans by themselves without seeking consultation from professionals or experts. This has been resulted to incompetence, inefficiency, wastage and under-utilization of resources available to the organization.

To counter the impediment, MFIs have to ensure basic small business knowledge and training to small business investors in the identified areas including, entrepreneurial, managerial, marketing and bookkeeping areas before providing them loan to reduce small business's failure rate and accelerate profitability and success rate.

Setting helps desks in bank and business promotion bodies

Small business entrepreneurs are marginal, uneducated and disadvantage inhabitants of the society. But investment functions in Bangladesh are bureaucratic, corrupted and complicated with a lot of paper works and red tape barriers (Browning and Chiappori 2012). The poor entrepreneurs are not knowledgeable and experienced with the formal administrative procedures. Thus, they are often confronted with harassment, unexpected delay and side payment to get registration and business license. Thus, investment cost of small business goes unexpected high and investment plan of many potential investors are nipped in the hood. To repel the impediments and extend the outreach of small business development, MFIs can set up help desks in bank branches to assist the small business investors in this area for successful growth and development of small business.

Investment in education sector

Creation of an effective human nation that increases labour productivity is very significant for the long-term and sustainable development of a nation (Goldin and Katz 2008, Hanushek and Woessmann 2012). Education is the single most significant component to create human nation (Goldin and Katz 2008). But the education sector in Bangladesh lags behind the standard. Literacy and school attendance rate is relatively low and school dropout rate is very high, mostly among the impoverished population as they can't effort to send their children to school rather send them to work to support their families. As of 2012, youth literacy rate is 77.1% for male compare with 80.4% female. Primary school attendance rate for male and female children is 72.2% and 81.2% respectively and secondary school attendance rate for male and female child is 42.2% and 47% respectively (UNCEF 2017).

The MFIs can play a significant role against the backdrop. They can work through the current generation and build up the future generation. MFIs' effective loan programs will increase impoverished investors' economic growth and income generation activities, employments and household income which contribute them to send more children to school for longer time. Besides, MFIs can introduce educational programs to provide standard education, mainly to the children of underprivileged which bring a radical change in socio-economic spheres in Bangladesh. If a generation is possible to lift out of illiteracy cycle through up to date and education, it will bring radical changes in socio-economic spheres. Let's see the literacy, school attendance and survive rate in Bangladesh in Table 8.

Table 8. The literacy, school attendance and dropout rate

Segment	Years	Ratio
Youth (15-24) literacy rate (male)	2008-12	77.1%
Youth (15-24) literacy rate (female)	2008-12	80.4%
Pre-primary school participation rate (male)	2008-12	26.8%
Pre-primary school participation rate (female)	2008-12	26.1%
Primary school attendance rate (male)	2008-12	77.2%
Primary school attendance rate (female)	2008-12	81.2%
Primary school participation, survival rate to last primary grade (male)	2008-12	62.2%
Primary school participation, survival rate to last primary grade (female)	2008-12	93.5%
Secondary school attendance rate (male)	2008-12	42.9%
Secondary school attendance rate (female)	2008-12	47.0%

Source: UNICEF, 8 Dec 2013

The Table 8 shows that in Bangladesh literacy and school attendance rate is relatively low and school dropout rate is very high due to high rate of poverty which resist the impoverished parents to send their children to school for longer time rather send them to works to support the families.

Conclusion

When and how MFIs will accelerate economic growth and improve poverty condition depends among the other things on whether and how successfully microcredit policy address the real constraints faced by the poor in a certain context and area and how effective measures are taken to overcome the impediments. Effective strategies and proper implementation are indispensable to reach its economic growth and poverty alleviation goals.

Lack of entrepreneurial and managerial knowledge and experience of MFIs' borrowers and their low working skills, high interest rate, ineffective credit giving and payback policies and ineffective investment of microcredit are mostly accountable for low profitability and short sustainability of small businesses, which push the impoverished investors into deep poverty.

The recommended banking structure of MFIs, which is designed to provide microcredits to encourage and increase the entrepreneurs and entrepreneurship training and business consulting for borrowers before granting them loan, will help to minimize the level of business disruptions and increase profitability.

The direct investment policy of MFIs will accelerate profitability and sustainability of MFIs and create more employment opportunity.

'Short term' and 'Long term' loan giving policy, which will classify the loan functions into two categories according to the investment plans of the borrowers and impose different interest rates and payback strategies for different loan categories, will escalate investment success rate. Recommended interest rate will minimize pressure on credit recipients and payback reformations will provide longer time to invest and get return on investment; will be viable alternative.

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The Conditions for Digitalization and Industry 4.0 Development in Selected European States

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Abstract:

Nowadays, the business environment is confronted with many changes and newly developed technologies. That is the reason why it is appropriate to cope with conditions or readiness for these changes. This paper is focused on research of business environments' conditions in selected European states in relation to the digitalization and Industry 4.0 trends. The aim is to find similarities and dissimilarities in the digitalization levels and in the conditions of the execution of Industry 4.0 concepts in the business environments of selected European states. Eleven indicators related to the issue of digitalization were chosen to analyse business environment situation. Groups of similar states were created using a cluster analysis based on the particular indicators. A comparison among the groups was realized to identify different industry readiness levels. The groups or clusters of states were briefly characterized and described within a context of emerging technologies. Besides between group comparisons a view on the inner structure of particular groups was outlined as well.

Key words: industry 4.0; digitalization; cluster analysis; business environment in selected European States

JEL Classification: C38; D80; O30; L16

Introduction

Digital technologies are used more frequently in wide variety of disciplines at the present time. They are expected to be the key drivers of the trend named Industry 4.0, even initiatives concentrated on activities connected with technological development were prepared, as mentioned for example by Devezas, Leitão a Sarygulov (2017, 2) or described by Mařík *et al.* (2016) in the local conditions (environment) of the Czech Republic. In different conditions, however, various influences and dissimilarities can support or prevent the trend from spreading in business. As mentioned for example by Vogelsang (2010, 4), different approaches to digitalization may appear in different conditions.

The existence of various approaches and ways of digital technologies implementation demands analysing the environment or classification for the circumstances in the selected states in this paper. The paper is focused on an attempt to identify different conditions for development and to find not only dissimilarities but also similarities in business environments.

The aim of the work is to structuralize selected business environments into groups with comparable conditions and to describe the set up groups of states in the next step. One of the motives of the classification is a possibility to identify the potential ways to increase the readiness for the emerging technologies. One of the reasons for the classification is the possibility to search for ways of improvement of conditions for development in the area of digitization and industry. These ways can be identified by examining the practices that have been chosen in states that may be considered as more technologically advanced or digitalized. Inspiration can be found also within states with comparable level of conditions. A more detailed insight into these environments could prevent companies or governments from practices which do not lead to expected results. Alternatively, it could also reveal potentials for growth. A framework formed from groups of similar states could serve as a basis for an analysis or a search for a procedure enabling easier work with data in comparison with an unsystematic examination of the conditions in the individual states.

Cluster analysis was used as a method for group identification. The analysis was based on eleven indicators which are related to digitalization or Industry 4.0 trend and which can indicate readiness of an analysed environment or potential for a successful development in the field of digitalisation.

1. Research Background

The introduction to the topic deals with a brief look at the terms digitalization and Industry 4.0.

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Digitalization is defined by many authors. A point of view presented by Vogelsang (2010) is mentioned there as an example. Vogelsang (2010, 3) points out the use of information in a binary form as an important aspect and background of digitalization. He also links digitalisation with the development of internet and mentions its all around the world influence and considers digitalization as which is realized in a short period of time and it can be also considered as an important factor leading to the development in the area of technologies.

The second term mentioned here is Industry 4.0. Devezas, Leitão a Sarygulov (2017, 1) view the Industry 4.0 as a next step in industrialization.

They mention a view on its character of digitally based cooperation and interconnection of things represented by their virtual models and human beings, and modern technologies using artificial intelligence. The term Industry 4.0 was created in 2011 in Germany and is connected with initiative concerning modern technologies as mentioned for example by Devezas, Leitão a Sarygulov (2017, 2). A connection of Industry 4.0 and digitalization is mentioned for example by Møler (2016).

The application of digital technologies and the concept of Industry 4.0 can be considered as important also because it became a topic of the World Economic Forum (WEF). Every year, The Global Information Technology Report is published. A worldwide view of the topic is presented in the report using a compound index constructed in order to rank countries in accordance with their performance in the assessed fields. The overall index consists of many partial variables related to information technologies. The index is used to rank the states according to the achieved results. The aim of the report is not to cluster countries according to their similarities. Only groups made for analytical purposes are based on income groups (classification by the World Bank). (Silja, Soumitra and Lanvin 2017)

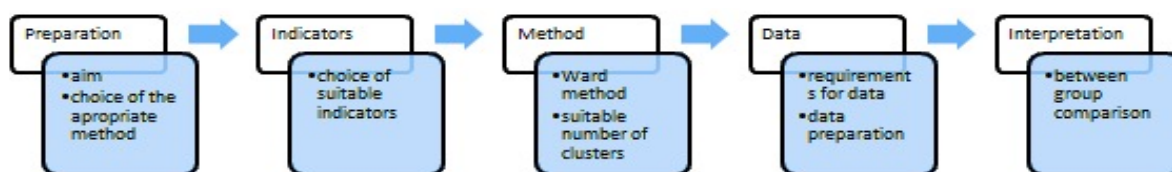
Unlike these reports this paper is focused more specifically, both from a geographical point of view (European countries) and within the scope of used variables and the available data.

Other studies concentrated on digitalization development (and the differences) in business environments of states were elaborated, including an analysis from Roland Breger Consultants, where also the index measuring readiness for Industry 4.0 is used for an assessment. The index is briefly described for example by Soldatos *et al.* (2016, 166)

2. Methodology

Procedure of methods application can be divided into consequential steps which are: choice of an appropriate method, indicators, choice of procedures within method, data collection (values for selected states) and interpretation. Within interpretation step, indicators in identified clusters are appraised (between groups and also within groups analysis was outlined). Procedure of realization is presented in Figure 1. Cluster analysis was realised within R program (R Core Team, 2017).

Figure 1 – Application procedure of the analysis



Source: Author's processing

2.1. Preparation – aims and reasons for application

As mentioned before, the aim is to find similarities and dissimilarities in digitalization levels and in the conditions of the implementation of Industry 4.0 concepts in the business environments of selected European states. In other words, the purpose is to create a structure, consisting of groups including similar states, based on characteristics related to digital technologies.

A structure in a form of clusters is considered to enable the identification with comparable business environments or to gain an overview of the business environments with higher degrees of digitalization for the purposes of the paper. This could be utilized to find new ways and approaches to digitalization development in particular region (state). The identified clusters can serve as a basis for more detailed analysis. A comparison of particular states based on selected indicators can be applied without existence of clusters, however, approach including clustering can be considered as less demanding and more structuralized.

Cluster analysis was chosen as appropriate method for achieving the set goal. Cluster analysis is a method for classification, *i.e.* sorting into particular groups as mentioned by Everitt *et al.* (2011, 1-13), who also

presents the multidimensionality of the method and possibility to base it on numerical inputs. This feature of the cluster analysis enables to use statistical data. The multidimensional character of the method *i.e.* analysis based on assessment of higher amount of indicators, enables to take into account more fields related to digitalization in this paper.

2.2. Indicators related to conditions for digitalization

There are reports focused on information technologies and digitalization using fields for digitalization-degree assessment and providing the views of authors on the suitable areas for an assessment. These are for example: index created by WEF (Silja, Soumitra and Lanvin 2017) or the index created by Roland Berger Consultants described by Soldatos *et al.* (2016, 166). Summary of areas connected do digitalization is provided also by indexes as the Networked readiness index mentioned by Volgesang (2010, 12) or Xu (2014, 11-12). Another resource of information studied to get an overview about factors influencing digitalization is literature concentrated on problematic of Industry 4.0 and its consequences and context, for example Mařík *et al.* (2016) or Volgesang (2010). Mentioned resources were used as an introduction to the issue and for getting an overview of approaches to the particular factors of digitalization development as they are seen by the authors of literature related to digitalization and information technologies. 11 indicators have been chosen for the purposes of clustering. Variables with an assumed connection to digitalization that could represent a level of digitalization development and focus on industry in particular business environments were chosen. The variables used in this paper were chosen also to fit the condition of quantitative form and which correspond with requests for use in cluster analysis. Lower accessibility of data has to be also taken into account.

These 11 indicators can be divided into three groups covering these areas:

- Knowledge and human resources – indicators no. 5, 9, 10;
- Technologies in business – indicators no. 1, 2, 3, 4;
- Industry-technological focus – indicators no. 6, 7, 8, 11.

The indicators are labelled by numbers from table in *Appendix 1*. A list of indicators, their measures and the reasons why they are included into the analysis are also described in *Appendix 1*.

2.3 Cluster analysis – Ward method

Cluster analysis is based on procedures, where objects (states) are divided into groups, these groups are formed by using variables (indicators) in such a way that the comparable states which are included into the same group and the states (generally objects) included to the different groups show dissimilarities as mentioned for example by (Řezanková, Húsek and Snášel 2007, 13). The clustering procedure is described by various authors for example Everitt *et al.* (2011), Mirkin (2013), Xu and Wunsch (2009), Hebák *et al.* (2005) and Řezanková, Húsek and Snášel (2007) or Pielou (c1984). The method used in this paper is Ward clustering method which is the representant of hierarchical clustering methods (Mirkin 2013, 137).

Ward method is based on Ward criterion $dw(S_{w1}, S_{w2})$ which expresses an increase in the sum of squared deviations from group (state) average and which was formulated by Ward (1963). The criterion has a form of the equation (1) and is calculated as:

$$dw(S_{w1}, S_{w2}) = \frac{n_{w1} \cdot n_{w2}}{n_{w1} + n_{w2}} \cdot d(c_{w1}, c_{w2}), \quad (1)$$

as presented for example by Mirkin (2013, 138), where $d(c_{w1}, c_{w2})$ represents Euclidean distance (squared) of clusters' centroids²² (c_{w1} and c_{w2}), n_{w1} and n_{w2} are the numbers of states in the analysed clusters. The process beginning with a connection of two states (generally objects) with the smallest distance into one cluster, on the basis of this criterion is described by (Mirkin 2013, 137 - 138), (Xu and Wunsch 2009, 32-33).

In this paper objects (countries) are assessed according to their dissimilarities. A distance calculation is used for this purpose and several metrics can be used in cluster analysis including for example Manhattan distance, Euclidean distance, Čebyšev or Minkowski metrics mentioned by several authors, for example Hebák *et al.* (2005, 122-130) or Řezanková, Húsek and Snášel (2007, 51 - 78). It is important to use comparable indicators, when the above mentioned metrics are used and if the indicators have different measurements, it is necessary to transform data (Hebák *et al.* 2004, 106 - 107), (Řezanková, Húsek and Snášel 2007, 29-32).

²² Centroid is a calculated object which doesn't represent a real object (in this paper it represents a hypothetical state) and is described by average values of indicators within a cluster as mentioned by Pielou (1984, 25). Centroid in this paper is represented by the average values of eleven indicators for each of the clusters.

Euclidean distance, used in this paper, can be calculated using formula (2), as mentioned for example by Zhang (2008, 74). The equation has the form of:

$$D_E(X,Y)=\sqrt{\sum_{j=1}^n (x_j-y_j)^2}, \quad (2)$$

where two states (generally objects) are compared, X represents one of the analysed states while Y the other analysed state, x_j is a value of j^{th} indicator of the state X and y_j is the value of j^{th} indicator of the state Y . $D_E(X, Y)$ is the distance between two analysed states (X and Y) including all variables.

The distances between clusters must be updated after every step of clustering; a newly created cluster must be considered (Mirkin 2013, 137-139). In case of Ward method, the distances are updated according to the equation (3) is used in the form:

$$D(C_t, (C_i, C_j)) = \frac{n_i+n_t}{n_i+n_j+n_t} \cdot D(C_t, C_i) + \frac{n_j+n_t}{n_i+n_j+n_t} \cdot D(C_t, C_j) - \frac{n_t}{n_i+n_j+n_t} \cdot D(C_i, C_j), \quad (3)$$

where $D(C_i, C_j)$ is the distance between cluster i and cluster j .

These two clusters are linked into one cluster. The distances between the newly created cluster and other clusters are calculated as $D(C_t, (C_i, C_j))$. The distance between cluster i and the other cluster t is $D(C_t, C_i)$, analogously, the distance between cluster t and cluster j is marked as $D(C_t, C_j)$. The number of states in the cluster i is represented by n_i and n_j is the number of states in the cluster j , n_t represents the number of states in the newly created cluster t . The equation (3) is described for example by Xu and Wunsch (2009, 34). This update is based on Lance-Williams formula presented by Lance and Williams (1967).

2.4 Optimal number of clusters

The final clustering structure, or sequence of the clustering steps, can be presented in a dendrogram, mentioned, for example, by Xu and Wunsch (2009, 33). A suitable number of clusters was derived from the dendrogram (based on the visual representation) in this paper. Dendrograms and the possibility to use this approach are mentioned for example by Hebák *et al.* (2005, 11) some of the other methods are described for example by Malhotra (2010, 670 - 672).

Five clusters are considered as the optimal number, based on final dendrogram which is displayed in the Figure 2, where the horizontal black line defines the level from which the clusters are divided.

2.5 Data accessibility

Data from the available source which is Eurostat (c2017) was gathered as the next step of the analysis. Data of 31 European states have been used in the analysis.

The data needed for the analysis are often inaccessible or accessible with difficulties or restrictions. This is the reason why indicators whose values are publicly available from reliable resource, such as Eurostat, were chosen. The indicators related to digitalization were assessed according to their completeness. Values from the same year were collected for all indicators. The year 2014 was chosen. This year is not too distant from current year and at the same time, data are accessible. The availability and the relation to issue of digitalization and Industry 4.0 were taken into account to select appropriate indicators. The suitable indicators were analysed according to statistical requirements. The methodology of data collection and information about data completeness (break in time series of estimates of Eurostat) is beyond the scope of this paper. Such information are available at web pages of Eurostat (Eurostat c2017).

The database of variables was not complete so it was essential to replace missing values. There were two types of missing values in the database. The first type is a value which is not accessible for the analysed year, but the values are accessible in some of the other years. In these cases, the values are replaced by an average calculated from accessible values in the other years. In case of the second type of missing the values, there are no values available or it is not allowed to use the values, so it is not possible to use the previous procedure. For replacement of the variable's values average of values of other countries are used. The use of average value instead of the missing values is mentioned, *for example*, by Hebák *et al.* (2004, 76-77) and Řezanková, Húšek and Snášel (2007, 32). Approximately 3% of missing values of both types were identified in the database.

2.6 Statistical requirements for use in cluster analysis

A predisposition for a correct application of the cluster analysis in a form of comparability of indicators' measures is presented by (Jobson, 1992, 490) and the standardization by z-core computation is proposed by authors as Řezanková, Húsek and Snášel (2007, 30). Some of indicators used in this analysis are measured by different units; see the Table in *Appendix 1*, so it is appropriate to standardize the data.

For the purposes of the cluster analysis, it is appropriate to use indicators without strong multicollinearity as mentioned by Řezanková, Húsek and Snášel (2007, 27-28) also recommends avoid the use of variables with relationships which are significant. Variables should not reach high multicollinearity, which can be indicated by variance inflation factor is described by many authors, as Kennedy (c2003). A combination of indicators where all VIFs were under the value 10 was chosen to avoid the use indicators with the strong multicollinearity (Kennedy c2003, 213).

2.7 Approach to data description and assessment

The assessment based on author's interpretation of the results of the calculations can be divided into two parts. The first part is focused on a comparison of the average values of the selected indicators among the identified clusters. In the second part, inner structures of the clusters were outlined.

In case of the comparison of the clusters to each other means of indicators within each cluster are used. These cluster averages are compared with overall averages of indicators (all states taken into account). Standardized values are used for construction of graphs. The standardized values based graphs enables easier comparison of either indicators or the particular clusters. The standardised average values are used for an assessment of the clusters, in some cases original units are used to give a more detailed description of the clusters. If the values of indicators for a particular cluster as a whole are mentioned, these are the average values for this cluster not a situation in the individual states. In case of the inner structures of the clusters values reached in the states are compared to the cluster averages values in original units are also used for the description.

3. Results and interpretation with discussion

An overview of states included into particular clusters (or groups) is displayed in Table 1.

Table 1. States included into particular cluster

Cluster number	States	Number of states
Cluster 1	Greece, Cyprus	2
Cluster 2	Bulgaria, Italy, Latvia, Hungary, Poland, Romania, Slovakia, Macedonia	8
Cluster 3	Ireland, France, Luxembourg, Malta, Netherlands, Sweden, United Kingdom, Austria	8
Cluster 4	Belgium, Denmark, Germany, Spain, Croatia, Lithuania, Portugal, Slovenia, Finland, Norway	10
Cluster 5	Czech Republic, Estonia, Island	3

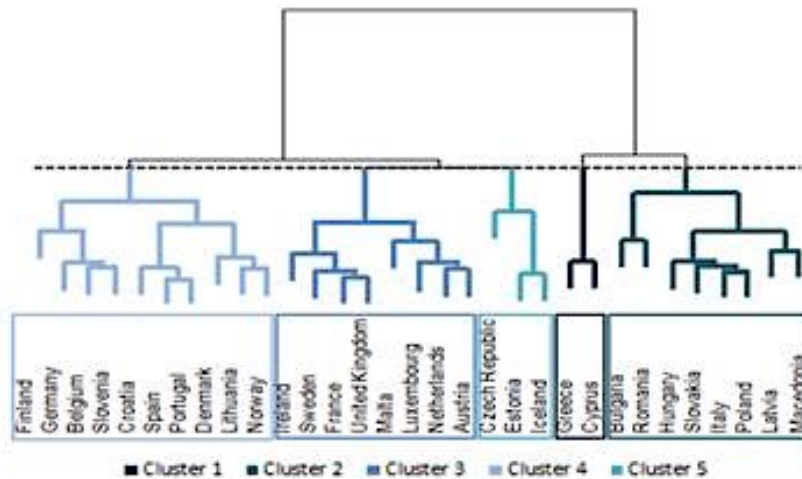
Source: Author's interpretation of the author's analysis based on Eurostat data

The next step is focused on a description of some specifics characteristics of identified groups, not only differences between clusters, but also their inner structures.

3.1 Comparison of the identified clusters - indicator averages approach

Five groups of states were identified as a result of Ward clustering method. They can be seen in the dednogram (Figure 2). The groups or clusters are highlighted for easier orientation. The less detailed view also shows two main clusters with significantly different values.

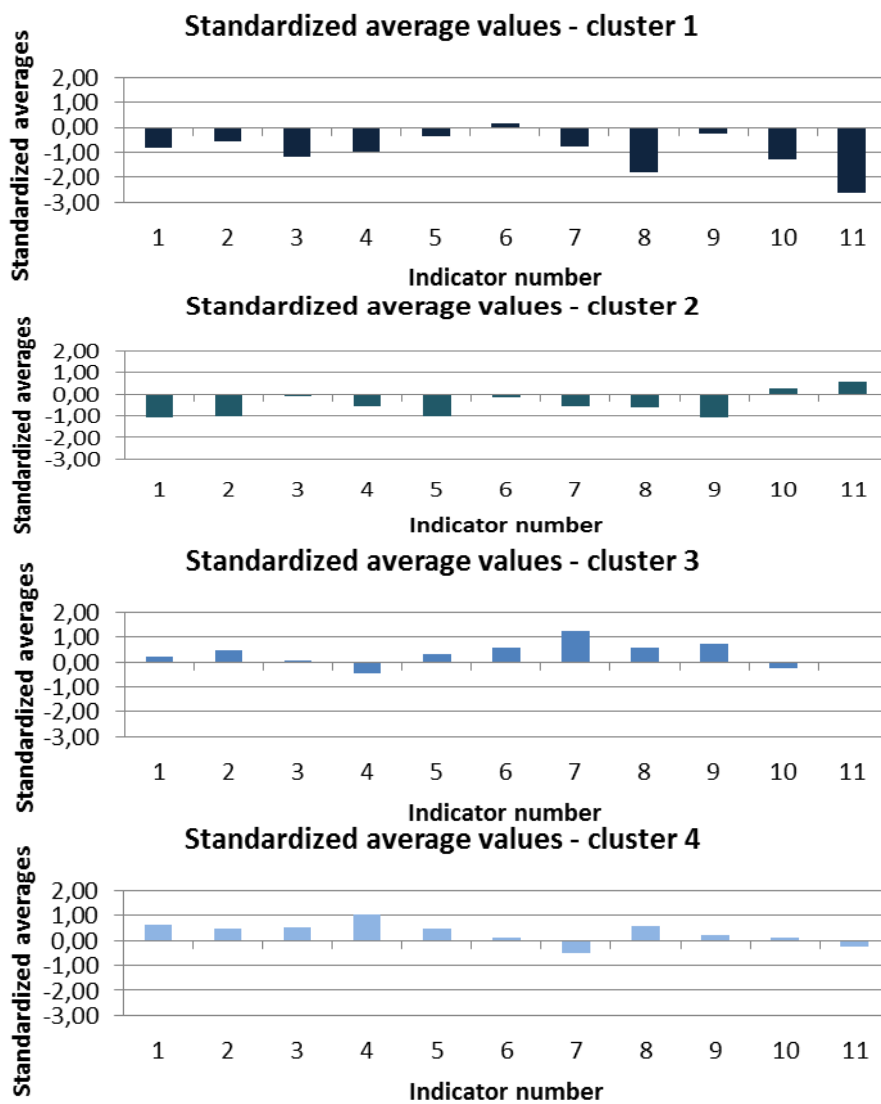
Figure 2. Scheme of cluster hierarchy

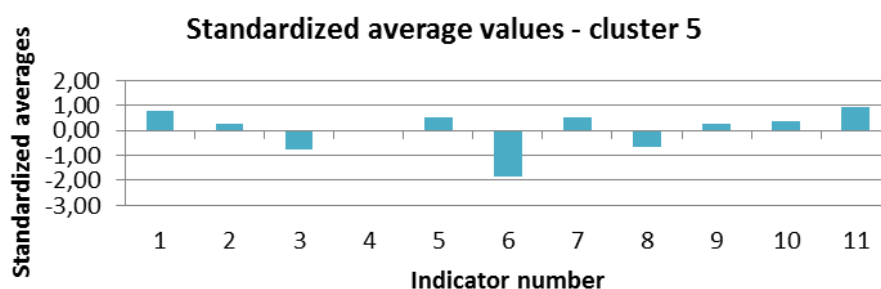


Source: Author's interpretation and analysis based on Eurostat data and calculations in R program

Standardized average values of particular indicators are displayed the Figure 3 for each individual cluster. Each graph is highlighted according to a colour used in the dendrogram.

Figure 3. Average standardized values of indicators (particular clusters)





Source: Author's processing based on Eurostat data

Where: 1 - % of enterprises having received at least 1 % orders online; 2 - % of enterprises with broadband access; 3 - % of enterprises using RFID; 4 - % of enterprises whose business processes are automatically linked to those of their suppliers and/or customers; 5 - % of individuals with high level of computer skills (individuals with 5 or 6 of the 6 skills related to computers); 6 - energy productivity; 7 - % of high-tech exports; 8 - % of private sector research and development expenditures from the overall GERD (Gross domestic expenditure on R&D) in monitored territory; 9 - % of human resources in science and technology (HRST); 10 - % of employment in high- and medium-high technology manufacturing sectors; 11 - labour input - total industry (excluding construction).

As a result of the analysis of identified cluster average values of eleven indicators, two clusters with prevailing values above-average values and two clusters with prevailing below-average values were identified. The last cluster can be characterized by mixed results, 7 indicators have values above-average, 4 indicators are below average (below average results for all analysed states). The cluster averages for the particular indicators are compared to each other and to the overall averages calculated from the data of all states for the particular indicators.

The averages of the indicators for five clusters, overall averages, standard deviations of indicators for five clusters, and overall standard deviations in a form which is not standardized are in presented in Appendix 2 and they are calculated based on Eurostat data (c2017). The identified clusters can be characterized in a more detailed way:

Cluster 1 – Below overall average values prevail in the first cluster, except for the indicator energy productivity (average of 8.7 HDP_{PPS}/kg of oil equivalent). Low values of % employment in high and medium-high industry ratio (in average 1.05 %) are reached in the first cluster, labour input index does not reach high level either. Comparison with the other clusters reveals that the states included in the cluster reach in lower cluster average values of private sector investments in research and development (% of private sector expenditures on the total R&D expenditures); the lowest value of an indicator among the analysed clusters is reached in a field of hi-tech exports. Values below the overall average are identified in a field of using RFID²³ and in automatically links between companies and suppliers/customers. These findings can suggest that states in this cluster are less focused on technologies in industry. If the use of information technologies (indicators 1, 2, 5) is taken into account, the states (cluster average) in this cluster are below the overall averages, but the values are higher than the average values of these indicators in the second cluster. The human resources in science and technology ratio has the higher cluster average value than in the second cluster. Based on these results, it is possible to say that there is lower spread of the attributes of digitalization. Although states in the first cluster are less focused on technologies, a higher orientation on the information technologies than on the industry itself can be identified. Lower involvement of companies in research and development (indicator 8) could be considered as a potential risk if innovations are recognised as a competitive advantage. Innovations are considered as the source of a competitive advantage by many authors, for example Betz (c2003).

Cluster 2 – The states in the second clusters can be marked as less focused on digitalization and industry using new technologies if the average variables for the second cluster are taken into account. The reason for such a description is the existence of prevailing values below overall averages. The only exceptions are the indicators related to employment in industry. There is 5.3% employment in high and medium-high industry and the average labour input index is 1.036 in the second cluster. If the second cluster is compared with the first one, it can be seen that companies are in average focused more on industry (indicators 10 and 11) and technologies in industry (companies with RFID ratio). Lower values (in comparison with the first cluster) are achieved in the field of work with information technologies (indicators 1, 2 and 5). In case of wider spread of high technologies, an

²³ Radiofrequency identification

unavailability of human resources capable to work with technologies could be a drawback for the technological development (need of workforce with skills for Industry 4.0 is also mentioned by authors as Mařík *et al.* (2016)).

Cluster 3 – The third cluster is characterised by high cluster average values of high-tech exports ratio (the average value of 19%, which is the highest value from all the clusters), energy productivity, company expenditures on research and development compared to overall expenditures in the particular territory (average of 52%) and human resources in science and technologies ratio (average of 52%) are significantly higher above the overall averages. Values above the overall averages are achieved in case of indicators of companies with online orders higher than 1% ratio, companies with broadband internet access ratio and individuals with high level of computer skills ratio, but the average standardized values are lower than in indicators 6, 7, 8 and 9. The indicators of employment in high and medium-tech industry ratio and companies automatically connected to suppliers/customers reached values slightly lower than the overall averages. The labour input index reached the value close to the overall average (average of 0.986 compared to the base year 2010) which indicates a slight decrease). The indicator of companies with RFID reaches the value slightly above the overall average. Clusters 3 and 4 can be described as more focused on the technologies with a probability of conditions suitable for digitalisation. Compared to cluster four, in cluster 3, there are higher values in the indicators hi-tech exports ratio, human resources in science and technologies and energy productivity. The states in cluster 3 (in average) have a potential to extend the use of particular digital technologies in practice (see indicators 1, 3 and 4)

Cluster 4 – Cluster four can be also labelled as focused on development of technologies with good conditions for digitalization due to prevailing values above the overall averages. If compared to cluster three, there are higher values reached in these fields: companies with RFID ratio (average of 13.2%) and companies automatically linked to suppliers'/customers ratio (average of 23% - the highest value among the all clusters). Higher value is reached in case of the indicator of individuals with high level of computer skills and companies with income from electronic trade higher than 1% ratio (average of 19.4%). Based on the cluster average values, it can be assumed that in cluster four the focus is on the practical use of technologies, whereas in cluster three, the cluster average values indicate focus on production of technologies (see average values for the cluster three of hi-tech exports ratio, human resources in science and technologies and gross domestic expenditure on research and development compared to overall investments to research and development in the particular territory).

Cluster 5 – States included in the fifth cluster are described by diverse cluster average results. Seven indicators were identified as above the overall averages (for example companies with online orders more than 1% ratio, individuals with high level of computer skills ratio, hi-tech exports ratio and labour input index (average of 1.062 in comparison with 2010, which is the highest value among all the clusters)). Four indicators reach cluster average values below the overall average, for example companies with RFID ratio, energy productivity (average of 3.9 HDP_{PPS}/kg of oil equivalent, which is the lowest value among the cluster averages) and company investments in research and development from overall investments in research and development in a particular territory. The other indicators reach values closer to the overall averages, especially companies with frequent electronic communication ratio. In some aspects, the cluster as a whole can be described as focused on technologies supporting Industry 4.0, but in other aspects below-average values are reached. The cluster is marked as partly focused on high-technology industry.

3.2 Outlining inner structures – indicator values assessment within the clusters

Although the clustering itself is based on identification of groups including similar objects (states), differences within clusters can be detected. The compromise between cluster homogeneity and number of clusters had to be taken into account in the paper. The technique used for the inner diversity assessment is a comparison and identification of significantly different values of indicators within every identified cluster. The inner structures description of each cluster would be beyond the scope of the paper that is why the focus is only on one selected indicator for each cluster. The indicator with the best or the worst achieved result (standardised values) in comparison with other indicators within one cluster is chosen as the illustrative indicator. At the same time, the illustrative indicator (cluster average) must meet the condition of including only the indicator with an extreme value (positive or negative) in comparison with values of the analysed indicator in other clusters. The graphs displayed in the Figure 3 (based on standardized values) used for selection purposes. Non-standardized values are used for the description purposes to illustrate the situation in the clusters. Standard deviations measuring the

indicator diversity²⁴ within clusters are also taken into account. If the standard deviations of indicators for the particular clusters and the overall standard deviations (all states taken into account) are compared, apart from exceptional cases, the values in particular clusters are not bigger than in the whole dataset. This can indicate that clusters with similar characteristics were created. The calculated standard deviations can be seen in Appendix 2.

Cluster 1 – Labour input index was analysed in the first cluster. There are no significant differences from the average (which is 0.7769). Both states included in the first cluster have comparable growth indexes. The most diverse indicator within cluster 1 is the indicator of broadband access.

Cluster 2 – Human resources in science and technology ratio is analysed in cluster number two. The average value in the cluster is 34.14%. Considerable differences from the average are detected in Lithuania and Poland, with the values of 40.7 and 40.4%, then Romania and Macedonia, with the values below the average (25.8% and 26.8%) (Eurostat, 2017c). The indicators of individuals with high level of computer skills, companies with broadband internet access, human resources in science and technologies, companies with RFID and companies automatically linked to consumers/suppliers are more diverse indicators than the others within cluster 2.

Cluster 3 – hi-tech exports ratio is chosen to illustrate inner structure analysis in the cluster. The most important differences from the average value (18.96%) are identified in Malta (with 28.7% of hi-tech exports of summarized exports from the state) and Sweden, with below-average value of 12.9% of hi-tech exports (Eurostat, c2017). The indicators with higher standard deviation are companies with online orders exceeding 1% (from overall orders), companies with RFID and energy productivity.

Cluster 4 – In cluster 4, the indicator of companies automatically linked to their customers/suppliers is described in a more detailed way. The average percentage of frequently communicating companies is 23%. The most different values are identified in Croatia (30% of frequently communicating companies) Spain and Slovenia have a below-average value of 18% (Eurostat, 2017c). Business sector expenditures on research and development (compared to the overall expenditures in the particular territory), companies with RFID, Employment in high- and medium-high technology manufacturing sectors, human resources in science and technologies, labour input index and individuals with high level of computer skills reach higher values of standard deviations.

The more detailed characterization was performed due to a bigger amount of states included in the cluster 4. The more detailed description was based on the dendrogram, in which two individual clusters were identified. In the first cluster (obtained when cluster 4 is divided into two clusters) including Finland, Belgium, Germany and Slovenia, higher average values in indicators of companies with RFID ratio, hi-tech exports ratio, company investments ratio to overall investment in a particular state, human resources in science and technologies, employment in high and medium-high industry ratio are achieved compared do the second cluster derived from cluster four. The indicator of companies with high broadband internet access ratio reaches slightly higher value in the first group of states derived from cluster 4 (Finland, Belgium, Germany and Slovenia).

Cluster 5 – Energy productivity is chosen as the example of inner structure description in cluster 5. The average in the cluster is 3.93 HDP_{PPS}/kg of oil equivalent. The highest value is reached in the Czech Republic (5.9 HDP_{PPS}/kg of oil equivalent), on the contrary the lowest value is 1.8 HDP_{PPS}/kg of oil equivalent in Island (Eurostat, c2017). When the focus is on the standard deviation, it can be said that indicators with higher values are companies with online orders exceeding 1%, energy productivity and employment in high and medium-high technology manufacturing sectors.

3.3 The environment of one of the selected sates – more detailed view

If the focus is on an assessment or description of the business environment of a selected state, in this case, it can be noticed, based on the cluster analysis that the Czech Republic belongs to the group with diverse results. In the group some of the indicators are below-average; on the other hand, some of them reach above-average values. Identically, the values for the Czech Republic differ too (also differences from the overall cluster structure appear). Values higher than the cluster average are reached especially in the indicator of companies with income form electronic trade higher than 1% ratio (ratio 1), employment in high and medium-high technology industry ratio and energy productivity ratio. Above-average (cluster averages) values are also identified in case of companies with broadband access ratio (ratio 2), companies with an automatically link to suppliers/customers, hi-tech exports ratio. The remaining indicators reach values below the overall averages (averages for the cluster 5). The areas, where is space for strengthening the potential for successful digitalization and Industry 4.0

²⁴ Standardized values are used for calculation of standard deviations and for better possibilities to compare them in the graphs. Non-standardized values are influenced by the use of different scales as mentioned for example by Jobson (1992).

development are human resources in science and technologies and higher amount of investments to research and development from private companies. The suitable mean for potential growth is strengthening of individuals' computer skills. For these purposes, the states where high values of the above mentioned indicators are reached should be analysed to identify and later verify, if these approaches are applicable in the business environment of the Czech Republic.

3.4 Topics for further research

The results from the cluster analysis can be used as a basis for further research of the Industry 4.0 trend – the outcomes from the analysis can serve as guidelines for companies in particular states for comparison and gaining experience from other states.

The identification of the conditions for digitalization is the first step of the analysis, which can be investigated in further details (e.g. potential, opportunities and threads analysis in identified fields). As the example of these thoughts an example from cluster five is chosen. In this cluster certain potential in human resources is indicated, so further analysis could reveal, how to utilize this potential or even how to increase it. Low values are reached in case of company investment in research and development to overall investments ratio, which means that the investments are from other resources, such as government. This could be a risk factor influencing the ability to retain competitive advantages and to create an environment “friendly” to technologies.

Another field to focus on is the inner structure of clusters and trends or the results showing different approaches or tendencies. The identified problematic areas can be then explored to identify the factors causing or influencing the current situation.

Conclusion

This paper describes a procedure which enables to (at least partially) apprehend the term digitalization. There was made an attempt to identify and select the factors reflecting the level of digitalization in the sample of states in European region in the paper. The aim was to identify similarities and dissimilarities in the characteristics of the states by using the cluster analysis method. The set of the selected states was structuralized into five groups based on the presented analysis. The states were included in the groups according to their characteristics to create consistent groups. This can be partially assessed by analysing the standard deviations whose values are not, except for marginal exceptional cases, higher in particular identified groups than in the whole set of states, as seen in Appendix 2. That is the reason why it can be stated that the groups with similar characteristics were identified.

Two groups with the focus on technologies were identified among the five created clusters. Although this two clusters are focused on technologies, the states in one of them are (in average) focused on use of technologies (cluster 4), while the states in the other one are focused more on production of technologies (cluster 3). Two groups of states which are less focused on technologies were identified as well (despite the fact these groups of states are not much focused on technologies, two different approaches appeared - a group where the use of information technologies prevailed (cluster 1) and a group focused more on industry (cluster 2) – even if it is not on the highest level, the results related to industry are better than in the first cluster). The last group is defined as partially focused on technologies (cluster 5). The identified groups were compared and the possible analysis of their inner structure was outlined. One selected state was described in a more detailed way.

The results from this type of analysis can serve as an inspiration from these states with better results. Finding possible ways and approaches to digitalization can be realized at national level, where primary goal is to compare states and assess approaches to work with technological development. At the corporate level, the analysis can be used as a basis for business environment assessment, for example as a part of PEST analysis or an analysis of the potential risks threatening companies appearing in the external environment. The use of this type of analysis is mentioned by Analoui (2003, 74-77) in the field of strategic management or by Chapman (2006, 670-672) in the context of risk management.

The cluster analysis method used in the paper for identification of the particular groups has its advantages and disadvantages when used for the purpose of research. These advantages and disadvantages analysed from the view of the particular use in this paper and they are based on author's experience with the method. The benefit, except for advantages mentioned in the methodology of the paper, is easier comparison of single states. The identified clusters (groups) are used as a basis for further analysis. A comparison could also be realized without cluster analysis, but with higher demands on time and without a framework for the orientation in the database. The limitations of the cluster analysis can involve work with averages and associated risk of high

variability within a cluster. During the process of application of the method, it was noticed, that if too many variables are included into the analysis, clusters with a low level of difference b are created.

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²⁵ Names of particular indicator used in the paper are listed in the Appendix 1. Original data were modified according to procedures described in Data accessibility chapter.

Appendix 1. List of selected variables

	Variable	Metric
1	Enterprises having received orders online (at least 1%)	% of enterprises with at least 10 persons employed in the given NACE sectors
2	Enterprises with broadband access	% of enterprises with at least 10 persons employed in the given NACE sectors
3	Enterprises using radio frequency identification (RFID) instrument	% of enterprises with at least 10 persons employed in the given NACE sectors
4	Enterprises whose business processes are automatically linked to those of their suppliers and/or customers	% of enterprises with at least 10 persons employed in the given NACE sectors
5	Individuals' level of computer skills (individuals with 5 or 6 of the 6 skills related to computers)	% of the total number of individuals aged 16 to 74
6	Energy productivity	Purchasing power standard per kilogram of oil equivalent
7	High-tech exports	% of exports
8	Gross domestic expenditure on R&D (GERD) by source of funds - Business enterprise sector	% of total GERD
9	Human resources in science and technology (HRST)	% of active population
10	Employment in high- and medium-high technology manufacturing sectors	% of total employment
11	Labour input - total industry (excluding construction)	Index (2010 = 100) - seasonally adjusted, quarterly values recalculated as average index for the year ²⁶

Source: Names and metrics - Eurostat (c2017), reasons for including indicators into the analysis – author's opinion and literature resources as Mařík *et al.* (2016), Volgesang (2010), Xu (2014), Soldatos *et al.* (2016) used for introduction purposes to the issue and for getting an overview of approaches to particular factors of digitalization development.

²⁶ Authors calculations based on Eurostat data

Appendix 2. Characteristics of identified clusters (non-standardized values)²⁷

No	Indicator Number of the cluster	Cluster 1		Cluster 2		Cluster 3		Cluster 4		Cluster 5		All states	
		Average	St. dev.	Average	St. dev.	Average	St. dev.	Average	St. dev.	Average	St. dev.	Average	St. dev.
1	Enterprises having received orders online (at least 1%)	9.5000	0.5000	7.7500	2.4367	16.625	6.4214	19.4000	4.3174	20.6667	6.3421	15.1613	6.9007
2	Enterprises with broadband access	91.5000	4.5000	89.1250	6.1122	96.625	1.4948	96.8000	2.1817	95.6667	1.2472	94.3226	4.9212
3	Enterprises using radio frequency identification (RFID) instrument	6.0000	2.0000	10.5000	3.7081	11.00	4.3589	13.2000	3.4583	7.6667	1.2472	10.9355	4.1265
4	Enterprises whose business processes are automatically linked to those of their suppliers and/or customers	12.0000	1.0000	14.1250	5.0852	14.875	2.7128	23.0000	3.4351	17.0000	3.7417	17.3226	5.4971
5	Individuals' level of computer skills (individuals with 5 or 6 of the 6 skills related to computers)	26.5000	3.5000	21.0000	6.7454	32.375	5.4529	33.5000	7.0746	34.0000	4.9666	29.5806	8.1982
6	Energy productivity	8.6500	0.0500	7.9500	1.5091	9.625	1.9221	8.5500	1.8348	3.9333	1.6780	8.2323	2.2920
7	High-tech exports	6.4000	2.7000	7.7000	3.5046	18.9625	4.6449	7.9334	3.1069	14.2405	2.2430	11.2345	6.1108
8	Gross domestic expenditure on R&D (GERD) by source of funds - Business enterprise sector	21.7500	8.0500	36.6234	8.7241	51.5218	4.5721	51.5548	11.0750	36.2333	0.6182	44.2874	12.3923
9	Human resources in science and technology (HRST)	42.1000	6.7000	34.1375	5.2149	51.70	6.9739	46.6900	8.0467	47.0333	6.6640	44.4806	9.5540
10	Employment in high- and medium-high technology manufacturing sectors	1.0500	0.1500	5.2750	2.6635	3.9125	1.3081	4.8200	2.3765	5.4667	4.1201	4.5226	2.6217
11	Labour input - total industry (excluding construction)	0.7769	0.0006	1.0359	0.0405	0.9864	0.0261	0.969	0.0688	1.0623	0.03102	0.9874	0.0796

Source: Author's calculations based on Eurostat data.

²⁷ Population standard deviation was used for calculations in the table. For the purposes of cluster analysis, standardization based on sample standard deviations was used (as mentioned, for example by Řezanková, Húsek a Snášel (2007, 30)), also from the reason that the dataset does not contain data from all the states in the territory of Europe. The values are standardized when considering existence of values of other states which are not included. In case of the calculations in the table, they are made for descriptive purpose, where standard deviations (population) of the indicated groups are compared. In contrast with the standardization calculations (for clustering purposes), only states included in particular clusters are considered. If standard deviation results for all the states in this table gained from the calculations using population and sample approach are compared, there are no significant differences between these two approaches related to the assumption that generally lower values of standard deviations are gained in case of groups than in case of all the states. Calculations of standard deviations are mentioned for example by Taylor (2007, 42-49).

The Relationship between Country-of-Origin Image, Corporate Reputation, Corporate Social Responsibility, Trust and Customers' Purchase Intention: Evidence from Vietnam

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Abstract:

This study proposes and tests the impact of Country-of-origin image on corporate reputation and corporate reputation on perceived corporate social responsibility, in which customer trust plays the mediating role and purchase intention is considered as the final result. Data were collected through a customer survey targeting car customers in 2 largest city in Vietnam. Cronbach's alpha, Factor analysis and Structural equation modeling were used to analyze the data collected. By using the sample of 1,027 customers, who own and use passenger cars in Vietnam, the results show that country-of-brand image and country-of-manufacture image have a positive impact on the corporate reputation and purchase intention of customers, in which the country-of-brand image has stronger impact than the later. Besides, corporate reputation has a positive, direct influence on perceived corporate social responsibility. It creates and nurtures customer trust. Under that manipulation, the customer will perceive corporate social responsibility in a positive way. And the effect is found to be partially mediated by customer trust. In addition, both customer trust and perceived corporate social responsibility present their influences on the purchase intention.

Keywords: country-of-brand image; country-of-manufacture image; corporate reputation; corporate social responsibility; customer trust; purchase intention

JEL Classification: M14; M31

Introduction

There is a common perception that corporate reputation is an important intangible asset that contributes to the organization's long-term competitive advantage. However, due to the invisible nature, complexity and ambiguity in causality, there are still unresolved issues related to what makes corporate reputation, as well as business performance (Fombrun, Ponzi and Newburry 2015).

The study of the country-of-origin is increasingly complex due to the emergence of bi-national brands. Although the impact of the country-of-origin has been extensively studied in marketing literature as a major factor affecting product evaluation, but it is still relatively new under consideration as a determinant of organizational evaluation (Vidaver-Cohen, Gomez and Colwell 2015).

In addition, businesses have attempted to carry out CSR activities aimed at increasing public awareness of the business (Bae and Cameron 2006). However, Yoon *et al.* (2006) believe that public consider social responsibility activities as self-interested activities and have suspicion that CSR could lead to a reduction in corporate reputation in the future. Many studies indicate that good reputation can be a buffer to minimize the negative reaction of customers for businesses (Bae and Cameron 2006, Shim and Yang 2016). In additional, corporate social responsibility has a positive influence on customers' attitudes and buying intentions (Ellen, Webb and Mohr 2006). However, some studies suggest that customers do not care about corporate social responsibility or concern only when it is beneficial to them (Tian, Wang and Yang 2011). Thus, there are many different views on corporate social responsibility, so more exploratory research is needed to clarify this topic. In particular, this issue is still relatively new in the context of developing countries (Fatma and Rahman 2015).

Finally, the nature of the relationship between corporate reputation and customer trust is still vague. Some authors believe that customer trust is viewed merely as one of the attributes or antecedents to measure corporate

reputation (Fombrun 1996, Ponzi, Fombrun and Gardberg 2011). On the contrary, some studies examine customer trust as a result of corporate reputation (Keh and Xie 2009, Walsh, Schaarschmidt and Ivens 2017). Therefore, reviewing this relationship is necessary. The study also considers the purchase intention as the end result because it represents actual behavior (Ajzen and Madden 1986).

From the background information, this study aims to explain the mechanism of interaction between the country-of-origin image, corporate reputation, corporate social responsibility, customer trust and customers' purchase intention.

1. Literature Review

Corporate reputation (CR): CR is considered differently based on different research fields. In economics, CR is considered as a reflection of a company's past actions. It provides signals to stakeholders about possible future activities of the business (Davies *et al.* 2003). In strategic management, CR is seen as a unique intangible asset, hard to imitate (Agarwal, Osiyevskyy and Feldman 2015). In marketing, a link that individuals establish with the business is considered as CR (Fombrun, Galdberg and Barnett 2000a) which is the power to attract customers (Davies *et al.* 2003). Fombrun (1996) defined corporate reputation as "a perceptual representation of a company's past actions and future prospects that describes the firm's overall appeal to all of its key constituents when compared with other leading rivals" (72). Fombrun's (1996) study was the first to systematically identify CR and was cited most extensively (Walker 2010).

Country-of-origin image (COI): According to Roth & Romeo (1992), the COI is the overall perceptions of customer formed from products of a particular country, based on their prior experience of production, marketing, strengths and weaknesses of the product. Globalization has accelerated the emergence of bi-national/hybrid products and brands (Prendergast, Tsang and Chan 2010). A bi-national/hybrid product may be designed in another country, manufactured in a second country, assembled in a third country, while origin-of-brand is from a fourth country (Saeed *et al.* 2013). In this study, the two main considered components are the country-of-brand image (COBI) and the country-of-manufacture image (COMI), because they strongly influence the perception, evaluation and purchase intention of customers (Guercini and Ranfagni 2013).

Corporate Social Responsibility (CSR): Berger *et al.* (2007) argue that there are two perspectives on the subject of CSR found: According to the management theory, the main focus are normative questions such: should businesses be involved in CSR activities and how CSR activities affect financial performance. While studies from marketing literature focus on how customers perceive CSR activities. Specifically, testing a CSR related action and considering its effects on perception of customers. Both perspectives are considered in many years. This study examines how CSR impacts on customer perceptions, attitudes and behaviors.

Friedman (1970) argues that businesses do not need to care about CSR. They only have one sole responsibility which is maximize profits, increase shareholder's value within the honest and fair rules of market competition. Managers should not just focus on the needs of shareholders, but meet the stakeholders or those who are influenced by achieving goals of organization, such as employees, customers, suppliers, and local community organizations.

Carroll and Buchholtz (2011) have pointed out the term "Corporate social responsibility" which means an enterprise not only carries out its economic and legal obligations but also has other responsibilities related to protect and improve society. Carroll (1991) classified CSR into four dimensions: economic responsibility, legal responsibility, ethical responsibility, and philanthropic responsibility.

Customer trust: According to Thomas (2009), customer trust is "an expectancy of positive outcomes, outcomes that one can receive based on the expected action of another party" (346). Trust reduces uncertainty in an environment where the customer feels vulnerable, so they rely on trustworthy organizations (Aydin and Özer 2006). Therefore, trust is belief in an organization which has no harmful actions and beneficial activities for both sides. Customer trust is seen as a link between past experiences and predictions of future action.

Purchase Intention: Purchase intention represents the likelihood that a customer plans or is ready to buy a particular product or service in the future. Actual actions can only be taken when they are interested and motivated, because people tend to engage in the behaviors that they are going to perform (Schiffman and Kanuk 2007). When consumers intend to buy positively, this creates a positive brand promise and motivates consumers to take actual action (Fishbein and Ajzen 1975, Schiffman and Kanuk 2007). Therefore, reviewing purchase intentions is a good basis for predicting future behavior.

Research hypotheses: Although the impact of COI has been extensively studied as the main factor influencing product evaluation COI is still relatively new under consideration as a decisive factor for organizational evaluation. Vidaver-Cohen *et al.* (2015) conducted a study, which explored the relationship of country-of-origin

and public perception of multinational corporations, operating in Latin America. Research shows that Country-of-origin is associated with both perceived reputation and behavioral predisposition to support the business. However, the data used for the study is enterprise level data used to answer questions pertaining to personal level perception, so there can be many biases. To accurately interpret the impact of the Country-of-origin, it is necessary to know the country-of-origin. Therefore, collecting personal information is crucial (Diamantopoulos and Zeugner-Roth 2010). And the hypotheses are given as follows:

H₁: A country-of-brand image has a positive effect on corporate reputation.

H₂: A country-of-manufacture image has a positive effect on corporate reputation.

Lyon and Cameron (2004) argue that during a crisis, a business may have a broader response strategy if it has a good reputation because consumers tend to believe that the response of such business is better than any others. Bae and Cameron (2006) assert that the public tends to deduce philanthropy in favor of having good CR. Shim and Yang (2016) argue that the corporate hypocrisy mediates the impact of CR on customer attitudes toward a business during a crisis. Pérez (2015) also suggested that the relationship between perceived CSR and CR could be a two-way relationship. The hypothesis is given as follows:

H₃: Corporate reputation has a positive effect on perceived corporate social responsibility.

CR and customer trust are inter-related and inter-dependent, but the nature of the relationship between them is still unclear (Van Der Merwe and Puth 2014). In the measurement model of Fombrun (1996) and Ponzi *et al.* (2011), trust is viewed merely as one of the attributes or preconditions for CR measurement. Meanwhile, Rindova *et al.* (2005) suggested that CR has an important role in reducing the uncertainty of the stakeholders as they assess the business. Van Der Merwe and Puth (2014) proposed a conceptual framework in which CR is considered as the premise of customer trust. In addition, Walsh *et al.* (2017) found that, in the German retail industry, gender played a regulatory role in the relationship between corporate reputation and consumer trust. The hypothesis is given as follows:

H₄: Corporate reputation has a positive effect on customer trust

Ellen *et al.* (2006) suggested that there is a positive link between CSR activities and customer attitudes towards firms. However, no study on the impact of customer trust to perceived CSR had been performed. Kim *et al.* (2009) suggested that customer trust has a positive influence on customer perceived CSR. When customers trust a business, they will have a good sense of corporate social responsibility. With the same manner, when customers have a belief in the business, they will assume that the business compliances with ethical principles and concerns for social welfare (McKnight, Choudhury and Kacmar 2002). Therefore, the hypothesis is given as follows:

H₅: The customer trust has a positive effect on perceived corporate social responsibility.

Current research has demonstrated the strong impact of COI on purchase intention of customers (Bruwer and Buller 2012). Pecotich and Ward (2007) believe that COI is one of the most influential factors to consumers' decision of buying a product, because the COI combines brand image with country image where the products are manufactured. Kumara and Canhua (2010) found that COI is one of the most important phenomena affecting the evaluation of foreign products. The hypothesis is given as follows:

H₆: A country-of-brand image has a positive effect on customers' purchase intention.

H₇: A country-of-manufacture image has a positive effect on customers' purchase intention.

Mohr and Webb (2005) have identified environmental factors and charitable activities that have a positive impact on purchase intention. Sen *et al.* (2006) argue that CSR initiatives lead to increased purchase intention of consumers, but only when they are aware of specific initiatives.

In contrast, Carrigan and Attalla (2001) argued that responsible corporate behavior does not affect customer choice for purchase. Thus, the relationship between CSR and purchase intention is not clear. However, there is evidence that CSR creates positive results for business. Therefore, it can be hypothesized that:

H₈: Perceived corporate social responsibility has a positive effect on customers' purchase intention.

Brown (1998) found that CR had a positive influence on the purchase intention and actual buying behavior of customers. Helm (2007) also proved that good CR allows businesses to sell at high prices, attracts investors

and lowers costs. A good CR can also lead to higher sales, as it starts the repetition of business due to customer satisfaction. So the development of high-level CR is an important premise to ensure competitiveness and creates positive behavior.

H9: Corporate reputation has a positive effect on customers' purchase intention.

Hennig-Thurau and Klee (1997) hypothesized that customer trust plays an important role in customer buying decisions. Ha *et al.* (2010) also confirmed the relationship between those two concepts. Customer trust based on previous experience is essential in promoting the purchase intention of buyers. Hajli *et al.* (2016) argue that customer trust influences the purchase intention directly and indirectly through the intermediary of social commerce information seeking. From the above discussion, it can be hypothesized:

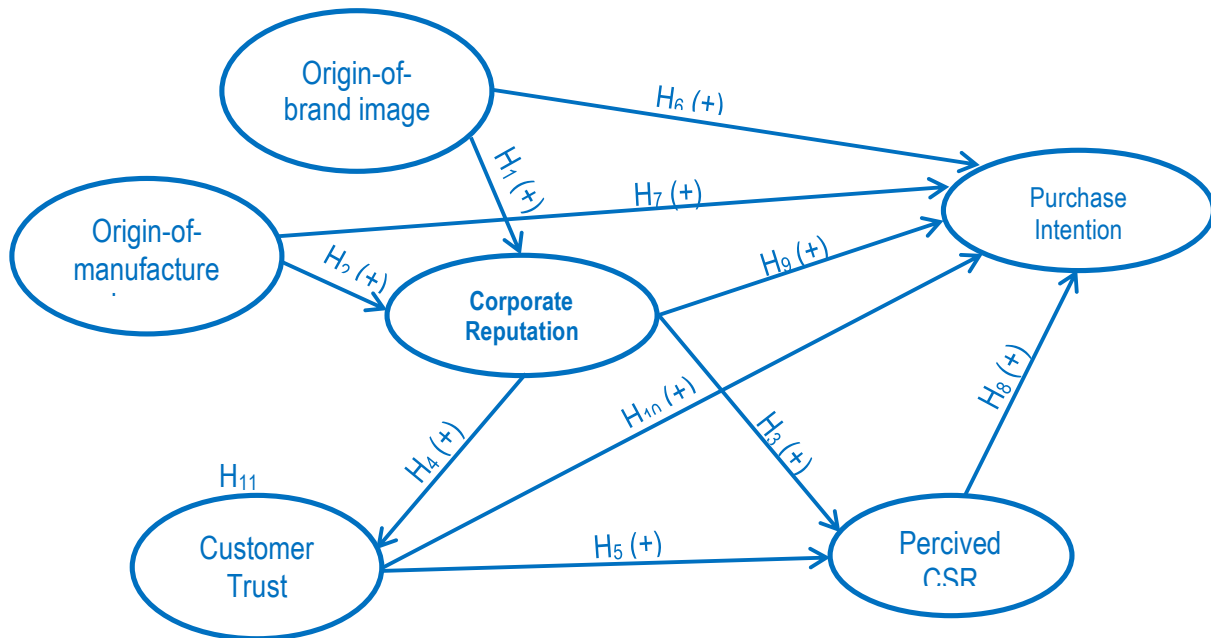
H10: The customer trust has a positive effect on customers' purchase intention.

CSR activities are highly appreciated if firms have good reputation. On the other hand, they are considered self-interested if there is bad reputation (Yoon, Gürhan-Canli and Schwarz 2006). Furthermore, businesses with good reputation are expected to behave well and less engage in negative actions. As a result, the customer trust is enhanced (Walsh, Schaarschmidt and Ivens 2017). Besides, when customers have confidence in the business, they will assume that the business adheres to ethical principles, concerns with social welfare and leads to positive perception of CSR (McKnight, Choudhury and Kacmar 2002). Based on this point of view, the hypothesis is given as following:

H11: Customer trust mediates the effect of corporate reputation to corporate social responsibility.

Conceptual model: Country-of-origin image, which is considered as a signal of reliability and product quality, affects corporate reputation (Thorne, Mahoney and Manetti 2014). In the same manner, corporate reputation is known as a signal of information about past and future activities of the business. It changes the way customers perceive and treat businesses (Fombrun 1996). In addition, the theory of reasoned action, proposed by Fishbein and Ajzen (1975), explains the relationship between attitude, intention and behavior. This study uses the signal theory and theory of reasoned action to support the interpretation of the model (Figure 1).

Figure 1. The proposed model



2. Methodology

This study employs qualitative research and quantitative research method. Qualitative approach uses group discussion techniques to develop appropriate scales in the Vietnamese market. Quantitative method uses the cronbach's alpha coefficient to measure the reliability of the scale, exploratory factor analysis, confirmatory factor analysis, and structural equation modeling to test the scale and test the hypothesis.

Scales: The COBI measurement scale, using the scale of Mohd Yasin *et al.* (2007), consists 7 items. Whereas, the COMI scale, using the scales of Pisharodi and Parameswaran (1992) and Chen and Su (2011), consists of 4 items. The corporate reputation scale is developed from RepTrak™ Pulse scale of Ponzi *et al.* (2011). Perceived CSR is developed from the scale of Singh *et al.* (2008). This scale is chosen because it is based on customer perception and covers all components in a multidimensional approach. Since these concepts are new in Vietnam and there are many different views about measurement. Therefore, the authors conducted a focus group discussion with eight customers who owned and used passenger cars in Vietnam. The results show that the perceived CSR scale should add some more items: COMR2, COMR4, COMR6. In addition, they argue that additional public reviews of businesses (CR5) should be included (Table 2). The results of a perceived CSR scale consisted three components: commercial responsibility, ethical responsibility, social responsibility, and 14 items. The scale of corporate reputation consisted of 5 items (Table 2). Five items, which are synthesized from the scale of Sirdeshmukh *et al.* (2002), Selnes and Sallis (2003), are used to measure customer trust. Finally, the Purchase intention uses items from the Lam *et al.* (2004) scale for measuring repurchase intentions. All scales are the seven points Likert scale from 1 (totally disagree) to 7 (totally agree).

Sample: In this study, we selected the automotive industry to test the hypotheses, because the potential for automobile sales in Vietnam is high. It is forecasted that in the next five years, the industry's average growth rate will be around 15% (BMI research report). Since cars are a valuable commodity, customers carefully consider the factors before buying. Therefore, the automotive industry clearly shows the relationship between the research concepts.

We carried out the survey in Ho Chi Minh City which is the largest cities in Vietnam. It is located in the south with a population of over 10 million people who mainly come from other provinces in Vietnam. In addition, we also surveyed in Da Nang city, the largest city in Central Vietnam.

To survey the relatively homogeneous market, the authors conducted direct interview to individual customers who owned and used passenger cars in Vietnam. The formal study was carried out from 15/02/2017 to 20/04/2017, in 9 districts in Ho Chi Minh City and 4 districts in Da Nang City. There was a total number of 1,215 answers collected after delivering 1,300 questionnaires. During the data entry process, 188 votes were eliminated. Finally, the number of 1,027 valid votes was selected as the official study data for this study.

3. Results and Discussion

3.1. Research results

Statistics characteristics: Out of 1,027 respondents, people from central and southern Vietnam accounted for more than 80%. Respondents were mainly characterized as: gender is male, aged between 26 and 55 years, popular education from high school to graduate and monthly income from 500 to 1,250 USD. The most surveyed car brand was Toyota, and the country-of-brand most surveyed were Japan and Korea. Automobiles manufactured and assembled in Vietnam are accounted for the highest proportion.

Analysis the reliability of the scales: Results of testing the reliability of scales in studied model show that all component scales have Cronbach's alpha coefficients greater than 0.6 (Garson 2008). However, the COMR4 variable has a corrected item – total correlation of 0.249 which is less than 0.3 and ER1 with a corrected item – total correlation of 0.279 less than 0.3 (table 2), thus eliminating these variables (Peterson 1994). The remaining scale research models have achieved the necessary reliability (Table 1).

Table 1. The reliability of scales

Components	Variables	Total correlation	Cronbach's Alpha	Note
Country-of-brand image	7	≥ 0.409	0.874	
Country-of-manufacture image	4	≥ 0.604	0.835	
Corporate reputation	5	≥ 0.642	0.867	
Commercial responsibility	5	≥ 0.703	0.893	Reject COMR4
Ethical responsibility	3	≥ 0.681	0.846	Reject ER1
Social responsibility	4	≥ 0.592	0.822	
Customer trust	5	≥ 0.647	0.880	
Purchase intention	3	≥ 0.793	0.902	

Source: Own development

Principal Axis Factoring (PAF) and the un-perpendicular rotation (Promax) are used. Analysis of the EFA shows that KMO = 0.892 > 0.5 and Sig (Bartlett's Test) = 0.00 < 0.05. The results provide an appropriate EFA test.

Table 2. Factor of the scale

Contrast	Factor loading
Country-of-brand image	
COB11. A country that is innovative in manufacturing	0.748
COB12. A country that has high level of technological advance	0.885
COB13. A country that is good in designing	0.661
COB14. A country that is creative in its workmanship	0.723
COB15. A country that has high quality in its workmanship	0.676
COB16. A country that is prestigious	0.710
COB17. A country that has an image of advanced country	0.796
Country-of-manufacture image	
COM11. Excellent workmanship	0.825
COM12. Reliable	0.872
COM13. Durable	0.908
COM14. High quality	0.889
Commercial responsibility	
COMR1. Is an innovator and launches new products into the market continuously?	0.809
COMR2. Makes efforts to improve products and services for customers	0.874
COMR3. Its products always maintain good quality	0.816
COMR4. Informs in a correct and truthful way about the characteristic/properties of its products	Reject
COMR5. This firm settles customers' complaint quickly	0.840
COMR6. Corporate advertising/promotion activities honesty	0.847
Ethical responsibility	
ER1. Is concerned to fulfil its obligations vis-a`-vis its shareholders, suppliers, distributors and other agents with whom it deals	Reject
ER2. Is concerned to respect the human rights when carrying out its activities	0.837
ER3. Always respects the norms defined in the law when carrying out its activities	0.909
ER4. Respecting ethical principles in its relationships has priority over achieving superior economic performance	0.842
Social responsibility	
SR1. Is concerned about protecting natural environment	0.658
SR2. Directs part of its budget to donations and social works favouring the disadvantaged	0.806
SR3. Supports the development of the society financing social and/or cultural activities	0.906
SR4. Is concerned to improve general well-being of the society	0.785
Corporate reputation	
CR1. Is a company I have a good feeling about	0.858
CR2. Is a company that I trust	0.858
CR3. Is a company that I admire and respect	0.756
CR4. Has a good overall reputation	0.793
CR5. The public appreciates this business well	0.688
Customer trust	
TRUST1. Company is competent at what they are doing	0.836
TRUST2. Company is trustworthy	0.866
TRUST3. Company is of very high integrity	0.815
TRUST4. Company is very responsive to customers	0.802
TRUST5. Company will respond with understanding in the event of problems	0.544
Purchase intention	
PI1. I consider this business as the first choice	0.888
PI2. I will buy this car brand in the future	0.896
PI3. I am willing to recommend this company to other people	0.919
TOTAL variance explained:	69.160%

Source: Own development

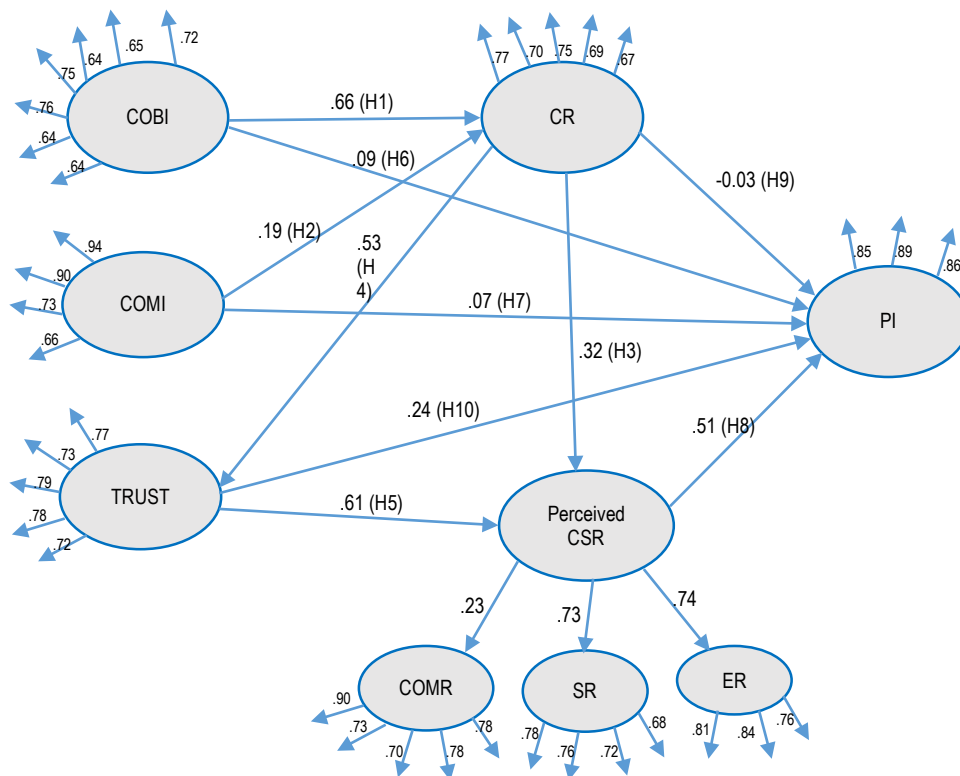
Table 2 shows that the variables in the researched model are extracted into 8 factors and have variance extracted of 69.160% > 50% factors loading of the measurement variables are greater than 0.5. The difference between the weights is greater than 0.3. Therefore, the variables are convergent.

Confirmatory factor analysis (CFA): The results show that there are 559 degrees of freedom and this model is appropriate for market data (Chi-square/df = 2.471 < 3; 0.962 > 0.9; GFI = 0.929 > 0.9; TLI = 0.957 > 0.9 and RMSEA = 0.038 < 0.08) (Hair 2010). Scales of social responsibility, purchase intention, ethical responsibility

do not correlate the measurement errors, so the observed variables are unidimensional. On the other hand, the remaining scales are not unidimensional. The standardized regression weights of the observed variables ranged from 0.642 to 0.936 (greater than 0.5) and the unstandardized weights were statistically significant ($p < 0.05$). Studied variables were used to measure concepts reaching convergent validity. Correlation coefficients for each pair of concepts were different from one. Those were statistically significant, so the components had discriminant validity. The results of the reliability verification and the average variance extracted test of the concepts showed that the Cronbach's alpha coefficient and the composite reliability of the components were greater than 0.6. Whereas, the average variance extracted was greater than 0.5. Consequently, the scales are highly reliable (Hair 2010).

Estimate the structural relationships: The results of the structural equation modeling test (Figure 2) showed that the theoretical model was consistent with market data such as, Chi-square = 1457.892, $df = 574$, Chi-square/ $df = 2.540 < 3$, GFI = 0.925 > 0.9, TLI = 0.955 > 0.9, CFI = 0.959 > 0.9, RMSEA = 0.039 < 0.08.

Figure 2. SEM analysis results of the theoretical model (Standardized)



Chi-square = 1457.982; $df = 574$; $P = 0.000$
 Chi-square/ $df = 2.540$; GFI = 0.925; TLI = 0.955
 CFI = 0.959; RMSEA = 0,03

Source: Own development

Estimates of the main parameters of the model (Table 3) showed that the direct relationships in the model were statistically significant ($p < 0.05$), except for the relationship between corporate reputation and purchase intention ($p = 0.641 > 0.05$).

Table 3. Regression coefficients of relationships in the theoretical model

Hypothesis	Relationships	Unstandardized coefficients	Standardized coefficients	SE	CR	P-value	Test hypothesis
H1	COBI → CR	0.814	0.659	0.050	16.412	0.000	Support
H2	COMI → CR	0.120	0.194	0.018	6.696	0.000	Support
H3	CR → Perceived CSR	0.258	0.320	0.036	7.258	0.000	Support
H4	CR → Customer Trust	0.561	0.530	0.040	13.939	0.000	Support
H5	Customer trust → Perceived CSR	0.463	0.607	0.038	12.272	0.000	Support

H6	COBI →Purchase intention	0.178	0.095	0.077	2.314	0.021	Support
H7	COMI →Purchase intention	0.067	0.071	0.026	2.609	0.009	Support
H8	Perceived CSR →Purchase intention	0.964	0.512	0.182	5.312	0.000	Support
H9	CR →Purchase intention	0.041	0.027	0.088	0.466	0.641	Rejected
H10	Customer trust →Purchase intention	0.338	0.236	0.099	3.141	0.000	Support

Source: Own development

Intermediate Analysis: To determine meaningful intermediate impact, four conditions need to be fulfilled: (1) CR has a significant impact on Customer trust; (2) Customer trust has a significant impact on Perceived CSR; (3) CR has a significant impact on Perceived CSR; and (4) The impact of CR on Perceived CSR decreases when calculating the effect of intermediate variables (Andrews *et al.* 2004).

The first two conditions were examined by estimating model 1 (Table 4). The results provided that the model was matched (Chi-square/df = 2.542; CFI = 0.927; GFI = 0.892; TLI = 0.917 and RMSEA = 0.064), so conditions 1 and 2 were met. Condition 3 was tested in model 2 with the perfectly fitted results. Therefore, condition 3 was satisfied. Finally, the comparison between model 2 and model 3 (Table 4) proved that CR impact on Perceived CSR decreased with the effect of Customer trust (normalized coefficient was 0.524 versus 0.466). Condition 4 was met.

Table 4. Models of relationship estimation

Relationships	Unstandardized coefficients	Standardized coefficients	SE	CR	P-value
Model 1: Condition 1 and 2					
CR →Customer trust	0.477	0.394	0.075	6.378	0.000
Customer trust →Perceived CSR	0.317	0.465	0.047	6.776	0.000
Model 2: Condition 3					
Corporate reputation →Perceived CSR	0.524	0.614	0.061	8.661	0.000
Model 3: Condition 4					
Corporate reputation →Customer trust	0.432	0.343	0.077	5.579	0.000
Customer trust →Perceived CSR	0.170	0.246	0.041	4.172	0.000
Corporate reputation →Perceived CSR	0.466	0.534	0.060	7.818	0.000

Source: Own development

In addition to the direct impact of CR on Perceived CSR, Customer trust was considered as an intermediate factor to the indirect impact of CR on Perceived CSR.

3.2. Discussion

The Perceived CSR scale is a second-order scale that measures three components (commercial responsibility, ethical responsibility, and social responsibility). The COBI, COMI, corporate reputation, customer trust, and purchase intention are first-order scales and statistical significance in Vietnam market.

Considering the relationship between concepts, COBI direct impacts on corporate reputation. When a brand comes from a country that is well appreciated by the customer, the corporate reputation will be evaluated positively. The results also point out that COMI also influences the corporate reputation. This finding is consistent with the study by Vidaver-Cohen *et al.* (2015). Thus, if a brand comes from a country that is well-regarded by the consumer, but country-of-manufacture with a poor image may affect the reputation of the business.

The results also show that corporate reputation direct impacts on perceived CSR. If customers evaluate good CR, they will perceive CSR under a positive direction. This result is consistent with research by Yoon *et al.* (2006) who believed that customers tend to perceive philanthropy motivation as sincere, trustworthy if they evaluate positively on the business. The results also show that customer trust is partly mediated on the impact of CR on perceived CSR. Thus, in addition to direct impact of CR on Perceived CSR, CR will indirectly partly-impact through the customer trust. When the business has good CR, it will lead customers to trust the business and trust will lead the customer to good perception about CSR activities.

Finally, COBI, COMI, Perceived CSR and customer trust have a direct impact on customers' purchase intentions. However, CR does not affect purchase intention, opposing to Brown's (1998) study. This result was discussed in depth with 05 customers owned and used passenger cars in Vietnam. All customers agreed with this result, because the re-purchasing intention in the automotive industry depends on many factors (price, quality, psychological discovery ...), corporate reputation will impact more for the first time buying intention.

In terms of impact level, COBI affects on CR stronger than COMI (Standardized coefficients are 0.659 and 0.194 respectively). CR directly impacts on Perceived CSR without the mediating role of customer trust with a standardized coefficient of 0.614 (p-value = 0.00) and when mediated by customer trust, the standardized coefficient is 0.534 (p-value = 0.00). In addition, Perceived CSR has the strongest impact, followed by customer trust and, finally, COBI and COMI (Standardized coefficients are 0.512, 0.236, 0.095 and 0.071, respectively).

Conclusion

The results show that, firstly, after adjusting the words and adding some items through focus group, the components scale reach high reliability. Secondly, the COBI has a positive impact on CR, in turn CR has a positive impact on Perceived CSR. On the other hand, the customer trust has an intermediary role in the relationship between CR and Perceived CSR. The COI, customer trust and Perceived positively influence the customer's purchase intention. However, corporate reputation does not affect customer intention.

To raise awareness of customers about CSR activities, companies need to focus on commercial responsibility with customers. Besides, businesses should concentrate on doing business legally and supporting social and charitable activities. The COBI is related to the CR. Therefore, if the business originates from an impressive nation, it will positively affect the corporate reputation. Furthermore, car brands manufactured in highly valued countries will have a positive impact on corporate reputation. Thus, if a brand comes from a country that highly valued by customers but products are produced in an underestimated country, it's reputation may be reduced.

This study finds the reverse relationships, which are the CR directly affects on perceived CSR and indirectly affects through the customer trust. When a business has a good reputation, part of it will make customers trust and evaluate the CSR activities in a good way. On the other hand, corporate reputation directly affect the perceived CSR of customers. Thus, for customers to evaluate the CSR activities in a favorable direction, businesses need to focus on building the corporate reputation and trust of customers.

This study supports that COI influences the consumer's purchase intention. Customer ratings of global brands are influenced by outside information. Besides, buyers, who are well aware about the COBI and the COMI, will have a good attitude and intend to buy those brands.

Finally, when customers feel good about CSR activities, as well as having confidence in the business, they will deliver support through their purchase intentions. Therefore, businesses need to spend money to support corporate social responsibility activities and build customer trust by developing their reputation.

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A Study on Adoption of Internet Banking and New Direct Banking Channels with Reference to Young Bulgarian Consumers

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Abstract:

The direct banking channels, specifically Internet banking have a high importance both for bank institutions and consumers. There is a clear tendency for expanding the perception of Internet banking by more consumers, especially in EU countries, albeit with some variations.

This research aims to examine the Internet banking adoption (IBA) rate of young Bulgarian people and to compare it with the rate at national level in Bulgaria. The data used is obtained through a distribution of online questionnaire among Bulgarian young users aged mainly 18-34 on the example of academic audience. The results of the study show that there are significant differences between official data on IBA rate for all Bulgarian population with those found for young people – the last one is about 50% and is more than 10 times the national level of the rate. Contrary to expectations, this study reveals that the majority of young Bulgarian people prefer to visit the traditional bank office for feedback and communication with their banks instead to use remote electronic channels. The findings also indicate that young consumers are not yet ready to complement Internet banking with a new channel such as social media banking. There are good preconditions for this in the future.

Keywords internet banking adoption; social media banking; unbanked population; Bulgaria

JEL Classification: C83; D83; G14; G21

Introduction

Electronic banking and especially Internet banking has established as a main e-business feature and related web-based technologies and applications. Internet banking has a strong influence on the whole bank market and is considered as the most important retail banking delivery channel (Karjaluoto *et al.* 2002). Authors such as Gonzalez, Mueller and Mack (Gonzalez *et al.* 2008), Ramavhona and Mokwena (2016) and others consider Internet banking as a channel, which has transformed the way banks conduct their business and has expanded their consumer base.

Internet banking provides electronic products and services that are mutually advantageous and valuable to both parties in transactions - banks and their customers.

From the banks point of view, Internet banking is very efficient and cost saving compared to traditional banking and other remote channels. According to survey fulfilled by Booz, Allen, and Hamilton (quoted by Nathan 1999) a standard bank transaction costs USD 1.07 over the counter at a bank branch, USD 0.54 per telephone, USD 0.27 through ATM, and only USD 0.01 over the Internet. These figures show that banks' transaction costs over the Internet are more than 100 times smaller compared to initiating them in a traditional bank branch. More recent studies (Shevlin 2007, Fiserv 2009, Deloitte 2010) on the value of banking transactions distinguish in more detail the use of remote channels, including the use of contact center and Interactive Voice Response (IVR) System. The new statistics on the cost per transaction in USD from the first two sources confirm the high performance of banks' online banking transactions – the cost online is as much as 25 to 50 times lower than via a bank branch. An additional argument to support the efficacy of internet banking are the results of study of Bainbridge *et al.* (cited by Heffernan 2005), showing that transactional costs via the Internet, including those for the IT systems necessary, amount to only 10% of the costs incurred by the traditional bank branch.

From the consumers' point of view, Internet banking provides them with a number of benefits, among which authors mark such as: easy access to banking services (Adapa 2011), cost and time saving, quick response and services (Susanto and Zo 2011) and others. Some authors point out the main benefit of Internet

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banking is that it is cheap and offers its users services that are convenient and not limited to time and place (Brogdon 1999, 4, Wu 2005).

Taking into account the proportions mentioned above between the classic and the remote channels and seeking better performance banks stimulate their customers to perform their transactions through electronic channels. For this reason, customers receive a fee reduction for internet banking transactions between 30-40 percent and even 50% and more. This discount makes Internet banking quite effective and attractive to consumers and is a serious basis for customer preferences to it.

Especially for young customers there is an inherent greater propensity to use electronic payment systems and electronic financial services. According to this important feature, more banks are willing to change and actually change their pricing structure to meet the expectations of young audiences (Koch and MacDonald 2009).

These benefits for all parties and its easiness to utilize are a reason for ongoing Internet banking grow and widely acceptance across consumers in many countries, markedly in developing countries (Susanto and Zo 2011). The focus of this paper is to study the Internet banking adoption (IBA) among young people in Bulgaria and their attitude and intention towards new channels for electronic banking like social media channel.

1. Literature Review

The research of many authors is dedicated to electronic banking channels and mainly to Internet banking. Different aspects of online banking as the primary direct banking channel are explored, including the adoption of Internet banking. Both academics and practitioners are interested in studies of the adoption of Internet banking (Mansumittrchai and AL-Malkawi 2011). Many authors explored the factors influenced the adoption process and success of consumers, revealing among the main factors such as satisfaction, loyalty, commitment, trust, etc. (Centeno 2004, Susanto and Zo 2011, Aldas-Manzano *et al.* 2011). Other studies summarize as critical success factors for IBA such as availability of resources, understanding customer needs, bank flexibility, good customer service, *etc.* (Shanmugam *et al.* 2015). In addition, some researchers (Munusamy *et al.* 2012, Yuen 2013) examined the impact of demographic factors like age, gender, race, income, educational level, occupation. Munusamy *et al.* pointed out only the age as significant factor and consumers aged below 25 are more likely to adopt Internet banking based on the example of Malaysia.

Another study pays special attention to young people, specifically to postgraduate students and the factors influencing their intention to adopt Internet banking (Fo and Ak 2015), concluding for significant influence of individual factors (attitude, trust, perceived usefulness, perceived ease of use), as well a social factor (subjective norms) towards IBA.

A number of studies indicate the reasons for the consumers' reluctance to adopt and use Internet banking because of lack of trust, uncertainty, security, and privacy concern (Cheng *et al.* 2006, Pikkarainen *et al.* 2004, Casalo *et al.* 2006, Aldas-Manzano *et al.* 2011, *etc.*).

Mansumittrchai and AL-Malkawi (2011) indicate that studies have been widely explored the IBA for developed countries, for advanced developing countries and for developing countries, with the number of studies for developing countries being rather small and should therefore be of special interest to scholars.

2. Data and research method

Part of the data used in this research are annual data obtained from: i) the databases and the site of Eurostat (the official statistical institution of European Union), and ii) databases of the World Bank. Other part of data was collected through a questionnaire based mainly among a number of university students. The process of data collection took place online. Being the main tool of data collection, online questionnaire was distributed to assess the rate of IBA, the channels that are preferred for communication with the banks and to check the possibilities for the use of new electronic channels for transactional banking.

The questionnaire was distributed online in two stages - at the first stage in April-May 2016 and then in January-February 2017. The total number of respondents is 548 from 16 countries - Bulgaria, Russia, Egypt, Netherlands, Romania, Kazakhstan, *etc.* 480 people of all 548 participants are Bulgarians and 68 are from other countries. The population of 480 Bulgarians is the subject of our research and in the study this 480 people will be called survey respondents. On their basis, the IBA rate among the young people will be measured and answers to the research questions will be given.

The aim of this study is through empirical data to investigate what is the adoption rate of Internet banking of Bulgarian young users (aged 18-34) on the example of academic audience. The sample's rate found should be compared with the official data about IBA for the whole Bulgarian population aged 16-74 and on this basis to make a summary of the actual status of this indicator for the active young population of the country. A subject of

the study is also to examine the attitude of young people towards new channels for transactional banking such as social media banking.

The following research questions have been formulated:

RQ1: Are young people more likely to adopt proposed innovative electronic financial services and is their IBA rate greater than the average rate at national level (for all Bulgarian population)?

RQ2: Do young people tend to communicate with their bank primarily with remote electronic channels instead of using the physical bank channel - over the counter?

RQ3: Are young people inclined, along with established remote channels like Internet banking, to use new channels for transactional banking as a transactional social media channel?

3. Empirical results and discussion

3.1. Internet banking adoption at national level in EU countries and Bulgaria

Data on the IBA in European countries are published by Eurostat on its Web site on a regular annual basis. These data show that after more than two decades, Internet banking is continuously expanding consumer penetration and enjoying ever-increasing use in EU countries. However, there are significant fluctuations in consumers' IBAs in Europe. The average Internet banking perception rate in the European Union at the end of 2016 is 59% of people aged 16-74 who have used Internet during the last 3 months (Eurostat 2017a). Age differentiation outlines a relatively lower interest in Internet banking among younger Internet users (16-24 years) - only 44% against 65% aged 25-54 and 55% aged 55-74.

Country variations around the EU average fluctuate widely. The Northern Europe's countries traditionally demonstrate a very high adoption rate - over and around 85% of consumers, used Internet: Denmark – 88%, Sweden - 86%, Finland – 86%, Netherlands - 85%, Estonia - 79% (Eurostat 2017b). Special accent should be placed on Norway – 91%, which, although outside the EU, is the first in the IBA. The opposite is the situation in the countries of Southern Europe, where the IBA is below 30%: Italy - 29%, Portugal - 29%, Cyprus - 29%, Greece - 19%. The lowest levels for 2016 are registered in Romania - 5% and Bulgaria - 4%. Thus, official statistics show unflattering low level of the IBA in Bulgaria, which indicates a very low interest of consumers in using Internet banking.

It can be concluded, there are big differences among IBA of countries in EU. It is interesting from a research point of view to compare the IBA rate at national level in Bulgaria with those, studied about the sample of young Bulgarian people.

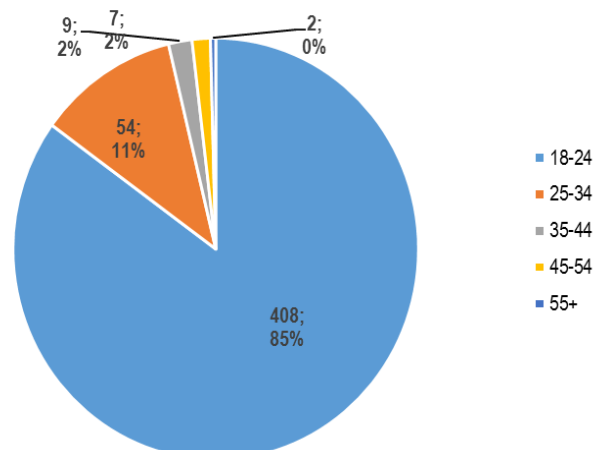
3.2. Demographic analysis of the surveyed respondents

The demographic analysis of the surveyed respondents shows the following ratios in the demographic characteristics surveyed by demographic indicators of gender, age and educational structure.

The gender structure of the 480 respondents shows a predominant share of women (58%) over men (42%). Women are more actively present in academic life and calendar, and for this reason they are predominant among the respondents.

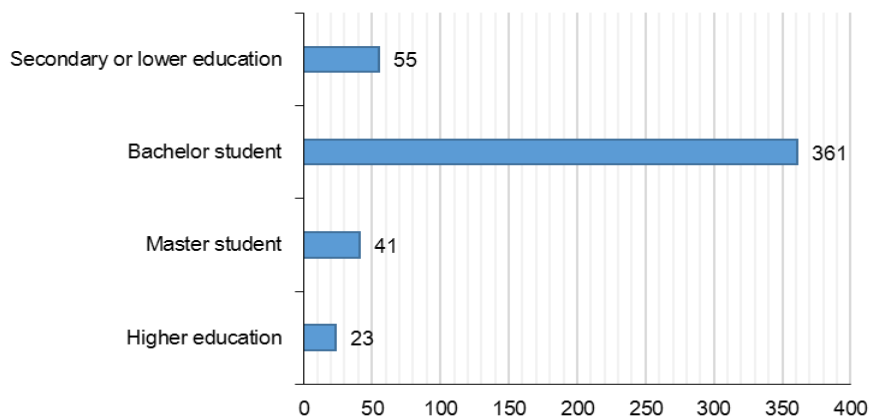
Regarding the age structure, the following ratios were detected, which are shown in Figure 1. The majority of respondents surveyed belong to the youngest age group - aged 18 to 24 years - 408 people with a share of 85%. Adding to them 54 people (or 11% of the total) belonging to the 25-34 years-old group a predominant share of young people is formed - a total of 462 people between 18 and 34 (with a total share of 96%). The respondents aged 35-55+ are 18 and represent only 4%. This fact gives us reason to believe that the conclusions of our research will be based on the analysis of the opinion of young respondents who are precisely the subject of our research interest on their IBA.

Figure 1. Age structure of the surveyed Bulgarian respondents



A separate question in the questionnaire collected data on the educational status of the respondents. As the object of study are mainly young people from academia as possible answers to the question „What is your education level?“ are included: „Secondary or lower education“, „Bachelor student“, „Master student“, „Higher education“.

Figure 2. Educational distribution of the sample (number of respondents)



The majority of respondents - 361 people or 75% of the total - are bachelor students, another 41 people (9%) are master students and 55 people (11%) have secondary or lower education (see Figure 2). Only 23 of respondents (5%) have higher education. Therefore, the educational group of undergraduates (bachelor students+master students) forms a total of 84% of the sample surveyed. This educational distribution corresponds to the age distribution. For the majority of young people aged 18 to 24, the status of undergraduates who are in the process of acquiring a bachelor or master degree as a stage of their education is normal.

3.3. Results about banked population rate in Bulgaria (national and sample level)

The use of electronic banking services and specifically online banking is directly dependent on unbanked individuals. The banked population includes people with no use of formal financial services or which make little or no use of formal financial services. Having a bank account is a necessary condition to get access to financial and banking services specifically (EBA 2015). To have access to banking services and to have a bank account is a necessary condition for each bank customer to use specifically online banking. This fact give us a reason to study the unbanked population rate of our sample of young people, to compare it with the banked population rate on a national level and to make a conclusion.

Unbanked population rate for Bulgaria at national level

According The Global Findex Database (Global Financial Inclusion Database) 2014 (Demirguc-Kunt *et al.* 2014), the country banked population rate for Bulgaria is 63% of all adults.

Table 1 shows the banked population rate of some countries in Europe. Countries are divided by the author into 4 groups.

Table 1. Banked population rate in different countries in Europe (data for 2014)

Group of countries	Rate ranging with a value or varying between:	Countries
I.	100%	Denmark, Finland, Sweden, Norway, Switzerland
II.	99-97%	Germany, Netherlands, UK, France, Austria
III.	87-72%	Italy, Portugal, Poland, Czech Republic, Hungary, <i>etc.</i>
IV.	63-61%	Bulgaria and Romania

Source: World Bank, The Global Findex Database.

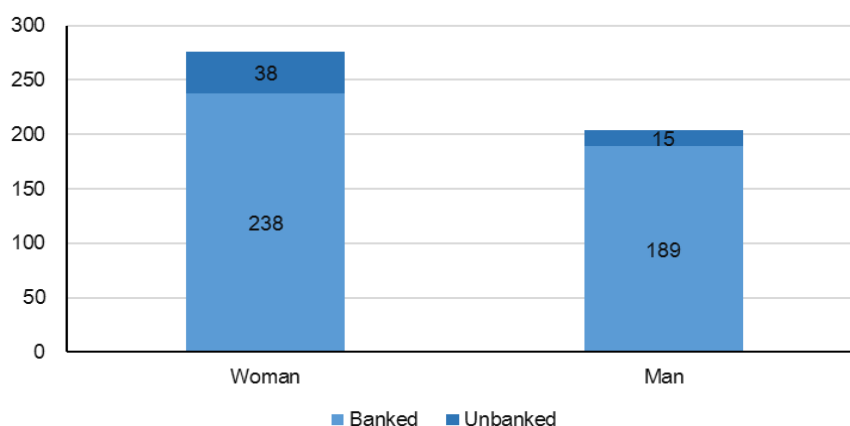
Comparing the rate between European countries across the different groups shows that its value for the first and second group is high and varies between 100% and 97%, for the third group is moderately high. At the bottom of the ranging fall Bulgaria and Romania, which have respectively 37% and 39% unbanked population. These rate's levels lag significantly behind the good European financial practices. Many studies have established the positive correlation between access to finance and economic growth and poverty alleviation at the country level (Honohan 2004, World Bank 2008, Bruhn and Love 2009). Financial inclusion has been regarded as key factor to poverty decrease as ownership and operating bank accounts is considered to be interrelated with initiating and development of different types of business, making all transactions and operations transparent as part of the legitimate business and outside the gray and black economy (ATM Industry Association 2017).

Unbanked population rate the surveyed respondents in the sample

A significant part of our research interest is the comparison of the unbanked population rate for Bulgaria of 63% with the same rate, calculated for the surveyed sample consisting mainly of young people. To determine the sample rate we use the answers to the question „Do you have a bank account and a bank card?“

The distribution of respondents according to this indicator is as follows: 427 people or 89% are banked people and the remaining 53 people or 11% belong to unbanked people. Among women, 86% (283 people) are in the banked population category, and for men this rate is higher - 93% or 189 people (Figure 3). The actual data gathered with the online questionnaire testify to an upward trend in the lagging behind of the Bulgarian banked population rate, thanks to the prospective young population. Young people clearly demonstrate a more active attitude towards financial inclusion and use of basic banking services.

Figure 3. Gender distribution of Banked and Unbanked respondents (number of respondents)



3.4. Internet banking adoption of young Bulgarian audience (at sample level)

The higher banked population rate of the sample is a good starting point for positive expectations for a high sample's IBA rate. Based on the question in the questionnaire "Do you use electronic banking services as an active Internet or mobile banking (allowing transfer of funds)?" a summary about the Internet banking perceptions of so-called generation Y consumers is made.

To the question of electronic banking are included Internet banking as well as mobile banking. The mobile banking means the provision and delivery of banking and financial services with the help of mobile telecommunication devices (Tiwari *et al.* 2007). On the other hand, mobile banking could be viewed as a subcategory or an improvement on Internet banking. By accessing the bank website via web browser on mobile device (smart phone, tablet and other smart portable devices which usually come with Internet access), the user

can use in fact Internet banking and there is essentially no difference between it and mobile banking (Parusheva et al. 2015).

The summarized answers to the question show the following results: 48% of respondents use Internet banking and the remaining 52% do not use the service. The 48% rate is 12 times higher than the official IBA statistics for Bulgaria (4%). This huge difference proves the great potential of young people who contribute to form a significantly higher IBA rate compared to the rate at national level.

Thus established IBA rate of Generation Y segment gives a positive answer to our first research question. Our expectation is confirmed: young people are more prone to adopting innovative electronic financial services, including online banking and their IBA rate is significantly higher than the average for the whole Bulgarian population.

In addition, this finding do not correspondent with the statement of Eurostat on young people's acceptability of Internet banking in European Union. Eurostat asserts that just 44% of younger internet users aged 16-24 perform some kind of electronic transactions with a bank (for payment, transfers or for looking up account information) against 65% aged 25-54 (Eurostat 2017b). Namely according to the EU's statistical office's figures young people are with 33% less active in using Internet banking. For Bulgaria, conversely, young people perceive and use the online services of Internet banking more than twice as much as adults.

3.5. Young people's preferred channel for feedback and communication with banks

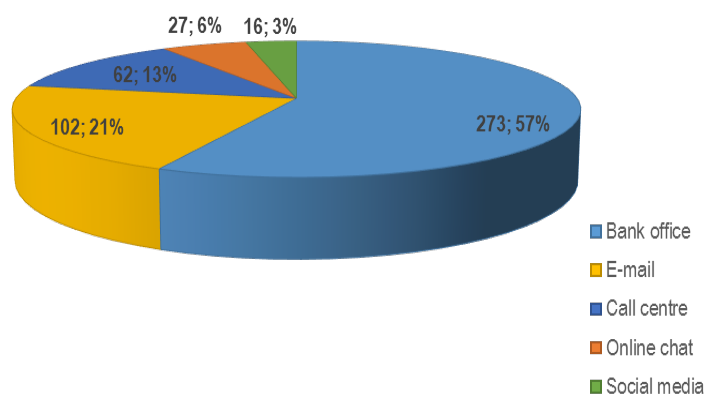
Nowadays, an interesting research question is: which are the young people's preferred channels for feedback and communication with their banks. Among clients, banks perceive young people as an important target group with a strong potential for revenue generation in the future. That is why communication with them is a priority for banks.

Traditional and well-established interaction channels include on first place the banking offices that users have physically to visit, as well as remote channels such as call centre and e-mail. In recent years a significant place among remote communication channels already occupy some electronic channels such as online chat and one of the newest channels - social media channel (Parusheva 2017).

Young people are active people with busy schedules for which time is especially valuable and therefore they can be categorized as big supporters of electronic means of interaction. In general, they prefer to save time, make things quick, easy and convenient and the electronic channels ensure this preference. Younger people are more likely to use the Web as a favorite intermediary channel. That why our expectations are young people to have a particular affinity to use remote channels like e-mail, online chat, and social media channel for feedback and communication with their banks.

Based on that research question, as a part of our study and respectively the questionnaire, the attitude of the young respondents towards favorite use of different channels for feedback and communication with their bank has been investigated. As an answers to the question involved both traditional bank office visits and remote channels like call center, e-mail, and using social media capabilities. The summarized results of the answers to the question are shown in Figure 4.

Figure 4. Respondents' preferred channels for feedback and communication with their bank



More than half of the respondents – 57% or 273 people, express a preference for the traditional bank office's visit, about one-fifth (21% or 102 respondents) trust e-mail communication, 13% (or 62 people) like call center. The other two channels - online chat and communication via social media, currently do not find enough

supporters among the young people in Bulgaria. Proof of this is the low share of support among respondents – online chat is indicated by 6% of respondents and the social media channel – by 3% of respondents.

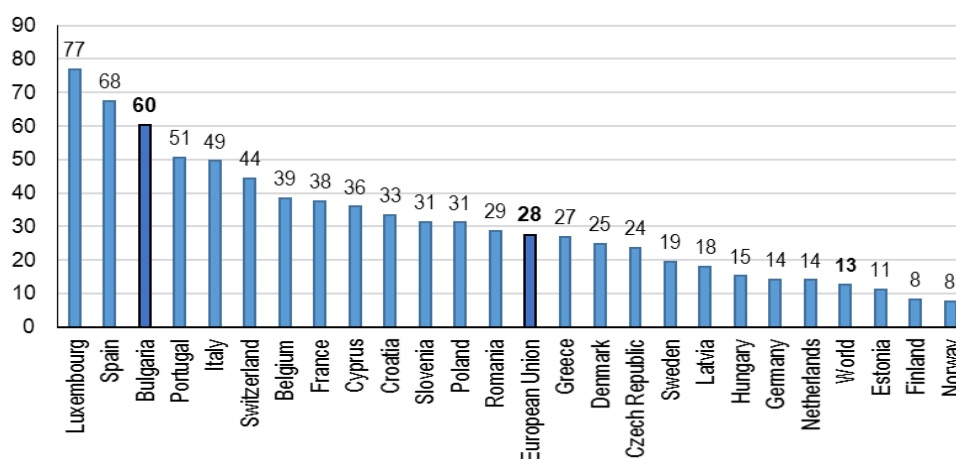
The results shown for preferred channels point to rejecting of expectation about user preference to remote channels. Surprisingly for us from a researcher point of view, the physical bank channel (at the counter) is the leading. It is interesting to establish what is the reason for the unexpected affinity of young people to visit physical bank offices.

One of the main reasons for this unexpected result could be found in well-developed physical banking infrastructure with available bank branches and offices in Bulgaria. A widely used indicator to measure its intensity is through the number of physical offices per 100 000 people.

The situation with assurance in Bulgaria with physical bank branches people can be evaluated as completely satisfactory. The average number of bank offices per 100 000 adults for the European Union is 28, while for Bulgaria this number is 60 - more than 2 times the average (Figure 5). According to this indicator, the country ranks third after Luxembourg and Spain. Even a country with highly established banking traditions like Switzerland (though outside the EU) has fewer bank offices - 44 offices per 100 000 people.

The state of this indicator shows that banking institutions in Bulgaria are still focusing on their physical presence with bank offices rather than focusing on electronic means of communication with their clients. Thus, bank customers are not sufficiently motivated and still prefer human interactions for communication, feedback, problem resolution, fee disputes, etc.

Figure 5. Number of commercial bank branches (per 100 000 adults) in different countries



Source: World Bank, World Development Indicators.

3.6. Young people's tendency to use new remote channels as the transactional social banking channel

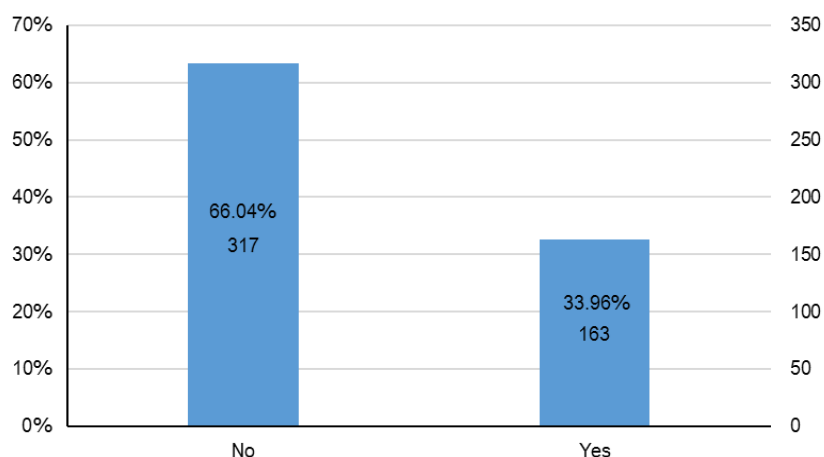
Another interesting research question is about the willingness of young people to adopt other new remote channels such as social media banking as a channel for active banking transactions.

Recent research (Parusheva 2017) shows that among other social media banking models one of the most up-to-date is transactional social banking model. There are already examples of banks in countries around the world (in India, Turkey, Spain, Nigeria, etc.) that use social networks for transactional banking. Other study show that some big banks like Citibank, Bank of Amerika, and ING Direct have active presence in social media and provide interactive online service support via Web 2.0 tools and channels (Shanmugam *et al.* 2015).

In the context of the possibilities of transactional social banking model, an important feature for Bulgarian Internet users is their strong interest in social networks and especially in Facebook (Parusheva 2017). The participation in social networks is one of the favourite Internet activity of Bulgarian online users. According to figures for 2016 of Eurostat, while in the EU on average 63% of Internet users participate in social networks, in Bulgaria the average level of participation is higher – 76% (Eurostat 2017c). This fact is particularly pronounced for young Bulgarian Internet users aged 16-24 for which the level is 91%. The figures give us reason to expect youth willingness to complement the Internet banking with an additional banking channel such as transactional social banking.

For support the research interest and to test the last research question the following question is included in our questionnaire: „Do you consider it positive if you can perform active transactions (such as "Pay to friend") through your account in social media?“ with possible answers Yes or No. The distribution of the answers is given in Figure 6.

Figure 6. Attitude of respondents towards possibility of using transactional social media banking (Yes or No)



The results indicate that at this point of time two thirds of respondents or 317 people do not approve the possibility of using transactional social media banking and about 34% or 163 people support this new channel. This empirical result confirms the dominant role of Internet banking as the leading electronic channel for transactional banking. It can be summed up that at this stage there are not enough significant empirical evidences of our expectation of young Bulgarian people's support for using social networks for transactional social banking and thus our research question gets a negative response. A subject of our future research will be to study the reasons for the inconsistency between consumer affection to social media and the lack of readiness to use them as a transactional banking channel. Despite the inconclusive empirical evidence at this stage of consumer support for the use of the social media transactional banking model, we believe it has a strong potential in the future.

Conclusion

Our aim has been based on empirical data to explore the recent adoption rate of Internet banking of Bulgarian young users and to compare it with the rate at national level for all Bulgarian population. The research of data collected through an online questionnaire distributed in a sample with academic audience allows us to conclude as follows.

Evidence from the study reveals that there are significant differences between official data on IBA rate for all Bulgarian population with those found for young people. The IBA rate of young Bulgarian people is about 50% and this rate is more than 10 times the national level of the rate. Among main reasons for this finding is the relatively low level of the banked population rate in Bulgaria at national level compared to the 90% at young people's level. Empirical data on young Bulgarian people do not support the allegation of Eurostat that the young people's IBA rate lags behind that of older consumers.

Surprisingly, the majority of young Bulgarian people (almost 60%) prefer to visit the traditional bank office for feedback and communication with their banks. Our study reveals among the potential preconditions for this conclusion the good availability of consumers with physical bank offices. In Bulgaria, the bank offices of 100,000 people are more than twice as high as the EU average.

Based on our empirical research, we have found that the majority of young consumers are still reluctant, along with established channels such as Internet banking, to use new channels for transactional banking such as transactional social banking. *Furthermore*, the strong affection for young people to use social media allows us to make a forecast that as Internet banking is already a perceived channel by them, in the same way the transactional social media banking will expand its adoption in the near future. For banking institutions to improve customer satisfaction is very important question and that why they can also utilize the results of this study.

This study can serve as a good basis for future detailed research about the possibilities for adoption of new transactional banking channels. The reasons for the still overwhelming non-acceptance of social banking and the opportunities for integration between it and Internet banking may be the focus of further research too.

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The Relationship of Lending, Funding, Capital, Human Resource, Asset Liability Management to Non-Financial Sustainability of Rural Banks (BPRs) in Indonesia

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Abstract

This study examines the relationship between lending, funding, capital, human resource, asset liability management and non-financial sustainability of Rural Bank (BPR) in Indonesia. This study was conducted to determine the extent of BPRs in Indonesia because this microfinance institution plays an important role in the development of the Indonesian economy. The objective of the study is to investigate the relationship of the independent variables with the financial and non-financial sustainability of the BPRs in Indonesia. The overall set of measures is constructed to evaluate the practice of BPRs in Indonesia. Data from 92 BPRs in Indonesia were collected and processed using SPSS to determine the relationship. The result demonstrates that the relationship of lending, funding, human resource and asset liability management to non-financial sustainability is significant. Whereas the relationship between capital and non-financial sustainability is not significant. The result of this study has practical implications for the Indonesia regulators to establish and revise regulations and standards tailored to the Indonesian unique background. The future direction of this research can be developed by changing or adding the variables and broaden the scope of research.

Keywords: lending; funding; capital; human resources; asset liability management

JEL Classification: E51; F34; G21; G24

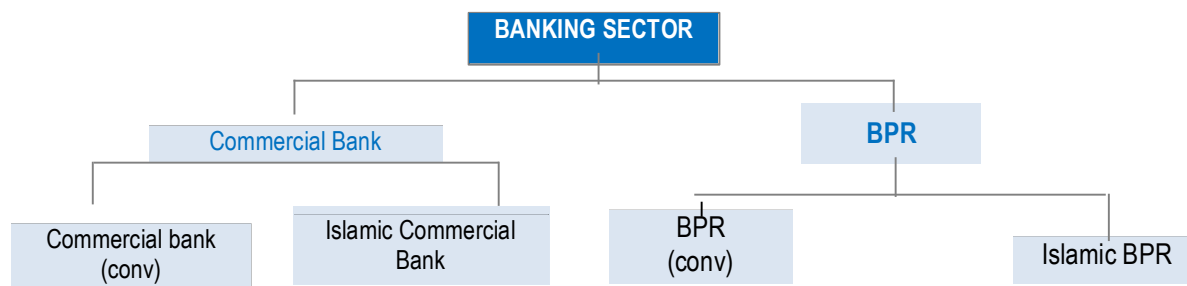
Introduction

Indonesia was one of the first countries to develop commercial microfinance in Asia, with regulated financial institutions providing the bulk of microfinance services throughout the archipelago. In addition to the success the commercial microfinance providers, Indonesia has also been a favourable ground for the development of numerous subsidised government programs, local and community-based financial institutions, cooperatives and Non-Government Organization (NGO). Indonesia has a quite large-scale microfinance sector. Microfinance is provided by various commercial banks and about 60,000 microfinance institutions (MFIs) with some customers that reached more than 50 million people. Total outstanding loans in 2013 amounted to USD 11.2 billion have been disbursed to the borrower 722 249. Furthermore, there are a USD 13.1 billion of deposits at micro financial institutions in 2013. Indonesia currently has more than 50 million micros, small and medium enterprises (MSMEs), The total number of MSMEs constitute 97% of the total existing companies. The contribution of MSMEs was estimated at 30% of GDP growth in 2012. Many of these MSMEs do not have adequate access to bank financing they need to expand the business, particularly in rural areas. Noting these circumstances, Bank Indonesia has issued a rule requiring commercial banks to allocate at least 20% of their loan portfolio for micro credit in 2018. The new law opens new opportunities for the growth of the micro sector in Indonesia (Global Business Guide 2013).

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According to the Banking Law No. 2110, 1998, there are two types of banks in Indonesia; (1) commercial banks that can provide full-service banking business and (2) BPR known as rural banks (BPR) that can provide certain banking services. BPRs are rural banks that are mostly operating in the countryside to handle farmers and small businesses. Businesses of BPRs today are unique because such banks are essential providers of the financing of Micro, Small and Medium Enterprises in Indonesia (Bank Indonesia 2014). The structure of the Indonesian banking system is as follows:

Figure 1. The Structure of the Indonesian Banking System



Source: Bank of Indonesia, (2014).

Indonesia is one of the first countries to develop commercial micro-finance institutions in Asia, and those institutions are providing microfinance services to MSMEs in all regions in Indonesia. In addition to the success of BPRs in providing micro credits, the Indonesian government also provides funding for the development of subsidy programs to the public which implemented through local financial institutions, community-based cooperatives, and Non-Government Organization (NGO) (Holloh 2001). The pattern of service provision of microfinance institutions in Indonesia is different of that carried out by other countries. The microfinance sector has been able to reach a broad and significant outreach in Indonesia. There are two main differences: (1) financial institutions in Indonesia are regulated, both public and private. Microfinance institutions have been able to expand sustainable financial services to the rural level which also touched many poor people. (2) The next difference is closely related to the role and status of NGOs, which in other countries support a lot of micro-finance activities (The Foundation for Development Cooperation 2003).

BPRs in Indonesia is one form of a formal microfinance institution that serves groups of SMEs. BPRs are limited liability companies and cooperatives owned by private and government institution. BPR is an official banking institution regulated under the Banking Act No. 7, 1992, which serves not only to distribute credit in the form of working capital loans, investment and consumption but also conduct public fundraising in the form of time deposits, savings and another form equivalent to them. The number of BPRs in Indonesia since 2008 is decreasing from 1772 BPRs in 2008 went down to 1,643 in 2014. Further, the amount of small BPRs are decreasing, while large BPRs is becoming bigger. 87.7% (1441) BPR has a total asset above USD 500,000. In 2008 there were only 1,180 BPRs (66,6%) with a total asset of above USD 500,000. The number of rural banks in Indonesia by the end of 2015 was 1634 banks that consist of 4895 offices, the location of BPRs is spread across the 33 provinces in Indonesia, and the concentration of BPRs is in Java and Sumatra. The distribution of rural banks in Indonesia with their head office, branches and support cash offices are concentrated in Middle East Java, West Java, East Java and Bali. The remaining of BPR are spread unevenly throughout Indonesia, which is related to the distribution of the population in Indonesia. Java is the most populated area in Indonesia and then followed by Sumatera, Sulawesi and Kalimantan. Contrary to the reduction of BPRs. The total assets of BPRs in Indonesia have grown from Rp 32,533 billion (USD 3,253 million) in 2008 to Rp 89,878 billion (USD 8,988 million) in 2014. There in an increase of 276% in six years. Further, the performance of the Indonesian BPRs also are steady and positive a. All bank performance indicators such as Loan Deposit Ratio (LDR). Non-Performance Loan (NPL). Return on Asset (ROA), and Return on Equity (ROE) also showed positive trends.

Table 1. Important Performance Indicators of the BPR

Indicator	2008	2009	2010	2011	2012	2013	2014
LDR (%)	82.54	79.61	79.02	78.54	78.63	84.34	79.79
- Total Credit	25,480	28,012	33,878	41,144	49,866	59,176	68,391
- Funds collected	25,944	29,496	36,420	44,836	54,535	60,024	72,914
- Core Capital	4,926	5,691	6,450	7,551	8,880	10,137	12,801
NPL (%)	9.88	6.90	6.12	5.22	4.75	4.41	4.75
- Non Current Credits	2,516	1,932	2,070	2,146	2,369	2,610	3,252
- Total Credit	25,472	28,001	33,844	41,100	49,818	59,176	68,391
ROA (%)	2.61	3.08	3.16	3.32	3.46	3.44	2.98
- Current Earnings (Profit/Loss)	849	1,158	1,447	1,853	2,328	2,661	2,682
- Total Assets	32,533	37,554	45,742	55,799	67,397	77,376	89,878
ROE (%)	22.67	25.08	26.71	29.46	32.63	32.41	27.89
- Current Earnings (Profit/Lo	849	1,158	1,447	1,853	2,328	2,661	2,682
- Paid In Capital	3,241	4,072	4,757	5,517	6,227	6,997	8,227
- General Reserve	506	546	661	772	909	1,214	1,389

Sources: Financial Service Authority, Republic of Indonesia (2015).

Despite the presence of the proliferation of the provision of microfinance services, several studies in Indonesia have shown that there is still an unmet demand for microfinance services (the number of MSMEs are quite dominant in the national economy), because many of rural households still do not have access to source funds from formal or semi-formal micro financial institutions (Wiyono, Hubeis and Zakaria 2010). Table 1 shows that the amount of credit has increased from USD 25,472 million in 2008 to 68,391 million in 2014, which is 2.7 times of 2008. Table 2 on the next page shows that the growth of lending and funding of BPRs is slightly higher than commercial banks. The average growth of BPR lending is 22.04%, which a little bit greater than of the commercial bank (21.65%). The role of BPR in lending is on average 1.55%.

Table 2. Important BPR Indicators

	2008	2009	2010	2011	2012	2013	2014	Average
Distribution of Funds								
Commercial Banks (billion Rp)	1,702,520	2,282,179	2,765,912	3,412,463	4,172,672	4,823,303	5,468,910	
Growth		34.05%	21.20%	23.38%	22.28%	15.59%	13.39%	21.65%
Rural Banks (billion Rp)	26,549	36,076	43,877	53,534	64,753	74,550	86,931	
Growth		35.88%	21.63%	22.01%	20.96%	15.13%	16.61%	22.04%
Total distribution	1,729,069	2,318,255	2,809,789	3,465,997	4,237,426	4,897,853	5,555,841	
Market share of BPRs	1.54%	1.56%	1.56%	1.54%	1.53%	1.52%	1.56%	1.55%
Source of Funds								
Commercial Banks (billion Rp)	1,718,965	2,180,934	2,563,562	3,093,848	3,542,518	4,070,018	4,594,876	
Growth		26.87%	17.54%	20.69%	14.50%	14.89%	12.90%	17.90%
Rural Banks (billion Rp)	22,629	30,367	37,034	45,462	55,289	64,001	74,594	
Growth		34.20%	21.95%	22.76%	21.62%	15.76%	16.55%	22.14%
Total sources of funds	1,741,594	2,211,302	2,600,595	3,139,310	3,597,806	4,134,019	4,669,470	
Market share of BPRs	1.30%	1.37%	1.42%	1.45%	1.54%	1.55%	1.60%	1.49%

Sources: Financial Service Authority, Republic of Indonesia (2015).

The Performance of BPRs in Indonesia for the first quarter 2016 showed a positive performance. Table 3 indicates that there is an increase in total assets, deposits and loans from the previous quarter respectively by 1.84%, 3.10% and 1.88%. The increase is in line with the increase in CAR by 1.71% from 21.93% to 23.64% and the increase in ROA from 2.71% in quarter IV 2015 to 2.87% in the quarter I of 2016. However, credit quality has declined while credit experience improvement, reflected in higher gross NPL and net NPL respectively by 0.79% and 1.05% to 6.16% and 4.39%.

Table 3. Important BPR Indicators

	2015 Quart. IV	2016 Quart. I		
Total Assets (billion Rp)	101,713	103,583	1.84%	increase
Credit (billion Rp)	74,807	76,216	1.88%	increase
Third party funds				
Saving	20,959	20,910	-0.23%	decrease
Time Deposit	46,307	48,444	4.61%	increase
Non Performing Loan (NPL)	5.37	6.16	-0.79	decrease
Return on Assets (ROA)	2.71	2.87	0.16	increase
Loan to Deposit Ratio (LDR)	77.81	77.22	-0.59	decrease
Cash Ratio (CR)	19.14	16.57	-2.57	decrease
Operating Expenditure to				
Operating Revenue (BOPO)	81.59	81.18	-0.41	decrease
Capital Adequacy Ratio (CAR)	21.93	23.64	1.71	increase

Source: Financial Service Authority, Republic of Indonesia (2015).

The main factor of the unhealthiest of many rural banks is due to mismanagement (Sindonews 2014). As a result, many rural bank licenses has revoked by the Financial Services Authority (OJK). The problem of some rural banks is the small portrait of the many BPRs experiencing problems and left too long by the regulators. In fact, mismanagement can be avoided if there is enough guidance from the regulator. BPRs have excellent business prospects, due to the distance between the BPR and their consumers that are closer to the institutions; rural banks are said to have a captive market because of their location. Thus, BPR must be able to compete with the larger financial institution. However, BPRs become less competitive compared with other commercial banks in distributing microfinance in their area. Furthermore, the quality of human resources in BPRs is still a problem; they must improve the quality of human resource to have a more competitive edge in the competitive banking business (Fauzan 2014).

At the end of 2004 in Indonesia, there were 2150 BPRs, and in 2014 the number dropped to 1,643 BPRs. The decline in the number of BPR is mainly due to the merger, closure (revocation) and new additions. Many factors can lead to a worsening of the financial performance of a BPR which in turn will result in the revocation of business licenses by OJK. The closing of BPRs among others is due to high Non-Performing Loan (NPL), the occurrence of fraud (embezzlement), non-prudent management and lending, and the presence of lack of capital (Otoritas Jasa Keuangan 2015). Aviliani (2009), a well-known Indonesian economist sees that Bank Indonesia marginalises the role of BPRs due to the issuance of new regulations which has made the competition not fare between the commercial banks and the BPRs. The regulator decreases the role of BPRs by providing more incentive for a commercial bank to expand. The unfair competition is pictured by the improved facilities for commercial banks to serve the micro business sector. On the other side, BPRs who are already operating in the rural areas are limited by the regulation to do the expansion. Only one branch office should establish per year, which is contradicting with commercial Banks, such as Bank Danamon which a subsidiary for micro credits which can set branches easily all over Indonesia.

The Research Questions is related to the relationship of lending, funding, capital, human resources and asset liability management to the sustainability of BPRs in Indonesia. The purpose of this research is to answer the research question and can generate new solutions or theories that can be used by academicians and banking practitioners in operating their businesses. In developing countries such as Indonesia, most of, much of micro banking customers are poor in the view of international standards. This situation is a challenge for emerging markets to determine how to improve the economic capacity of the poor population, BPRs in Indonesia are the agents of development in the rural development in Indonesia. These rural banks will cater the financial services in the rural area which are usually not taken care by the commercial banks. The research studies the relationship between lending, funding, capital, human resource, asset liability management and sustainability of Indonesian BPRs. The results must be able to identify the strength and weaknesses of each variable to sustainability. Further the study will confirm the support of the theory on the relationship between the independent variables and a dependent variable.

1. Literature Review

Rural Banks

Regulated microfinance (Rural banks) provider in Indonesia are commercial bank and BPRs. These regulated micro financial institutions are following the economic principle and tend to handle the upper level of the microfinance market, with loans of more than Rp. 3 million (USD 300). NGOs, cooperatives, and other village based institutions also called Bank Kredit Desa (BKD) in Indonesia are not regulated and provides microfinance services to the lowerend of the market, and they also still have an outreach limited in rural areas (Charitonenko and Afwan 2003). As it is known, Indonesia is famous for its large-scale microfinance sector, with a wide range of commercial and rural banks. There are more than 56.5 million MSMEs, which contributes more than 50% of the Gross Domestic Product (GDP) in 2014. However, many of these MSMEs do not have adequate access to bank financing which is needed for their business development, especially in rural areas. MSMEs is an opportunity for rural banks to compete with commercial banks in developing their business (KPMG 2014).

Non-Financial Sustainability

Since 1983, microfinance institutions in Indonesia have had to design their own microcredit programs. The source of fund is using their own resources and without government subsidy. This means a shift from subsidised credit programs toward business orientation credits. This is a commercialisation process where microcredit is not only provided to develop the poor and small enterprises but also for profitability and sustainability of institutions. Many firms now use non-financial measures such as product quality, customer satisfaction and market share to evaluate and reward managerial performance (Chatteji and David 2006). The primary reasons suggested for the use of non-financial performance measures are that these measures are better indicators of future financial performance than accounting measures, and they are valuable in evaluating and motivating managerial performance.

Lending

The offering of credits (loans) is the main activity of the bank. The lending function is considered by the banking industry as the most important function for the utilisation of funds. Because of this, BPRs should manage the disbursement of credit management on a prudent basis. When commercial banks, including BPRs, have managed to collect funds (funding) from the public, the amount will become a burden to the banks if it is left alone. For the funds that have been collected from the depositors, the banks should allocate the funds to the provision of credit to encourage the performance of businesses. Forms of loans that are generally on offer to bank customers can be divided into three basic forms, namely working capital loan, investment loan and consumer loans. In practice, however, the title or the name of various loans offered to the public is not the same between banks or BPR.

Funding

The factors affecting the size of the loan portfolio in the banking sector can broadly viewed from internal factors and external factors of the bank. Internal factors include the bank's banking, fund mobilisation and interest rates. Sources of funds used for the loan portfolio are expected to come from the public in the form of savings and time deposits. The amount of funds that can be raised from the public will be able to loosen the ability of banks to extend credit. The effectiveness of the search and release of funds will depend on the high-low lending rates offered. High-low interest rates will affect the community/employers to take bank credit. The higher the interest rate, the lower the interest of the rural to take the credit and vice versa. Bank in channelling credit should consider various factors, including the condition of the bank especially its financial performance. A growing number of MFIs have formalised and sought to fund growth through public deposits and thus became willing to accept banking regulation and the concomitant standards of transparency and prudential management. As the institutions matured and expanded, many MFIs gradually made the transition to include commercial funding that spanned the range of risk and liquidity profiles and thus could be adjusted to match the capital structure requirements at different stages of the institutional life cycle. Some observers view these changes as a general shift toward capital structures more typical of commercial financial institutions (Bogan *et al.* 2007). The empirical evidence of Bogan *et al.* (2007) research fails to support interpretations of the life cycle approach that focus on MFI age as the deciding factor in sustainability, but points to the importance of capital structure and funding instruments as key determinants of financial sustainability. They found that for MFIs, asset size is not a problem regarding both sustainability and outreach.

Capital

A strong capital structure of a BPR suggests that the BPR has a large amount of capital that may affect the possibility to get higher profit. However, a large amount of capital which may also lead to the possibility of excess capacity in bank funds. The inability of the Bank to channel those funds to communities can lead to an excess of liquidity. While banks with low capital structure could affect public confidence and other parties concerned. Because capital is used as a tool to ensure the survival of a business and as an assurance to the lender Bank who keep their money in banks (Lukiana 2012). Coleman (2007) found that most microfinance institutions are employing high leverage and finance their operations with long-term debt rather than short-term debt. Also, highly leveraged microfinance institutions perform better by reaching out to more clientele, enjoy scale economies, and therefore are better able to deal with moral hazard and adverse selection, enhancing their ability to deal with risk. The obvious implication of his findings is that MFIs use more debt about equity for financing the operations of the MFIs.

Human Resource

The factor of HR is one of the critical success factor and business continuity of the BPRs. BPR is a financial institution that serves as an intermediary by public trust (Hutagalung *et al.* 2017, Muda *et al.* 2018 and Pohan *et al.* 2018). Most of BPR working capital is coming from the public in the form of savings and time deposits (Muda *et al.* 2018). In carrying out its functions, BPR faces various risks, among others, credit risk, operational risk, legal risk and reputation risk. BPRs are highly regulated institutions that require professionalism, competence, and integrity in managing the BPR. Hence, the number of HR employ in a BPR must be able to support the operation of the company that at least should consist two directors, two commissioners, an accountant, an internal auditor, cashier, administrative (general and credit), marketing as targeted funding and lending, credit supervisor, the security, and other functions (in line with the development of business volume BPR) as an internal control (Bank Indonesia 2014). Therefore, the recruitment of employees should come from the environment where the BPR is located. Salaries and facilities to support the living costs of employees should be based on the economic conditions at the location of BPR, and the BPR must be able to provide at least the minimum wage to drive performance and employee loyalty. Over the past few years, quite a lot of BPRs were closed due to the inadvertence of management in managing the company. This is caused by the poor quality of human resources working in BPRs. Human resource in BPRs was less able to manage customer funds, lack of control over information technology (IT) which is required to support the company's performance. Therefore, most BPRs needs to improve the quality of human resources through professional recruitment as well as provide enough training (Muda *et al.* 2017, Dalimunthe *et al.* 2017, Hutagalung *et al.* 2017). If the BPR's human resources can be improved, there will be a better understanding of the industry, an understanding of the capacity, the market and technology then this may increase the quality of BPR to survive.

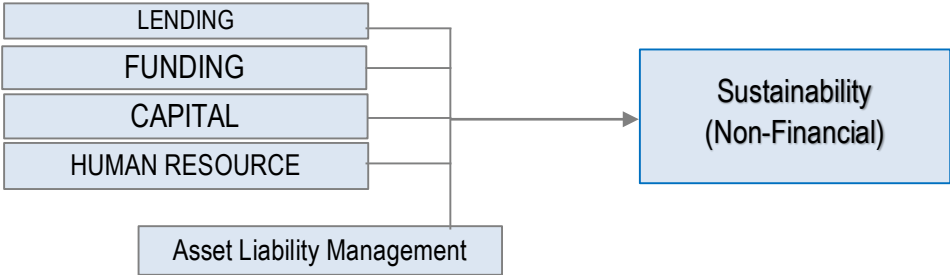
Asset and Liability Management

ALM is the process of controlling assets and liabilities that interconnected in an integrated manner to achieve the bank's profit (Das, Lu, Papaioannou and Petrova 2012). ALM is a policy and strategy for the achievement of the annual plan. Asset and Liability Management is a process of planning, organising, and monitoring through the collection, process, analyse, report, and the establishment of the strategy for asset and liability in order to eliminate risks which includes liquidity risk, interest rate risk, exchange rate risk and the risk of the portfolio in supporting the achievement of the bank's profit (Das *et al.* 2012). ALM deals with the efficient management of sources and uses of bank funds concentrating on profitability, liquidity, capital adequacy and risk factors in a dynamic and competitive economic environment. The banking business has recently become more sophisticated due to rapid technological developments, expansion of economies, diversity in bank operations, and increased competition and/or relationship between financial institutions. Especially in an unstable economic environment, the success of a bank depends on the quality of its asset and liability management. Banks are in the business of management of conflicting objectives (such as maximisation of profit and minimisation of risk) and mismatching accounts due to the maturity transformation process. The maturity transformation process is one of the most important features of banking, that is, banks lend for longer maturities than their borrowing maturities. Therefore, they have higher short-term liability accounts compared with short-term asset accounts and higher long-term asset accounts compared with long-term liability accounts (Oguzsoy and Guven 2007). The transaction costs of lending consist of the costs of administering credit, coordination costs and the costs of the risk of default. It is further highlighted that administrative costs are those which are directly attributable to the processing, delivering and administering of loans while coordination costs are those resources a financial institution dedicates to

ensuring that clients adhere to the terms stipulated in loan contracts (Saito and Villanueva 1981). According to Polski and Kearney (2001), banking activities generate two types of transaction costs, which are subject to different political and economic influences. One type of transaction costs, interest expense, reflects the costs of funds for the banking activities and the second type, non-interest expense, reflects the costs of information and coordination. HR Management Consists of two interrelated concepts: human resources development and utilisation of human resources Ikeanyibe, (2009). HR development requires Activities towards improving the ability of individuals to be able to realise the potential for productive growth of the organisation, while the utilisation of HR is an activity to obtain maximum performance from the individual maximum. Development requires investment, and utilisation of is required in order the desired results can be achieved. Therefore, the management of human resources should really be used in the occupied sector, and development is necessary to equip them in the achievement of the goals and targets set by the company.

2. Research Framework

Figure 1. Conceptual Framework



The research framework is developed using the transaction cost theory and the theory of human resource as the underpinning theory of the study. The relationship of lending, funding, capital and asset liability management to sustainability are all related to transaction cost theory. Meanwhile the relationship between human resources to sustainability is based on the theory of human resource. There are three types of costs that should be managed by a financial institution when lending to customers. All three charges are Cost of the money lent; the cost of prudent financial practices, including the allowance for bad debts; and transaction costs. Transaction costs include costs for the identification and screening clients, processing the loan application, complete the documentation, lending, collection and follow-up if anyone do not make payments settlement. Cost of funds and prudent banking costs are generally comparable to the amount of the loan. While the cost of transaction are usually not proportional to the amount of loans. This is due to the size of micro loans which on average is much smaller than most of other loans (corporate and personal). As result, transaction costs on a percentage basis of the total number of micro loans tends to be higher. When the group lending model is adopted, it would require a variety of unusual charges such as costs for group formation, training costs associated with the procedure. Additional cost is also required for the supervision the lending group, and group lending has a frequency of installment payment more quickly than other kind of normal loans (Shankar 2006). To become eligible, group-based microcredit need to reduce transaction costs for both lender and the borrower. Group lending programs vary in their transaction cost characteristics depending on their arrangement on the provision of credit and its social context. Bhatt and Tang (1998) illustrate the arguments by examining the challenges faced by various group lending programs Worldwide. They also have examined how social capital, or the lack of it, affects the transaction costs and operations of three conventional group lending arrangements: a group loan with joint liability, an individual loan with joint responsibility and an individual loan with individual responsibility.

2.1. Hypotheses Development

2.1.1. Lending and Non-Financial Sustainability of BPRs

Support the sustainable development of micro enterprises through financial markets require sustainable financial institutions and independent. Sustainability businesses will refer to the long-term ability of the company in meeting goals or targets. For financial institutions and other companies, this requires profitability (return on assets is positive) profit or business profit are achieved when revenues exceed company expenses (Schreiner 1999). In addition, business sustainability is measured by looking at the financial sustainability and economic sustainability of an entity. Financial sustainability of a financial institution is when organizations can obtain good profitability and

has enough liquidity to be able to overcome any challenges of bankruptcy. On the other hand, economic sustainability is a proxy that can be easily measured the impact of financial intermediation in rural areas that are not associated with full cost benefit analysis (Yaron *et al.* 1998). Sustainability of financial institutions in this period has been easily made and presented in various medias. The easiness of information is made possible due to the existence technology and statistics to illustrate periodic trends in the financial institutions market penetration, relative income levels, and quality of service (Alam 1999, Parveen 2009). Practices shows that large banks use a standard set of quantitative criteria's in making decisions to approve or deny the application of small business loans. Small banks such as BPRs in making credit decisions uses qualitative criteria's. These criteria use personal interactions of the loan officers on the loan applicants based on guidelines established by each institution (Alam 1999, Parveen 2009). The banking industry treats the loan function as an important function for the utilization of funds. Interest income of the loans channeled a core revenue for financial institutions, and banks gained the highest gross profit from loan portfolio. Therefore, the administration of the loan portfolio must be taken seriously, because it affects the profitability of the bank. Rotich, Wanjau, and Namusonge (2015) found out that relationship lending has a positive correlation with sustainability (financial performance). Relationship lending that was mentined as a more efficient lending technique in the case of MSMEs. Evidence shows that relationship lending helps MSMEs in access to loans from banks. Pradnyamita, Cipta, and Yudiaatmaja (2016) also has discovered that lending has a positive and significant effect on the financial performance of BPR. Likewise, the research conducted by (Prasetyo and Utomo 2007) who found that the increase in lending is growing the earnings of BPRs. Such improvements can ultimately ensure the sustainability of BPR. In this study, the relationship of lending and sustainability (financially) is analysed by constructing the following hypothesis:

H1: There is a positive relationship between lending and the sustainability (financial and non-financial) of BPRs in Indonesia.

2.1.2. Funding and Non-Financial Sustainability of BPRs

The capital structure from financial institutions has become an important issue in the financial world, especially after the collapse of the banks in 2008, as well as bailouts issued by the government's in efforts to restructure financial institutions affected. This situation has had little impact indirectly on the development of funding at the time of the BPRs. There are signs that counterpoint factors have established various funding sources and instruments available to microfinance institutions. These factors are found through variation contained in the different areas within the microfinance institution funding patterns. Further, regional variations are influenced by historical factors, including the pattern of saving and borrowing that is traditionally done, and variations contained in the regulatory environment (Bogan, Johnson and Mhlanga 2007). The composition of funding shows a comparison between the third-party funds (debt) to equity. The utilisation of third-party funds (debt) can increase the opportunity for rural banks to channel larger loans to MSMEs and at the same time can enhance the profitability of the company. Wahyuni and Putra (2012) found that funding composition has a positive effect on the profitability of BPRs. Karyani (2012) in her study of BPRs in West Java found that the intermediation function of microfinance institutions has a positive effect on the business performance on BPRs especially in strengthening capital and business productivity. The intermediation function (funding and lending) and the positive effect on the business performance influences sustainability directly or indirectly, in improving the ability to monetise profits (Karyani 2012) Research on the rural banks is still very limited associated with the process, resources, and requirements for BPRMFI includes a variety of providers which varies in terms of legal structure, mission, target area, and methodology. MFIs can be classified into various forms on the basis of organizational structure (cooperatives, solidarity groups, village banks, individual contracts, and model of linkage) and on the basis of legal status (NGOs, cooperatives, banking institutions registered, government organizations, and projects). Regardless of the form/type of microfinance institutions, funding is a very important issue for them, because the ability to find funds is important for the entity to achieve sustainability regardless of their vission and mission (Bogan 2012). Therefore, the next hypothesis is established to test the relationship between funding and sustainability on Indonesian BPRs. The hypothesis related to relationship is as follows:

H2: There is a positive relationship between funding and the sustainability (financial and non-financial) of BPRs in Indonesia.

2.1.2. Capital and Non-Financial Sustainability of BPRs

The capital structure from the lending institution has become an important issue in 2008 in the world of finance (banking). The situation is causing governments to help banks to be saved. When funds are available, the

question becomes what would happen to the capital structure of the assisted entities. The mixture of capital structure will work best between debt, equity, and grants (aid). Forms of capital structure are needed to ensure the solvency and self-sufficiency? Questions about the shape of the optimal capital structure for a lending institution, especially those who have access to grant funds, is an open question and weighted (Bogan 2012). The results of Bogan's (2012) study, show that MFI capital structure is associated with sustainability. Grant (capital) as a percentage from assets was significantly but negatively related to business sustainability. For MFIs that are not regulated, the use of grants (capital) does not have a negative relationship with business sustainability. This reinforces the view that the use of grants in the long run will hamper the ability of the entity in achieving outreach of lending, and in general, the operation is inefficient due to the lack of competitive pressures associated with the fundraising market. Grant (capital) is expected to inhibit the development of MFIs to be competitive, efficient and sustainable operation. Abrar and Javaid (2016) using the data from 2004 to 2010 from about seventy countries around the world, discovered that microfinance institution with a high amount of debt enjoys higher returns than MFIs that own less debt. This means that the company will be more profitable if debt equity ratio (DER) is high, where debt is a substantial part of the capital structure. The results also showed that the ratio of debt to equity is significant and positive to profitability of microfinance institutions. These results validate the hypothesis that the increase in the debt financing will increase the profitability of MFIs. Not only that, but also benefits for shareholders, since the earnings remain available to them

Maryadi and Basuki (2014) found that the capital adequacy ratio (CAR) has a positive and significant impact on financial performance of Conventional BPRs. This means that if the amount of ownership capital increases, it will affect the magnitude of the fulfilment of the bank's assets. It will be easier for the banks manage their assets (including loan/credit) that in turn can increase profitability. Similarly, Sekabira (2013) found that micro-finance institutions with a better capital share composition in the capital structure will be more related to sustainability. Therefore, the next hypothesis is established to test the relationship between capital and sustainability on Indonesian BPRs is as follows:

H3: There is a positive relationship between capital and the sustainability (financial and non-financial) of BPRs in Indonesia.

2.1.3. Human Resource and Sustainability of BPRs

The theory of human resources is closely related to sustainable development. This theory has been used by many researchers as an analytical framework for the study in the field of human resources. Furthermore, the classical economists argue that land, capital and labor are the foundation of production factors. Workers are usually linked with humans who qualifies as a resource or income of an institution. Workers occupy a major place in the production because land is a cultivated asset, and capital that may be idle, will in fact never been found, nor in as findings or accumulation, but by and for the use of labour (Ikeanyibe 2007). Without denying the importance of other resources from the production process, the theory assumes that humans are the most important asset of an organization. Humans as a potential resource has its limitations in skills, knowledge and capabilities that can be developed, utilized and managed to ensure the survival and progress of an organization. Basically, Human Resource Management requires two interrelated concepts are in the development of human resource and the utilisation of human resources (Muda *et al.* 2017). The human resource development activities that aim to enable individuals to realise the potential for growth of a productive organisation, while utilisation is signalling the activity to obtain the best individual performance (Muda and Dharsuky 2015, Lubis *et al.* 2016; Muda *et al.* 2016, Gusnardi *et al.* 2016; Dalimunthe *et al.* 2016 and Nurzaimah *et al.* 2016). Hutapea (2015) in his study found that intellectual capital has a positive relation to sustainability. Intellectual Capital in his study is defined as the aggregation of all knowledge and competences of employees that can bring competitive advantage to the companies. Ikeanyibe (2008) have found several factors that affect the sustainability of microfinance institutions which is caused by poor development of skills, lack of business initiatives, poor staff development, the lack of good staff utilization and compensation, and ineffective control of the authorities. Therefore, it is recommended to take concentrated action in building the capacity of poor communities, increase supervision and control, and ensure that an appropriate employee development is in place. Melinda (2006) found that the practice of managing human resources in BPRs in East Java has a positive and significant effect on organisational performance. Practice of managing human resource consists of: the existence of career paths, formal training system, results-oriented assessments, performance based compensation, a sense of security in their work, the reception of the voice of employees, and the definition of the job (Dalimunthe *et al.* 2017).

Therefore, the next hypothesis is established to test the relationship between human resource and sustainability on Indonesian BPRs. The hypothesis related to relationship is as follows:

H4: There is a positive relationship between human resource and the sustainability (financial and non-financial) of BPRs in Indonesia.

2.1.4. Asset Liability Management and Sustainability (Financial and Non-Financial) of BPRs

Asset Liability Management (ALM) is a computation of credit risk, liquidity risk, capital risk and interest rate risk to counter threats to a bank. Credit risk is the risk of default of customer loan repayments. Liquidity is the ability of banks to meet deposit withdrawals and the completion of commitments timely and in full. Information on the liquidity position is required to consider the disbursement of funds needed for lending when requested and investing when desired. Excessive account mismatch can cause problems with the liquidity of finance institutions. Risk capital is required to measure the bank's ability to continue its operations when faced with large losses. Capital can be treated as long term liabilities that can be used to absorb losses unexpectedly from large losses. Interest rate risk shows the effect of changing the net interest margin between loans with interest rate spread as a deviation from the practices of the interest rates of assets and liabilities. When interest rates decline, banks will be able to make higher profits because they can renew their obligations immediately at a lower interest rate of loans, and it can occur when the opposite situation happened. Inflation is another factor that intensifies the impact of interest rate risk in the banking industry. Banks that operate in a high variable inflation environment will be more sensitive and vulnerable to all risks when compared to banks operating in countries that are relatively stable in the inflation environment because of the presence of uncertainty on future transactions. (Oguzsoy and Guven 2007). ALM focuses on measuring and managing risks arising from factors beyond the control of a financial institution, such as the volatility of the foreign exchange rate, interest rate fluctuations and the availability of funds (liquidity), all of which are a function of demand and supply for money in the world economy. A good ALM process will enable a financial institution to minimize the risks inherent in the balance sheet by currency matching of assets and liabilities as closely as possible with the risk appetite of the financial institutions. When the terms of the currency of the corresponding assets and liabilities are perfectly matched, then there will be no financial risks, including credit risk and operational risk (Brom 2009).

Idoliyan and Wiryono (2014) found that ALM elements such as Credit risk (presented by Non-Performing Loan and Reserve Ratio) shows medium significant relationship with financial sustainability in all types of BPR. They also found that interest rate risk another element of ALM (presented by Net Interest Margin) shows positive and low significant relationship with financial sustainability. Credit risk and interest rate risk are two forms of risk in asset liability management. The overall risk management is required to help determine the right balance between risk and reward. As microfinance institutions diversify their funding sources, sound asset liabilities management are very important to support financial institution to assess and manage their financial risks (Brom 2009). Empirical findings in India concluded that the ownership and structure of the bank has a major influence on the ALM procedures. It is further observed that the State Bank of India and its association has the best correlation, which can show the best pattern of asset-liability maturity. Most banks in India are managed by liability because they all use funds from the money market to meet their maturing obligations. Most banks are very aggressive to benefit from the use of short-term funds for long-term investments. Interest rate and liquidity risk is the significant risk that they face, and the impact can affect the quality of the balance sheet, so they should be regularly reviewed to obtain sustainability (Prathap 2013). Therefore, this study aims to analyse the relationship between asset liability management with the sustainability of BPRs in Indonesia by constructing the following hypothesis:

H5: There is a positive relationship of asset liability management and the sustainability (financial and non-financial) of BPRs in Indonesia.

3. Research method

Research Design

This type of research is an investigation of a correlational study in which researchers are interested to illustrate the important variables related to the problems examined. Correlational study is conducted within the BPR's work with minimal disturbance to the natural flow of work. Data collection for the study uses primary data which are collected through questionnaires sent to the BPRs. Correlational studies are invariably conducted in a non-contrived setting. The unit analysis is data gathered from the BPRs. This study is a cross-sectional study for which data are collected for the year 2014.

3.1. Sample and Data Collection

The population of this study is BPRs listed at the Indonesian Central Bank (Bank Indonesia) and OJK, the total number of BPRs in 2014 is 1643, which are in Sumatra, Java, Kalimantan, Sulawesi and Papua. This study does not include Islamic Shari'ah rural banks in the sampling of questionnaires. Reasons for not entering BPRS in this study is due to the regulator has classify this type of bank in different group.

Sampling Technique

The form of the sampling technique is done by selecting a random sub-group of the population. This sampling method should be able to produce similar results with the simple random sampling technique. Samples are generally obtained from the first sample at a higher level, for example from the randomized province who were selected and then the sampling is followed at other levels of the provinces chosen.

Data Collection

Data collection for this study consists of primary data. Primary data are collected by sending questionnaires to directors of BPRs. The questionnaires consist of question relating to lending, funding, capital, human resource management, asset liability management, and of the financial and non-financial sustainability of the BPRs.

Types and Sources of Data

This study uses primary data. Primary data is data obtained from respondents of the head office banks by asking respondents to answer some questions contained in the questionnaire. The source of data is the Director of BPR or the chairman of the company's operations.

Population

The population of the study is all BPRs registered in Bank Indonesia and OJK which in this case are represented by the Directors who works at the head office of banks. The selection was based on the assumptions that they understand all operational activities related to the research topic. The data on the BPRs are obtained from OJK and in the year 2014 amounted to 1643 head offices spread unevenly in Indonesia. This study uses BPR as a research object on the grounds of a) BPRs as one of the financial institutions that sustain the economy of the country especially for people in the region b) BPR is expected to continue to survive as a bank dedicated to small entrepreneurs to be able to realise the equalisation of banking services, business opportunities, and income c) Although BPRs targeting small business owners that are not reached by commercial banks, but the complexity of the work at BPR is almost the same as commercial banks.

Missing Data

Missing data are ubiquitous in social science research. Missing data refer to the invalid data in which respondents may decline to answer a question in the survey or may not know the answer due to lack of knowledge of the subject (Hair, Black, Babin and Anderson 2010).

Detecting Outliers

In statistics, an outlier is an observation point that is distant from other observations. An outlier may be due to variability in the measurement or it may indicate experimental error; the latter are sometimes excluded from the data set. Outliers can be caused by experimental or measurement errors, or by long-tailed populations. Detecting outliers is carried out the same as the steps in finding out missing data. There is no rigid mathematical definition of what constitutes an outlier; determining whether an observation is an outlier is ultimately a subjective exercise. There are various methods of outlier detection. Some are graphical such as normal probability plots. Others are model-based. Box plots are a hybrid. Model-based methods which are commonly used for identification assume that the data are from a normal distribution, and identify observations which are deemed "unlikely" based on mean and standard deviation

Assessment of Normality

An assessment of the normality of data is a prerequisite for many statistical tests as normal data is an underlying assumption in parametric testing. There are two main methods of assessing normality-graphically and numerically. The Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk (S-W) is used to test the assumption that the sample data are drawn from a normally-distributed population. Both test require interval data and can be run in SPSS. Both test the null hypothesis that the data come from a normally-distributed population. The alternate

hypothesis is therefore that the data come from a population that is not normally distributed (Muda *et al.* 2018). Consequently, if the results of either test are significant (e.g. $p < 0.05$) rejecting the null hypothesis means rejecting the assumption of normality for the distribution. A typical use of the Kolmogorov-Smirnov and the Shapiro-Wilk tests is to check assumptions of normality required by other statistical tests to be used later in your analysis (Marhayanie *et al.* 2017, Nasir *et al.* 2017, Muda *et al.* 2017). Both tests are sensitive to the size of the sample: large sample even with small deviations from normality will be reported as significant. As a result, both tests should always be used in conjunction with visual inspection of histograms and Skewness and Kurtosis measures.

Assessment of Multicollinearity

Multicollinearity is a statistical phenomenon where there are two or more independent variables in a multiple regression model which is highly correlated. It refers to a condition when the predictor variables are strongly correlated among themselves (Myers and Well 2003, Nasir *et al.* 2017; Hasan *et al.* 2017 and Azlina *et al.* 2017). Variables are said to be multicollinearity if there is a linear relationship between them. According to (Field 2009), multicollinearity exists between independent variables and makes it difficult to evaluate the significance of individual predictors. Field (2009) recommends diagnosing by seeing the variance inflation factor (VIF) and the tolerance values. Hair *et al.* (2010) suggest multicollinearity below 10 for VIF and over 0.10 for tolerance as acceptable values.

Assessment of Autocorrelation

Autocorrelation is a mathematical representation of the degree of similarity between a given time series and a lagged version of itself over successive time intervals. It is the same as calculating the correlation between two different time series, except that the same time series is used twice: once in its original form and once lagged one or more time periods. The Durbin Watson statistic is a number that tests for autocorrelation in the residuals from a statistical regression analysis (Handoko *et al.* 2017, Nurlina *et al.* 2017, Sirojuzilam *et al.* 2017 and Ferine *et al.* 2017). The Durbin-Watson statistic is always between 0 and 4. A value of 2 means that there is no autocorrelation in the sample. Values approaching 0 indicate positive autocorrelation and values toward 4 indicate negative autocorrelation.

Assessment of Heteroscedastic

A collection of random variables is heteroscedastic, and if there are sub-populations that have different variabilities from others. Here "variability" could be quantified by the variance or any other measure of statistical dispersion. Thus, heteroscedasticity is the absence of homoscedasticity. The existence of heteroscedasticity is a major concern in the application of regression analysis, including the analysis of variance, as it can invalidate statistical tests of significance that assume that the modelling errors are uncorrelated and uniform-hence that their variances do not vary with the effects being modelled (Muda *et al.* 2016, Yahya *et al.* 2017). The Glejser test for heteroscedasticity, developed by Herbert Glejser, regresses the residuals on the explanatory variable that is thought to be related to the heteroscedastic variance.

3.2. Hypotheses Testing

The Coefficient of Determination

The coefficient of determination, denoted R^2 or r^2 and pronounced "R squared". The coefficient of determination is used to find how large variety of independent variables can explain the overall variation of the independent variables (Lubis *et al.* 2016, Sihombing *et al.* 2017, Erlina *et al.* 2017). The coefficient of determination measures how much influence the independent variable overall of the ups and downs of the variation of the dependent variable. The coefficient of determination is between zero and one. If $R = 0$ means between independent variables (independent variables) and dependent variable (dependent variable) has nothing to do, whereas when $R = 1$ means between independent variables with the dependent variable have a strong relationship.

Partial Regression Coefficient Significant Test (F test)

An F -test is a statistical test in which the test statistic has an F -distribution under the null hypothesis. It is most often used when comparing statistical models that have been fitted to a data set, in order to identify the model that best fits the population from which the data were sampled (Tarmizi *et al.* 2016, Sirojuzilam *et al.* 2016, Dalimunthe *et al.* 2016, Nurzaimah *et al.* 2016). Exact " F -tests" mainly arise when the models have been fitted to the data using least squares. The F statistic is used when there is a need to decide to support or reject the null hypothesis. The F test results shows both an F value and an F critical value. The F critical value is what is

referred to as the *F statistic*. In general, if the *F statistic in a test is larger than the table F value, it can reject the null hypothesis* (Dalimunthe *et al.* 2016, Muda 2017). However, the statistic is only one measure of significance in an F Test. The p value should also consider the p value. The p value is determined by the F statistic and is the probability of the results which could have happened by chance.

Multiple Linier Regression Analysis and Partial Regression Coefficient Significant Test Individually (t test)

Multiple regression analysis is a model where the dependent variable depends on two or more independent variables. This analysis is used to determine the influence of the independent variable/independent of the dependent variable. T test basically shows how far the influence of the independent variables individually in explaining the variation of the dependent variable (Sadalia *et al.* 2017, Syahyunan *et al.* 2017, Muda *et al.* 2018). The purpose of the t test is to test the regression coefficients individually. This test can be done by comparing the calculated t with the t table or view the significance column for each t, the t test is identical to the F Test (Nurlina *et al.* 2017, Ferine *et al.* 2017). Or it could be replaced with Stepwise test method.

3.3. Result and discussion

3.3.1. Result

Overall Response Rate

385 questionnaires have been sent to the directors of conventional BPRs at their head offices who are located throughout Indonesia by post. 93 questionnaires have been returned which represents a response rate of 24%. The remaining 286 questionnaires were not returned and 6 questionnaires did not reach the respondent and was returned to the researcher. Questionnaires that are returned are from 93 banks which are coming from 19 provinces in Indonesia. The table shows that the questionnaires are mostly obtained from BPRs located in West Java (28), North Sumatra (21) and Central Java (10). This is the representation of BPRs in Indonesia.

Descriptive Statistics

Descriptive statistics are numbers that are used to summarise and describe data (Sekaran and Bougie 2010). Data refers to the information that has been collected from an experiment or a survey. Descriptive statistics is the discipline of quantitatively describing the main features of a collection of information, or the quantitative description itself. Descriptive statistics are distinguished from inferential statistics (or inductive statistics), in that descriptive statistics aim to summarize a sample, rather than use the data to learn about the population that the sample of data is thought to represent. The results shows that the mean for lending is 3.5, funding (3.9) and capital (3.9), and for human resource (4.2), ALM (4.3) and non-financial sustainability is 4. However, the value of mean for sustainability (financial) is only around 2. This generally means that descriptive statistics, unlike inferential statistics, are not developed on the basis of probability theory.

Classical Assessments

Assessment of Normality. The normality test aims to test whether the regression model, the confounding variables or the residuals have a normal distribution. The t test and F test assumes that the value of the residuals follow a normal distribution. If this assumption is violated, then the statistical test is invalid for small samples (Gujarati 2003, Field 2009 and Muda *et al.* 2018). In this study, the normality test of the residuals uses the Kolmogorov-Smirnov test with a significance level of $\alpha = 0.05$. The basis for decision making is by look at the probability p results, with the following provisions.

If the probability p value $\geq 0,05$, then the normality assumption is fulfilled.

If the probability p value $< 0,05$, then the normality assumption is not fulfilled.

Table 4. Normality Test for Regression Equation: Non-Financial Performance

	Unstandardized Residual
N	92
Kolmogorov-Smirnov Z	1.028
Asymp. Sig. (2-tailed)	.241
a. Test distribution is Normal.	
b. Calculated from data.	

Source: Results of the Researcher's Processed Data (2017).

Based on the normality test results depicted in Table 4 the known value of the probability or Asymp. Sig. (2-tailed) for non-financial performance is 0.241 because the probability value is greater than the significance level, namely 0.05. It can be concluded that the normality assumption is met. Testing the normality assumption can also use the chart analysis approach. In the normal probability graph plot approach, if dots (.) diffuse far (spread winding on a diagonal line like a snake) on the diagonal line, then the error in the normality assumption is indicated that normality is not met. If the points spread very close to the diagonal line, then the assumption of normality is met.

Figure 2. Normality Test: Normal Probability Plot for Regression Equation

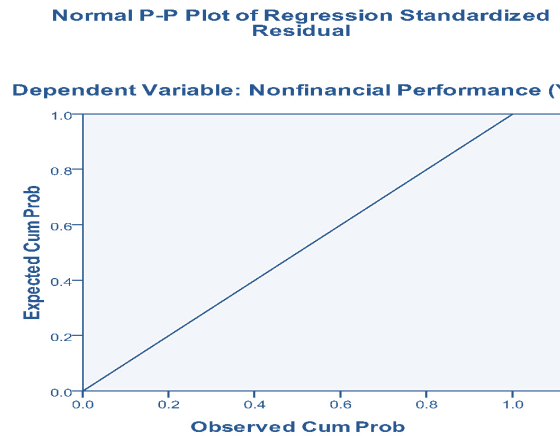


Figure 2 show the outputs of SPSS that shows the normal probability plots in the figures that show how the points are spread close to the diagonal line. This situation show that the Normality Assumption is met.

Assessment of Multicollinearity. To check whether there is a multicollinearity between variables, it must be seen from the test results that shows the value of Variance Inflation Factor (VIF). VIF value of more than 10 indicates that multicollinearity is happening between the independent variables (Stevens 2009).

Table 5. Multicollinearity Test for Regression Equations Non-Financial Performance

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Lending (X1)	.883	1.133
	Funding (X2)	.346	2.887
	Capital (X3)	.630	1.587
	Human Resource (X4)	.200	5.000
	Asset Management Liability (X5)	.501	1.995

Source: Results of the Researcher's Processed Data (2017)

Table 5 shows that the VIF value of the independent variables are between 1 and 10. So, it can be concluded that there is no multicollinearity among the variables. Table 5 shows that the VIF value of the independent variables are not greater than 10. So, it can be concluded that there is no multicollinearity among the variables.

Assessment of Autocorrelation. Autocorrelation test is used to test for the presence of autocorrelation in residuals. Autocorrelation means that adjacent observations are correlated, and if it is correlated, then least-squares regression underestimates the standard error of the coefficients of the predictors. Assumptions about the independence of the residual (non-autocorrelation) can be tested using the Durbin-Watson test (Field 2009). Statistical value of Durbin-Watson test ranges between 0 and 4. Field (2009) with a value 2 meaning that the residuals are uncorrelated". The size of the Durbin-Watson statistics depends upon the number of predictors in the model and the number of observations. For accuracy, an exact acceptable value in Durbin and Watson's (1951) original paper is values less than 1 or greater than 3 are cause for concern; however, values closer to 2 may still be problematic depending on your sample and model.

Non-Financial Performance

Table 6 shows that the Durbin-Watson statistic value of the dependent variable is 2.023. Those result is close to two which is between 1 and 3. Therefore we can conclude that the assumption of non-autocorrelation is met. In other words, there is no symptoms of autocorrelation in residuals

Table 6. Autocorrelation test for Regression Equation: Non-Financial Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.754 ^a	.568	.543	.300949	2.023
a. Predictors: (Constant), Asset Management Liability (X5), Lending (X1), Funding (X2), Capital (X3), Human Resources (X4)					
b. Dependent Variable: Nonfinancial Performance (Y2)					

Source: Results of the Researcher's Processed Data (2017).

Assessment of Heteroscedasticity. Detection of the presence or the absence of heteroscedasticity can be done with the Glejser test (Gujarati 2004). The Glejser test for heteroscedasticity regresses the residuals on the explanatory variable that is thought to be related to the heteroscedastic variance. Here are the results based on test Glejser.

Non-Financial Performance

Table 7. Heteroscedacity Test Using Glejser Test for Regression Equation: Non-Financial Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.752	.296		2.541	.013
	Lending (X1)	.036	.070	.056	.518	.606
	Funding (X2)	-.089	.069	-.219	-1.280	.204
	Capital (X3)	-.016	.058	-.034	-.272	.787
	Human Resource (X4)	-.120	.124	-.219	-.972	.334
	Asset Management Liability (X5)	.050	.035	.199	1.398	.166
a. Dependent Variable: abs_residual_Glejser_Y2						

Source: Results of the Researcher's Processed Data (2017).

Table 7 shows that all glejser test results for the five independent variables are above the significant value 0.05. The results conclude that there is no Heteroscedascity.

Hypotheses Testing. In hypothesis testing, there will be calculated the coefficient of determination, testing the partial regression coefficient significance overall or simultaneous (test F), and partial regression coefficient significance test individually (t test).

Determination Coefficient Analysis. The coefficient of determination (R²) is a value which measures how much the ability of independent variables used in the regression equation in explaining the variation of the dependent variable (Gujarati 2003). The coefficient of determination should be between 0 and 1. A small coefficient (close to zero) of the value of determination R² means that the ability of the dependent variables simultaneously in explaining that the variation of dependent variables is very limited. A coefficient of determination R² that is close to 1 means that the independent variables have provide almost all information needed to predict the variation of the dependent variable.

Non-Financial Performance

Table 8. Determination Coefficient for Regression Equation: Non-Financial Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.754 ^a	.568	.543	.300949	2.023
a. Predictors: (Constant), Asset Management Liability (X5), Lending (X1), Funding (X2), Capital (X3), Human Resources (X4)					
b. Dependent Variable: Nonfinancial Performance (Y2)					

Source: Results of the Researcher's Processed Data (2017).

Table 8 shows that the coefficient of determination (R-Square) is 0,568, and this means that the effect of lending, funding, capital, human resources, asset management and liability of the non-financial performance is 56.8%.

Partial Regression Coefficient Significant Test (F test). In general, an F-test in regression compares the fits of different linear models. Unlike t-tests that can assess only one regression coefficient at a time, the F-test can assess multiple coefficients simultaneously. The F-test of the overall significance is a specific form of the F-test. It compares a model with no predictors to the model that you specify. A regression model that contains no predictors is also known as an intercept-only model. The next table shows the results as follows:

Non-Financial Performance

Table 9. The Simultaneous Test Effect on Regression Equations Non-Financial Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.240	5	2.048	22.612	.000 ^a
	Residual	7.789	86	.091		
	Total	18.029	91			
a. Predictors: (Constant), Asset Management Liability (X5), Lending (X1), Funding (X2), Capital (X3), Human Resources (X4)						
b. Dependent Variable: Nonfinancial Performance (Y2)						

Source: Results of the Researcher's Processed Data (2017)

Table 9 shows that the significant value obtained from the test for non-financial performance is 0.000, which is smaller than 0.05. The results concluded that all independent variables simultaneous has a significant relation with the non-financial performance variable.

Multiple Linier Regression Analysis and Partial Regression. The t-test assesses whether the means of two groups are statistically different from each other. This analysis is appropriate whenever you want to compare the means of two groups, and especially appropriate as the analysis for the post test-only two-group randomized experimental design. To test the significance, you need to set a risk level (called the alpha level). In most social research, the "rule of thumb" is to set the alpha level at 0.05. The t test results are as follows:

Table 10. Significance Test of Individual Regression Coefficient Individual for Nonfinancial Regression Equation Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.301	.444		.678	.500		
	Lending (X1)	.304	.105	.218	2.895	.005	.883	1.133
	Funding (X2)	-.205	.104	-.238	-1.978	.051	.346	2.887
	Capital (X3)	-.066	.086	-.068	-.766	.446	.630	1.587
	Human Resource (X4)	.780	.185	.668	4.212	.000	.200	5.000
	Asset Management Liability (X5)	.129	.053	.243	2.428	.017	.501	1.995
a. Dependent Variable: Nonfinancial Performance (Y2)								

Source: Results of the Researcher's Processed Data (2017)

On the basis of Table 10, it can prepare the regression equation and further it can sum up the results of the hypothesis testing for variable dependent Non-Financial Performance, as follows. The regression equation:

$$Y2 = 0,301 + 0,304X1 - 0,205X2 - 0,066X3 + 0,780X4 + 0,129X5 + e$$

The results of hypotheses testing relating to dependent variable Non-Financial Performance, are as follows: Testing of the hypotheses on the relationship between lending, funding, capital, human resource, and asset liability management variables with non-financial sustainability found that all the independent variables were significant except for Capital.

3.3.2. Discussion

Lending and Sustainability. On the other hand, the relationship between lending and non-financial sustainability is positive and significant. This is not consistent with the study of Nugraha and Marino (2013), where they found that there is no relation between lending and non-financial sustainability. Credit distributed by banks in Indonesia is one of the factors that can promote economic growth. Nugraha and Marino (2013) in their study found that there is no relationship between lending and economic growth in Indonesia. So it can be said that bank lending is done less successful in creating economic growth in Indonesia. This is due to high credit growth is apparently occurring in consumer loans compared to the growth of productive loans (working capital and investment). This fact has caused the real sector economy is less successful in the creation of employment opportunities more widely. Provision of credit by banks in Indonesia should pay attention to the sustainability of the environment. However, in practice, only large banks that pay attention to the rules relating to the environment. Loan disbursement can become a problem when those loans are used for business or events that ultimately lead to or cause pollution or have a damage to the environment. Rural banks until now are still not able to observe and analyse the environmental impact of the distribution of loans to MSMEs. Rural banks generally are focussing on financial performance (Rouf 2012).

Funding and Sustainability. The relationship between funding and financial sustainability is positive and not significant. This result is not supported by Sekabira (2013) and Sukma (2013) who found that third-party funds are negatively correlated to non-financial sustainability. Yuniarty (2012) also found that third party funds in the form deposits and saving has significant on the operating sustainability of BPRs in West Java. Data in Table 5 shows that the trend of funding in the Indonesian rural banks is increasing on an average of 22.04% per year. This means that the trust of the public is also increasing. Unfortunately, the relationship with sustainability is not seen, because the market share of funding to the total funding in the banking system is only on average 1.49%. This might be due to the characteristic of microfinance institutions where the members or clients of the banks are coming from middle-low class income.

Capital and Sustainability. The relationship between capital and non-financial sustainability in this study is not significant. No empirical related studies on capital and non-financial performance of studies were found in the knowledge of the researcher. Worokinasih (2013) in her study on the performance of rural banks in Indonesia has argued that there are still challenges for rural bank to strengthen the performance. According to her, rural banks should be consistent in serving customers with the socio-cultural approach which could produce loyalty from clients (Situmorang *et al.* 2017). Further, strong personal relationships with its customers is an advantage for the bank. Rural bank is able to provide financial as well as non-financial service by face to face. BPR is also able to adjust the conditions, customs, culture and the life of the surrounding community. The transaction cost theory on the other hand, posits that MFI that use of Equity as a source of funding will enable MFIs to meet the microfinance promise. Reliance on capital is beneficial along two dimensions: outreach and efficiency. Capital is the cheapest fund for BPRs to respond to the profit incentive, working to increase revenues and decrease expenses so that they can have revenues sufficient to cover all operating expenses.

Human Resource and Sustainability. The relationship between human resource and non-financial sustainability is positive and significant. The result of this study is supported by Yunanto, Sarma, and Kadarisman (2015) who found that credit processing services, promotional services and public services as a human resource function jointly and individually has a significant effect on non-financial performance. Further, Wiriani, Piatrini, Ardana and Juliarsa (2010) found that the primary effect of the level of training to performance is significant. The performance of a group of employees who received training frequency that is more than group of employees who receive fewer training frequency is significantly different. The performance of a group of employees with high frequency training achievement scores showed higher performance than the group of employees with lower training frequencies. The human resource theory mentions that human resource management is relating with strategies, tactics and objective of business owners to administer policies and procedures relating to the management of employees. The objective of the theory is that business owners are able to manage cost effectiveness of organisations. This theory has supported the results of the study of human resource and non-financial sustainability.

The paper discovers that some of the factors that have affected the sustainability of microfinance institutions in Nigeria include poor skills development and lack of business initiative among the potential clients of the institutions, poor staff development, utilization and compensation in the institutions themselves and ineffective supervision and control of operators by the regulatory authorities. It is therefore, recommended among others actions that sustainability in the sector should preeminently concentrate efforts in capacity building of the poor,

improvement of supervision and regulation by monetary authorities and ensuring proper employee development, utilization and compensation. These recommended actions must be collaborated by the key stakeholders whose roles were analysed. The paper discovers that some of the factors that have affected the sustainability of microfinance institutions in Nigeria include poor skills development and lack of business initiative among the potential clients of the institutions, poor staff development, utilization and compensation in the institutions themselves and ineffective supervision and control of operators by the regulatory authorities. It is therefore, recommended among others actions that sustainability in the sector should preeminently concentrate efforts in capacity building of the poor, improvement of supervision and regulation by monetary authorities and ensuring proper employee development, utilization and compensation. These recommended actions must be collaborated by the key stakeholders whose roles were analysed.

Asset Liability Management and Sustainability. Asset liability management is the management of the total balance sheet dynamics and it involves quantification of risks and conscious decision-making with regard to asset-liability structure in order to maximise the interest earnings within the framework of perceived risks. The primary objective of asset liability management is not to eliminate risk, but to manage it in such a way that the volatility of net interest income is minimised in the short run and economic value of the organisation is protected in the long run.

Conclusions and Suggestions

The result demonstrates that the relationship of lending, funding, human resource and asset liability management to non-financial sustainability is significant. Whereas the relationship between capital and non-financial sustainability is not significant.

Limitation of the Research. The limitations of this study are the number of samples collected for this study. The number of BPRs in Indonesia are 1643 companies scattered in 33 provinces in Indonesia. For this study, 385 questionnaires have been sent, but only 93 BPR questionnaires were obtained, which is only 24% of the sample. So the empirical results of the study still could be questioned. In addition, this study uses data from one year and not longitudinal data. Hence, the study cannot obtain specific changes in the institutional and economic environment of BPRs in Indonesia that can affect the relationship of the independent and the dependent variables of the study.

Theoretical Contributions. The study on the relationship between lending, funding, capital, human resource, asset liability management and sustainability of Indonesian BPRs is important. This is because it adds the source of knowledge in the field of microfinance institutions. This study has identified the relationship between lending, funding, capital, human resource, and asset liability management to sustainability (financial and non-financial). Further the study has confirmed the support of the transaction theory on the relationship of lending, funding, capital and asset liability management with sustainability. The support of human resource theory to the relationship of human resource and sustainability is also confirmed. This research is expected to enrich the knowledge of banking especially in rural banking that serves MSMEs located in suburban and rural areas. The study of lending, funding, capital, human resources and asset liability management and the sustainability of BPRs are very important not only for academicians but also for practitioners in their decision-making process.

Practical Contributions. This study is expected to enrich the knowledge on the banking industry especially for rural banks who serve the poor community in the rural areas. This study is very important to the practitioners in their decision making process. The study found that lending has a positive and significant relationship with sustainability (financial) which is very important to BPRs to become financially sustainable. Lending for BPRs are the main resource for income generating. The study also found that human resource is very important for BPRs. Human resource has a positive and significant effect on non-financial sustainability.

Policy Makers. The result of this study is also important for policy makers in countries where micro finance has a role in the development of micro, small and medium enterprises (MSMEs). In Indonesia, OJK has the function to foster and oversee all BPRs. Therefore, the results of this study will help them in the necessary settings associated with lending, funding, capital, human resources and asset liability management.

Research Implications. In this study, the relationship between lending, funding, capital, human resource, asset liability management and sustainability (financial and non-financial) is empirically tested. The study has collected data from 93 BPRs (rural banks) in Indonesia. The collected data has been processed using smart PLS and has produced two results for every hypothesis (in total five hypotheses). Hence, the empirical findings in this study shed light on the role of lending, funding, capital, human resource, asset liability management relating to sustainability (financial and non-financial). The results also offer insights to banking institutions and policy makers who are interested in improving the sustainability of small banks (BPRs).

Future Research Direction. On the knowledge of the researcher, the research on BPR not been much done and publicized, and so far, many researchers focus only on financial performance of BPRs. However, there are many opportunities on topics that can be studied with regard to BPRs. Especially for researchers in Indonesia, BPR is an important financial institution within the financial system in Indonesia dealing with micro and, small and medium enterprises in the outskirts of major cities in Indonesia. Besides lending, funding, human resource and asset liability management, this research can further extend on risk management and corporate governance. Studies can also be directed to include the role of OJK in overseeing and fostering rural banks in Indonesia, whether as an independent variable, or as a mediating or moderating variable. Studies related to BPRs can enrich the knowledge of academicians in the field of microfinance, practitioners who are working in the small banking sector and for regulators who are interested in the industry.

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Evaluation of the Investment in Combined Stock Markets under Co-Integration and Diversification Benefit: The Case of Southeast Asian Markets

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Abstract:

Concerning the ASEAN linkage idea to pool ASEAN capital market together, this paper examines the insight benefit of the combination of Emerging Markets from the 5 original Association of Southeast Asian Nation (ASEAN) countries including Indonesia, Malaysia Philippine, Singapore, and Thailand. The 10 years' data of the daily returns from these markets during 2007 to 2017 was investigated. The association analysis discovers the risk diversification benefit from the low or negative correlation among these countries' stock market returns. However, investors cannot fully obtain diversification benefit in the long run. The co-integration test indicates the existence of the long run relationship among the returns of these ASEAN stock markets.

Keywords: ASEAN linkage; capital market; emerging market; co-integration; association analysis; diversification

JEL Classification: E22; F36; G15

Introduction

The establishment of the ASEAN Economic Community (AEC) in 2015 brings about stronger collaboration of the Association of South East Asian Nations (ASEAN) countries and leads to the integration of capital markets to pool the funds to support the growth of this region. For investors, the more accessibility to the investment in stocks of different ASEAN markets together should generate the higher possibility to earn superior risk diversification benefit at lower transaction cost. The first attempt started by pulling the three stock markets including Malaysia, Singapore, and Thailand together through the network called ASEAN Trading Link in 2011. At the present, with the better technology, the integration directly carries on under brokerage firms' network.

However, the process of regionalization may lower the degree of the geographic segmentation and create the hindrance of the risk diversification. This study investigates the investment in the stock markets of five ASEAN countries, including Indonesia, Malaysia, Philippine, Singapore, and Thailand under correlation analysis and co-integration test to gain more information on diversification benefit from these markets' integration in the long run. The research results would provide academic knowledge and evidences on the topic of market efficiency and the advantages of regional diversification. This in-depth knowledge would help investors to build portfolios with more appropriate strategies for the investment in ASEAN countries and provide evidence for the policy makers to build more effective policy on capital market to support the economic growth for this region.

1. Literature Review

The high attention on the integration of stock markets brings about many studies in this area. Nevertheless, to make these documented studies meaningful and useful for this research examination, these researches are classified into the three groups; International Diversification, Segmentation, and Long-run relationship or co-integration among the stock markets.

The idea of risk diversification has widely been examined and developed further by many scholars since it was introduced by (Markowitz 1991) which recommended investors to put different assets in their portfolios to reduce their overall risk. One extensively extended issue is associated to enhancing risk reduction by moving toward the investment in other different foreign countries. As each country's economic fundamentals are not exactly the same, its economic growth tends to be different from each other. For international diversified

investors, poor investment performance from one country could be offset by superior investment performance in other countries. Empirically, many researches, for examples, Grubel (1968), Levy and Sarnat (1970), Solnik (1974) provide the supportive evidences for the risk reduction through this international diversification. The later paper such as Li *et al.* (2003), Mayer and Rose (2003), Eun and Resnicke (1994) still confirms this worldwide investment idea with similar conclusion.

In contrast, many studies provide evidences against the principle of international diversification benefit. These papers claim that the world markets become less segmented or share more common economic factors and the inclusion of international financial instruments might not create high benefit to investors. For example, Shawky *et al.* (1997) reports the evidence against the benefit of risk reduction from adding up the international investment. Rajan and Friedman (1997) informs that the high correlation of the world markets is the reason for the low international diversification's advantage. Carrieri *et al.* (2004) recommend investors to adjust portfolio by considering cross-industry diversification to improve the investment performance. Kashefi (2006) and Yang *et al.* (2006) suggest that the international diversification advantage is decreasing as the world stock markets become less divided.

The stock markets' co-integration is another important issue related to the investment in the combined market. The tied economics of ASEAN countries might create some common trends for these countries' economies. Accordingly, the possibility for the co-movement of these countries' stock markets could be high and if it is so, the diversification benefit for those who diversify their portfolio investment from an ASEAN market to another market in the same region might not be as high as they expect. Chan *et al.* (1992) advises that risk reduction through international diversification is less effective when markets are co-integrated and according to Engle and Susmel (1993), the markets in the same region might share more common factors which lead their performances to be co-integrated. Chan *et al.* (1997) also suggests that the co-integration test could be applied to find whether there is common stochastic trend for these markets and reports the evidences showing that the co-integration exists only in a few stock markets. Hung and Cheung (1995) finds low co-integration among the tested ASIA's stock markets.

For the long-run relationship test, co-integration is an approach which is widely recognized and used by several researches, for instances, the study of the relationship between stock indices and exchange rates by Abdalla and Murinde (1997) and Amare and Mohsin (2000). There are many techniques which could be applied for this relationship effectively, for example, Engle and Granger (1987)'s co-integration method and *etc.* Nevertheless, Johansen (1998) and Johansen (1991)'s co-integration test is recognized as one of the useful and efficient techniques. This method is developed from Engle and Granger's co-integration and can be used to test for the co-integration of more than two variables at the same time. Hence, it is more applicable for the test of the long-run relationship among many stock markets together.

2. Methodology

This paper obtains 10 year daily return from stock market indices gross dividend ($R_{i,t}$) of Indonesia, Malaysia, Philippine, Singapore, and Thailand during July, 2007 to June 2017 for the analysis. The daily returns of each market are calculated as follows:

$$R_{i,t} = \Delta \ln I_{i,t} \quad (1)$$

where: $I_{i,t}$ is stock market index of country i at time t .

Then, Pearson's correlation coefficients of the returns (Corr) from each pair of these markets is calculated to examine the risk diversification potential by using the following equation:

$$Corr = \frac{\sum_{t=1}^n (R_{i,t} - E(R_i))(R_{j,t} - E(R_j))}{\sqrt{\sum_{t=1}^n (R_{i,t} - E(R_i))^2} \sqrt{\sum_{t=1}^n (R_{j,t} - E(R_j))^2}} \quad (2)$$

where: $E(R_i)$ denotes the expected daily return or average daily return of country i and $E(R_j)$ is the expected daily return or average daily return of country j .

Next, Johansen's co-integration technique is applied to investigate the existence of long-run diversification from combing these markets together because this method can be efficiently applied to examine the co-integration of more than two markets at the same time.

Under this method, the data must be tested for their unit root property to avoid spurious result. The unit root test is done by applying Augmented Dickey Fuller Test under regression model without trend and drift, regression model with drift, and regression model with trend and drift by using the following equation:

$$\Delta \ln I_t = \alpha + \beta t + \pi \ln I_{t-1} + \sum_{j=1}^n \gamma_j \Delta \ln I_{t-j} + \epsilon_t \quad (3)$$

where: $\Delta \ln I_t$ is the first difference of stock market index of country i at time t . $\Delta \ln I_{t-j}$ is the lagged difference of stock market index time series. α represents the drift, t is time trend and ϵ_t is the error term.

The Augmented Dickey Fuller statistic test is applied to the null hypothesis (H_0) that π equals to zero. The time series data is non-stationary or has unit root when the ADF statistic values are higher than McKinnon's critical values (p-value is less than 10%) or the null hypothesis is failed to reject. Accordingly, the test on the difference of the time series data must be applied. The data will be meaningful when the time series has no unit root otherwise the next difference must be found and test until there is no unit root contained in the data.

Then, Johansen (1988) technique is applied to examine the long run relationship of the return of ASEAN stock markets under multiple co-integrating vectors. The association between the rank of a matrix and its characteristic roots (Eigen values) is tested according to the following equation:

$$\Delta x_t = A_0 + \pi x_{t-1} + \pi_1 \Delta x_{t-1} + \epsilon_t \quad (4)$$

where x_t represent the vector, $\ln I_{i,t}$ and ϵ_t is the error term.

Next, the number of characteristic roots that is insignificantly different from unity is investigated under the one of the following two statistic equations.

$$\lambda_{trace}(k) = -T \sum_{i=t+1}^n \ln (1 - \hat{\lambda}_i) \quad (5)$$

$$\lambda_{max}(k, k + 1) = -T \ln (1 - \hat{\lambda}_{k+1}) \quad (6)$$

where: k represents the number of the applicable observations and $\hat{\lambda}_i$ represents the number of the characteristic roots being estimated.

The null hypothesis used for the first equation is that the number of co-integrating vectors is less than or equal to k against a general alternative and null hypothesis used for the second equation is that the number of co-integrating vectors is k in opposition to the alternative of $k+1$ co-integrating vectors.

3. Findings

Descriptive Analysis

The descriptive statistic analysis of the ASEAN markets' daily return during July 2007 to June 2017 provides interesting information. Table 1 uncovers that in general ASEAN stock markets follow the rule of risk-return tradeoff. Indonesia's stock market provides the highest average daily return at 0.052%/day and has the highest risk with the highest standard deviation of 1.395% per day. Singapore market gives the lowest return of 0.009% per day and has the standard deviation of 1.194%, the second lowest next to Malaysia market. Malaysia stock index's standard deviation is lowest at 0.761% per day however its return is in the middle of the group at 0.025%. Philippine and Thailand markets' indices are rather similar in their average returns at 0.043% and 0.044%. Their variation is also very close at the standard deviation of 1.293% and 1.270% consecutively. In addition, all ASEAN market's return distributions are not normal. The markets return skews to the left with high kurtosis.

Table 1. Descriptive statistics of daily return from the stock indices of Indonesia, Malaysia, Philippine, Singapore, and Thailand during July, 2007 to June, 2017.

	Indonesia	Malaysia	Philippine	Singapore	Thailand
Mean	0.052%	0.025%	0.043%	0.009%	0.044%
Standard Deviation	1.395%	0.761%	1.293%	1.194%	1.270%
Kurtosis	7.80	16.68	9.46	11.66	7.50
Skewness	-0.64	-1.05	-0.70	-0.31	-0.64
Range	18.58%	14.71%	23.49%	21.28%	18.64%
Minimum	-10.95%	-9.96%	-13.09%	-12.93%	-11.09%
Maximum	7.62%	4.75%	10.40%	8.35%	7.55%
Sum	127.56%	61.63%	106.07%	23.04%	108.09%
Count	2444	2444	2444	2444	2444

Source: The Bank of Thailand and Reuter Database

Correlation Analysis

Table 2 and Table 3 exhibit the correlation of the daily stock indices and daily returns of the stock markets from Indonesia, Malaysia, Philippine, Singapore, and Thailand during July, 2007 to June, 2017. At the first association test, these stock markets appear to be highly correlated. The correlation coefficients of stock indices of these stock markets is very high in the range of 0.8447 for the pair of Singapore and Philippine to 0.9763 for the pair of Indonesia and Malaysia. However, when the daily returns are investigated, the view on the co-movement of ASEAN stock markets turns to be opposite. The result obviously shows that these stock markets do not really move together. The lowest correlation coefficient is the pair of Indonesia and Singapore at -0.0282 and the highest coefficient is between Singapore and Thailand at 0.5850. According to the rule of diversification, investors could reduce their risk if their portfolios include the investment in these markets together.

Table 2. Pairs of Correlation Coefficients among the Daily Stock Indices of Indonesia, Malaysia, Philippine, Singapore, and Thailand during July, 2007 to June, 2017.

	Indonesia	Malaysia	Philippine	Singapore	Thailand
Indonesia	1.0000	0.9763	0.9759	0.8695	0.9858
Malaysia	0.9763	1.0000	0.9633	0.8928	0.9753
Philippine	0.9759	0.9633	1.0000	0.8447	0.9856
Singapore	0.8695	0.8928	0.8447	1.0000	0.8769
Thailand	0.9858	0.9753	0.9856	0.8769	1.0000

Source: The Bank of Thailand and Reuter Database

Table 3. Pairs of Correlation Coefficients among Daily Returns from the Stock Indices of Indonesia, Malaysia, Philippine, Singapore, and Thailand during July, 2007 to June, 2017.

	Indonesia	Malaysia	Philippine	Singapore	Thailand
Indonesia	1.0000	-0.0165	0.0472	-0.0282	-0.0043
Malaysia	-0.0165	1.0000	0.0300	0.5564	0.4607
Philippine	0.0472	0.0300	1.0000	-0.0205	0.0299
Singapore	-0.0282	0.5564	-0.0205	1.0000	0.5850
Thailand	-0.0043	0.4607	0.0299	0.5850	1.0000

Source: The Bank of Thailand and Reuter Database

Co-integration Analysis

Co-integration examination on the long-run relationship of ASEAN stock markets consists of two part; unit root test and Johansen's co-integration test.

Unit Root Test

From the results of unit root tests in Table 3, the Augmented Dickey Fuller (ADF) test fails to reject the null hypothesis of unit root at one percent significance level. Hence, all 5 ASEAN stock markets' total return indices have unit root at level or $I(0)$. In other words, they are not stationary. However, when the ADF test is done at first difference or $I(1)$ of these indices, the indices become stationary at one percent significance level. Consequently, this study applies the returns of these indices, $I(1)$, for the co-integration test.

Table 4. Results from Unit Root Tests of Total Return Indices of the Stock Markets of 5 ASEAN Countries including Indonesia, Malaysia, Philippine, Singapore, and Thailand

Test		ADF Test									
		Indonesia		Malaysia		Philippine		Singapore		Thailand	
		t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value	t-stat	p-value
Level	None	1.927	0.9875	1.571	0.9719	1.469	0.9653	0.386	0.7958	1.759	0.9815
	Intercept	-0.320	0.9196	-0.4532	0.8976	0.264	0.9277	-0.952	0.7718	-0.318	0.9199
	Trend and Intercept	-2.425	0.3664	-2.987	0.5522	-3.098	0.1070	-2.477	0.3399	-2.253	0.4591
First Level	None	-30.941	0.0000*	-45.262	0.0001*	-45.474	0.0001*	-47.784	0.0001*	-47.050	0.0001*
	Intercept	-31.041	0.0000*	-45.313	0.0001*	-45.313	0.0000*	-47.780	0.0001*	-47.050	0.0001*
	Trend and Intercept	-31.039	0.0000*	-45.307	0.0000*	-45.307	0.0000*	-47.790	0.0000*	-47.108	0.0000*

Note: * 1% significance level (MacKinnon (1996) one-sided p-value)

Source: The Bank of Thailand and Reuter Database

Since the unit root test in the prior step confirms that the first level of the total return indices of the 5 ASEAN countries is stationary, Johansen's co-integration could be done in the next step meaningfully.

Johansen's co-integration test

Johansen's co-integration test is applied under Trace Statistic and Maximum-Eigen Statistic with one lag length. The statistic analysis includes the trend for the total return indices of the stock markets of Indonesia, Malaysia, Philippine, Singapore, and Thailand to reflect the economic growth of these countries in the long-run. The report from both Trace and Maximum-Eigen approaches in Table 5 uncover the same results that, at the 0.05 level of significance, there are 2 co-integrating equations for the total return of stock indices from all ASEAN countries. This evidence confirms that there exists a long-run relationship of these 5 ASEAN stock markets. In other words, the economic integration of these 5 ASEAN countries, perhaps, makes them be more alike.

Table 5. The Outcomes from Johansen's Co-integration Rank Test - Trace and Co-integration Rank Test - Maximum-Eigen Statistic on Total Return Indices of the Stock Markets of 5 ASEAN Countries including Indonesia, Malaysia, Philippine, Singapore, and Thailand.

Hypothesized no. of CE(s)	Eigenvalue	Co-integration Rank Test - Trace Statistic			Co-integration Rank Test – Maximum-Eigen Statistic		
		Trace Statistic	Critical Value (5%)	Prob. **	Max Eigen Statistic	Critical Value (5%)	Prob. **
None*	0.030006	125.6674	69.81889	0.0000	74.39716	33.87687	0.0000
At most 1*	0.012685	51.27026	47.85613	0.0231	31.17429	27.58434	0.0165
At most 2	0.004723	20.09596	29.79707	0.4164	11.56007	21.13162	0.5914

Note: *Denotes rejection of the hypothesis at the 5% significance level; **Mackinnon-Haug-Michelis (1999) p-values

Conclusion

The problem of real estate investment on the lack of investment tools is less significant since there are many types of real estate investment available for investors in many markets. This study analyses the relative performance of different types of real estate and real estate securities investment by using mean-variance and stochastic dominance techniques to provide more information to investors to use in improving their portfolio.

This paper's purpose is to study the impact of the combined stock markets under co-integration and diversification benefit by investigating the Southeast Asian emerging markets. The total return of stock indices from 5 ASEAN countries including Indonesia Malaysia, Philippine, Singapore, and Thailand are examined by using correlation analysis, unit root test, and Johansen's co-integration techniques.

The correlation analysis indicates that there is room to reduce risk by building portfolio which pools stocks of these 5 markets together since the correlation coefficients for these countries are rather low. The maximum coefficient is the pair of Singapore and Thailand at 0.5850 while the lowest coefficient is the pair of Indonesia and Singapore at -0.0282. However, after running unit root test and examining in-depth for the long-run co-movement of the total return indices, the outcome from the analysis indicates the existence of the long-run co-integration among these 5 ASEAN stock markets.

The research results are very instructive in many aspects. The existence of co-integration among the studied markets implies that though the low correlation among the total return indices indicates that investors might receive diversification benefit from adding stock from other countries in their portfolio, the risk reduction benefit might not be high if they hold the same portfolio in the long-run. The evidence also supports for the existence of market efficiency. The stock market performances of these countries reflect their economic integration by becoming more directly related. For AEC policy makers, the co-integration evidence suggests that Association of South East Asian Nations (ASEAN) becomes more integrated. Change of economic condition in a member could affect other members too. A policy for the group should be made carefully.

Nonetheless, there are some limitations on this study. The data during the world economic crisis in 2008 might distort the result. The negative impact when the crisis occurred and the positive impact during the recovery time may bring about over direct co-movement. The repeated studies should be done by focusing on the data during the normal period and expand to another economic integrated region.

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Corporate Governance Mechanisms in Preventing Accounting Fraud: A Study of Fraud Pentagon Model

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Abstract:

This research is aimed to identify whether financial targets, ineffective monitoring, change in auditor, change in direction and arrogance on accounting fraud and analyse the moderating effect of corporate governance mechanism on fraud pentagon model. This research compile data of 12 companies of fraud and non-fraud 32 companies listed on the Indonesian Stock Exchange during 2012-2016. The researcher uses logistic regression, the results of this study shows that risk factors in perspective fraud pentagon that significantly affect the accounting fraud are only a change in direction. As a moderating variable, corporate governance mechanisms ownership is only institutions which able to weaken the relationship of change in direction in the accounting fraud.

Keywords: corporate governance mechanism; accounting fraud; fraud pentagon

JEL Classification: G32; G34; M41

Introduction

The financial statements become one of the forms of corporate communication tools regarding financial data or operational activities of the company to the users of financial information. Users of financial information include: the management, employees, investors, creditors, suppliers, customers, and government. Companies can show their performance improvements over a period of time through financial reporting, but in fact there are many deviations such as number manipulation, disclosure, mark-up, and eliminating data in the presentation of financial statements. Performance results contained in the financial statements more aims to get the impression of "good" from various parties. Encouragement or motivation to always look good by various parties often force companies to manipulate in certain parts, so that ultimately presents information that is not appropriate and will harm many parties. Fraud by companies such as manipulating financial statements is often called accounting fraud. The behaviour of irregularities in the presentation of financial statements is an example of accounting fraud.

According to the Indonesian Institute of Accountants (IAI 2011), the accounting fraud as: (1) Misstatements arising from fraud in financial reporting are misstatements or deliberate omission of amounts or disclosures in financial statements to trick users of financial statements, (2) misstatements arising from undue treatment of an asset (often referred to as misappropriation or embezzlement) relating to the theft of an entity's

assets resulting in a financial statement not presented in accordance with generally accepted accounting principles in Indonesia. Not stopping in ENRON's case, the recent accounting fraud case was also able to attack a technology company that has stood for 140 years, Toshiba Corporation. This case began to unfold since July 2015, Toshiba proven to do the inflation of 151.8 billion ¥ profit or equivalent to 1.22 billion USD in five years. This is quite unfortunate by many parties, good corporate governance, reputable corporate reputation is not enough to make a company classmate Toshiba really clean of the fraud. The case of fraud experienced by Toshiba impact on the resignation of Toshiba CEO, Hisao Tanaka and followed by two other senior executives.

In addition to the fraud diamond theory that continues from the fraud triangle theory, Crowe (2011) also helped refine the theory that triggered by Cressey. Crowe found a study that the element of arrogance also contributed to the occurrence of fraud. Crowe's research also includes fraud triangle theory and competence elements in it, so that the fraud model found by Crowe consists of five elements of indicators namely pressure, opportunity, rationalization, competence, and arrogance. The theory presented by Crowe in 2011 is named with Crowe's fraud pentagon theory.

This study is a study that applies Crowe's fraud pentagon theory. This is done because the theory is a renewable theory that had not previously been applied to researching fraudulent financial reporting, especially in Indonesia, and the fraud indicator described in Crowe's fraud pentagon theory is much more complete than previous similar theories such as the theory of fraud triangle and fraud diamond. The elements in Crowe's fraud pentagon theory cannot simply be researched and thus require variable proxies. Proxies that can be used for this research include pressure proxied with, financial targets, financial stability, external pressure, and institutional ownership. These are the opportunity proxied by ineffective monitoring and the quality of external auditors; Rationalization proxied by change in auditor; Capability proxied by the change of company directors; and arrogance which is proxied with frequent number of CEO's picture. These five factors are indicated to be the trigger for the increase of fraud, especially in recent years. The desire of the company so that the operational activities of the company is guaranteed going concerned always look good cause companies sometimes take a shortcut (illegal) that is by doing fraud.

This study was conducted because of the background of concern over the rise of cases of financial reporting fraudulent in Indonesia, especially in the financial sector and banking tend to be quite difficult to disclose. Until now, little research has been done to peel the case, especially by using Crowe's fraud pentagon theory. Based on this background, the study was conducted to conduct a more in-depth examination of Crowe's fraud pentagon theory proposed by Crowe (2011), to investigate and provide further explanation whether Crowe's fraud pentagon theory can help to detect a tendency for accounting fraud especially in the financial sector and banking and government sectors in Indonesia.

Based on the results of previous studies indicate the inconsistency of research results related to the perspective of pentagon fraud. First, Financial targets were conducted by Lou and Wang (2009), Anshar (2012), Martantya (2013) and Firmanaya (2014) where the results of his research showed significant influence on accounting fraud. However, research results from Puspitrisnanty and Fitriyani (2014), Skousen *et al.* (2008); (2009) and Sukirman and Sari (2013) showed that ROA has no effect on accounting fraud. Second, ineffective monitoring is done by Skousen *et al.* (2008), Antonia (2008) and Sun and Liu (2013) have significant effect on accounting fraud. Nevertheless, Martantya's (2013), Skousen *et al.* (2009), and Ratmono *et al.* (2013) results show that ineffective monitoring has no effect on accounting fraud. Furthermore, the related rationalization factor is done by Chen and Elder (2007) and Sukirman and Sari (2013) whose research results show significant influence on accounting fraud. However, it is not in line with Firmanaya (2014) and Ratmono *et al.* (2013) where rationalization has no effect on accounting fraud.

Wolfe and Hermanson (2004) clearly explain that the Change in Direction is capable of causing a stress period which opens up opportunities for fraud. Dechow *et al.* (1996) in relation to fraudulent financial reporting investigates the issue of corporate governance structures and the degree of concentration of ownership by insiders. The results showed that when the concentration of ownership owned by the fraud company will be easy to occur. Fraudulent financial reporting also relates to issues of corporate governance structure. Dechow *et al.* (1996) states clearly that the highest level of fraud occurs in companies with no good corporate governance or weak governance system.

Arrogance is a behaviour of superiority and greed within someone who believes that internal control is not applied to him (Horwath 2011). Arrogance is usually more directed to a person who has a higher position in a company. A study by Tessa and Harto (2016) suggests that a CEO tends to be more willing to show everyone the status and position he has in the company because they do not want to lose that status or position. In research by Tessa and Harto (2016) it is also obtained the results of research on the influence of arrogance against the

detection of fraudulent financial statement. Where is argued that arrogance variables with proxy number of CEO photos contained in a financial report significantly affect the detection of fraudulent financial statement.

In this study intends to examine and analyze the role of corporate governance mechanisms in preventing accounting fraud in the perspective of pentagon fraud by Crowe (2011). Corporate governance mechanisms can be used by companies to align ownership and management interests. Corporate governance mechanisms are needed in monitoring, controlling and managing where a means is used to weaken accounting fraud. Corporate governance mechanisms focused on the owners of these companies will certainly prevent accounting fraud. Thus, a strong corporate governance mechanism will weaken the risk factors for accounting fraud. Research on accounting fraud has been done but the results are still not established yet. There are different research results so that it becomes interesting and encourage the testing done in the next research. This study was motivated based on previous studies and the results of previous studies still have inconsistent results.

Based on the phenomenon and research gap, where the inconsistency of research result motivates the researchers and it is interesting to do further research. This study considers the mechanism of corporate governance as a moderating variable to bridge the research gap. The research question is whether corporate governance mechanisms can prevent accounting fraud in the perspective of pentagon fraud. To analyse the fraud indicator in Crowe's fraud pentagon theory which consists of the effect of financial targets, ineffective monitoring, change in auditor, change in direction, arrogance on accounting fraud (2) To analyse the effect of corporate governance mechanism on financial targets, ineffective monitoring, change in auditors, change in direction and arrogance on accounting fraud.

1. Research Background

According to Jensen and Meckling (1976) explained that the occurrence of agency problems is the result of a contract between the principal and the agent. In practice, corporate managers who act as agents with responsibilities increase the profits of the owners, but managers also have an interest to maximize their welfare (Yantho and Pramuka 2007). The existence of different interests between principal and agent resulted in conflict of interest. With the conflict of interest is causing a variety of pressure for companies where the company must improve its performance in order to provide rationalization. The potential for fraud can easily occur when management has adequate capability, access and positioning (capability) and strong opportunity and opportunity) in fraudulent accounting.

The company uses agency theory to pursue corporate governance mechanisms. The rise of corporate fraud cases in reporting their financial statements has attracted the attention of many academics and economists to develop various theories which is capable to be used as a reference to detect fraud. One of them is the theory of fraud risk factors that is fraud pentagon. Thus, this research is done by placing corporate governance mechanism as moderating variable to fill and answer research gap on the relation of risk factor to accounting fraud.

Fraud Diamond

Wolfe and Hermanson (2004) add three conditions put forward by Cressey (1953) in the form of factors that influence a person to cheat, with element capability. Wolfe and Hermanson (2004) argue that: "Many frauds, especially some of the multibillion-dollar ones, would not have occurred without the right person with the right capabilities in place. Opportunity opens the doorway to fraud, and incentive and rationalization can draw the person toward it. But the person must have the capability to recognize the open doorway as an opportunity and to take advantage of it by walking through, not just once, but time and time again. Accordingly, the critical question is who can turn on the opportunity for fraud into reality? "

According to Wolfe and Hermanson, fraud is unlikely to occur without a person having the proper ability to carry out such fraud. The capability in question is the nature of individuals committing fraud, which encourages them to seek opportunities and make use of them. Opportunities for entry to fraud, pressure and rationalization can attract a person to fraud, but the person must have a good ability to recognize the opportunity to do the fraud tactics appropriately and get the maximum profit. But none of this will happen without someone who has the ability to recognize opportunities as opportunities and take advantage of them. In 2004 came a fraud theory introduced by Wolfe and Hermanson, a theory they found known as fraud diamond theory. The theory of diamond fraud is a refinement of the theory of fraud triangle. The diamond fraud theory adds capability / capability elements as a fourth element in addition to pressure, opportunity, and rationalization elements previously described in the fraud triangle theory.

Crowe's Fraud Pentagon Theory

Renewable theories that explore more deeply about the trigger factors of fraud are the pentagon fraud theory (Crowe's fraud pentagon theory). This theory was proposed by Crowe Howarth in 2011. The theory of pentagon fraud is an extension of the fraud triangle theory previously proposed by Cressey, in this theory adds two other elements of fraud: competence and arrogance competence. The competence described in the pentagon fraud theory has a similar meaning to the capability previously described in the fraud diamond theory by Wolfe and Hermanson in 2014. Competence is the ability of employees to ignore internal controls, develop concealment strategies, and controlling the social situation for his personal gain (Crowe 2011). According to Crowe, arrogance is an attitude of superiority over the rights owned and feels that internal control or company policy does not apply to him.

Hypothesis Development

Financial targets have a relationship with agency theory that explains the relationship between agents and principals. Agents and principals have an expectation to fulfill their respective interests. The connection in this case is in the desire of management to get a bonus on the results of their performance against the fulfillment of the principal desire is the fulfillment of financial targets in the form of profit. The higher the company's ability to achieve its financial goals can be said that the company's performance the better. But sometimes there are certain factor that cannot be controlled by the company to make the financial target is not achieved and the existence of the company will be in doubt. The emergence of pressures on achieving financial targets to earn bonuses on performance results and maintaining the existence of company performance can lead to the possibility of a pressure on the fulfillment of financial targets against fraudulent financial reporting.

Managers in achieving the various targets of the company are required to work optimally. The manager tries to improve his performance in order to achieve the company's targets, one of which is the financial target. Skousen *et al.* (2008) says ROA is a ratio that measures operational performance which can reflect the level of asset efficiency used. This is supported by Cashmere (2013, 202) which says that ROA is a result or a return on the resources utilized. Therefore, ROA is used as a proxy for financial targets. Furthermore, ROA can be used by companies in measuring ability to generate profit. The higher the ROA, the higher the profits the company will earn and the better the company's condition if its assets are used (Dendawijaya 2005). Research done by Huang *et al.* (2016), Yesiariani and Rahayu (2016), Lin *et al.* (2015), Firmanaya and Syafruddin (2014) and Suyanto (2009) revealed that ROA as a proxy of financial targets has a significant effect on fraud.

The higher the ROA the better the performance of management, which means the overall operation of the company, has been effective. However, in improving its performance by targeting higher ROA allows management to cheat in the form of accounting fraud. This is similar to the results of research Wisyastuti (2009) that when the company has a high profit level of fraud is also higher. So, the hypothesis in this study is:

H1: Financial Targets Positive Influence on Accounting Fraud

Ineffective monitoring is a condition in which the absence of effectiveness of internal control system owned by the company. This may occur because of management dominance by one person or small group, without compensation control, ineffective oversight of the board of directors and audit committee on internal financial reporting and control processes and the like (SAS No.99). With the lack of control from the internal company becomes an opportunity for some parties to manipulate the data in the financial statements.

Accounting fraud is one result of poor monitoring levels and inadequate monitoring systems. In these conditions trigger the occurrence of fraud because the opportunity to do things that harm and violate the rules of the company is very wide open (Andayani 2010). Companies if their level of supervision is low will have many gaps of all forms of crime including accounting fraud. SOP enforcement and proper monitoring of the system becomes a must if you want to avoid cheating. With the existence of a good oversight mechanism is expected to minimize the fraud. In addition, the audit committee should monitor periodically and intensively to management. If the audit committee function does not work, then it triggers an opportunity or opportunity where it will easily be used by some parties to make a profit by doing accounting fraud. The hypothesis in this study is:

H2: Ineffective Monitoring Positive Influence on Accounting Fraud

Rationalization is one of the risk factors of fraud triangle that leads to fraud. Substitution of auditors and KAP becomes the proxy of rationalization (Skousen *et al.* 2009). The change in auditor or the change of auditor used by the company may be considered as a form to eliminate the fraud trail discovered by the previous auditor.

This tendency encourages companies to replace their independent auditors to cover the fraud within the company. According to Stice (1991) that the change of auditors occurred due to several things including the risk of audit failure and subsequent litigation becomes greater than the following year. Change in auditor can indicate the occurrence of a fraud. The results of Loebbecke *et al.* (1989) found a fraud occurring during auditor tenure which is still in its first two years of service. This is similar to Albrecht (2002), which states that auditor turnover is related to accounting fraud. Substitution of auditors results in the stress period and transition period of a company. One indication of accounting fraud is the change of auditors in two years' period. The higher the auditor turnover, the higher the accounting fraud rate will occur. So the hypothesis in this study is:

H3: Change in Auditor Positive Influence on Accounting Fraud

Wolfe and Hermanson (2004) argue that a fraud is not possible if it is not done by someone with the right ability and position to carry out every detail of the cheating. Capability means the efforts of a person in committing acts of cheating for the achievement of certain goals. Sihombing and Rahardjo (2014) use change in direction as a proxy of capability to identify indications of accounting fraud. Change in Direction makes the initial performance is not optimal which caused the company during the transition period requires time to adjust (Sihombing and Rahardjo 2014). Change in Direction leads to conflict of interest because it is generally politically charged and there are interests of certain parties. Wolfe and Hermanson (2004) state clearly that the capability of the Change in Direction is motivated and triggers a fraud. Change in Direction can be considered as a strategy to remove the traces of previous directors which are considered to understand the various frauds that has been done by the company.

With a change or change of directors this can appear stress period that will provide opportunities for a cheating in the company. This will affect the company's performance results are not maximal. Do not stop there, internal parties are also required to quickly adapt to the new director for corporate performance recovery. In a study conducted by Indah (2017) confirmed that the change of directors can affect the accounting fraud. This is supported by research conducted by Rika Widya (2014).

A change of board of directors is chosen as a variable of one of the elements in Crowe's fraud pentagon theory, capability. There are six components in capability, including: positioning, intelligence, confidence / ego, coercion skills, effective lying/ deceit, and stress management. The change of board of directors is the transfer of authority from the old directors to the new directors with the aim of improving the previous management performance. Substitution of directors indicated able to describe ability in doing stress management. Wolfe and Hermanson (2004) argue that changes in directors are capable of causing a stress period that affects the more open opportunities for fraud.

The change of the board of directors can be a company's effort to improve the performance of the previous directors by changing the composition of directors or recruitment of new directors who are considered more competent than previous directors (Tessa and Harto 2016). On the other hand, a change of board of directors may be a company's attempt to get rid of directors who are deemed to know the fraud committed by the company and the change of board of directors is considered to require adaptation time so that initial performance is not maximal (Tessa and Harto 2016). Hypothesis in this research are:

H4: Change in Direction has a positive effect on Accounting Fraud

Arrogance is a behaviour of superiority and greed that exists in someone who believes that internal control is not applied to him (Horwath 2011). Arrogance is usually more directed to a person who has a high position in a company. A study by Tessa and Harto (2016) suggests that a CEO tends to be more willing to show everyone the status and position he has in the company because they do not want to lose that status or position. In research Tessa and Harto (2016) also obtained the results of research on the influence of arrogance against the detection of fraudulent financial statement. Where is argued that arrogance variables with proxy number of CEO photos contained in a financial report significantly affect the detection of fraudulent financial statement.

Arrogance can be measured by the frequent number of CEO's picture which is the number of CEO photos emblazoned on the company's annual report. The large number of CEO photographs emblazoned in an annual company report can represent the level of arrogance or superiority that the CEO has. A CEO tends to be more willing to show everyone the status and position he has in the company because they do not want to lose that status or position (or feel unacknowledged), this is in line with one of the elements expressed by Crowe (2011). A high level of arrogance can lead to fraud because with the arrogance and superiority of a CEO, the CEO feels that any internal control will not apply to him because of his status and position. According to Crowe (2011), there

is also the possibility that the CEO will do whatever it takes to maintain the position and position it currently holds. On the basis of such thinking it can be constructed a hypothesis:

H5: Arrogance has a positive effect on Accounting Fraud

The Board of Commissioners has full authority and responsibility in controlling, supervising and directing the management of the company's resources (Sykhorozza 2005). When the company has a board of commissioners that works effectively then its performance will also be good. The quality of this function is a determinant of the effectiveness of corporate governance. Differences of interests between the owners of the company and management can be aligned with corporate governance mechanisms. The quality of corporate governance mechanism is widely related to the quality of the company (Tangjitprom 2013). Monitoring by the board of commissioners and shareholders is a very important mechanism in aligning shareholder and management interests. The effectiveness of company monitoring conducted by an independent board of commissioners will minimize fraud despite high financial targets, ineffective monitoring, change in auditors, change in direction, and high arrogance. The Board of Commissioners has the responsibility to oversee management and ensure the implementation of the management of the company, the enforcement of SOP and the obligation of corporate accountability in accordance with the results of the corporate governance forum in 2003.

The results of the study (Skousen *et al.* 2009) prove that fraud occurs in companies with few external board members. Further research Beasley (1996) states the entry of the board of external commissioners improve the effectiveness of management control in order to prevent the occurrence of accounting fraud. The same thing was also expressed by Dechow *et al.* (1996) and Dunn (2004) in which many commissioner commissions are able to prevent fraud. Based on (KNKG 2004) the board of commissioners is responsible and competent in management monitoring. Board of commissioners is a predictable corporate governance mechanism affecting managerial opportunistic behaviour. So, the hypotheses of this study are:

H6a: Board of Commissioners as moderator Negative on Financial Target relationship to Accounting Fraud.

H6b: Board of Commissioners as moderator Negative on Ineffective Monitoring relationship against Accounting Fraud.

H6c: Board of Commissioners as moderator Negative on the Change in Auditor relationship to Accounting Fraud.

H6d: Board of Commissioners as moderator Negative on the Change in Direction relationship to Accounting Fraud.

H6e: Board of Commissioners as moderator Negative on the relationship of Arrogance to Accounting Fraud.

Corporate governance is a controlling company in order to organize and manage in which the objective is to increase the accountability and prosperity of the company Monks and Minow (2011). Control is to oversee the manager, so that managers can work in accordance with its function. The effectiveness of the board of commissioners will add strength to the CEO, where CEO strength is influenced by the level of independence of the board of commissioners. Independent Commissioner is a member of the board of commissioners which is not affiliated with the controlling shareholder, among members of the board of commissioners, management and other parties capable of affecting the level of independence and only works for the benefit of the company's welfare (KNKG 2004).

Independent commissioner is a strategic position in carrying out supervisory functions in order to implement good corporate governance. The results of Chtourou *et al.* (2001) provide conclusions when there is an independent board of commissioners that can influence accounting fraud caused in the supervision work independently. When an independent board of commissioners increases its oversight, then the accounting fraud rate will be lower. This is similarly delivered by Matolcsy *et al.* (1997) board dominated by internal directors tend to have weak corporate governance. Thus, accounting fraud can be minimized by discharging an independent commissioner because an independent commissioner is an independent party that represents a shareholder whose job is to specifically oversee all actions of the manager. Accounting cheating will be reduced because they are overseen by independent commissioners despite the financial targets, ineffective monitoring, change in auditors, change in direction, and high arrogance. Hypotheses in this research are:

H7a: Independent Commissioner as moderator Negative on Financial Target relationship to Accounting Fraud.

H7b: Independent Commissioner as moderator Negative on Ineffective Monitoring relationship to Accounting Fraud.

H7c: Independent Commissioner as moderator Negative on the Change in Auditor relationship to Accounting Fraud.

H7d: Independent Commissioner as moderator Negative on the Change in Direction relationship to Accounting Fraud.

H7e: Independent Commissioner as moderator Negative on relationship Arrogance to Accounting Fraud.

Institutional modelling becomes the proxy for corporate governance mechanism that is predicted to weaken the correlation of fraud diamond risk factors to accounting fraud. Beiner (2004) explains that to know the ownership of instirusi based on the percentage of voting rights owned by the institution. Institutional ownership has the ability to control management through effective monitoring so as to minimize fraud. This is because institutional investors are sophisticated investors that they are not easily fooled by the management of the company. Institutional investors in investment analysis activities spend a lot of time and institutions have spent a lot of money in gaining access to information so that they work in the process of control becomes optimal.

Cornertt *et al.* (2006) states that supervision conducted by institutional investors in a company could limit the behaviour of managers. *Furthermore*, Cornett *et al.* (2006) supervision by institutional investors is also able to encourage managers to give priority to company performance that can minimize opportunistic management behaviour. The existence of institutional ownership will reduce accounting fraud so that the financial statements can describe the real concept although the level of financial targets, ineffective monitoring, change in auditors, change in direction, high arrogance. Hypotheses in this research are:

H8a: Institutional Owners as moderator Negative on Financial Target relationship to Accounting Fraud.

H8b: Institutional Owners as moderator Negative on Ineffective Monitoring relationship against Accounting Fraud.

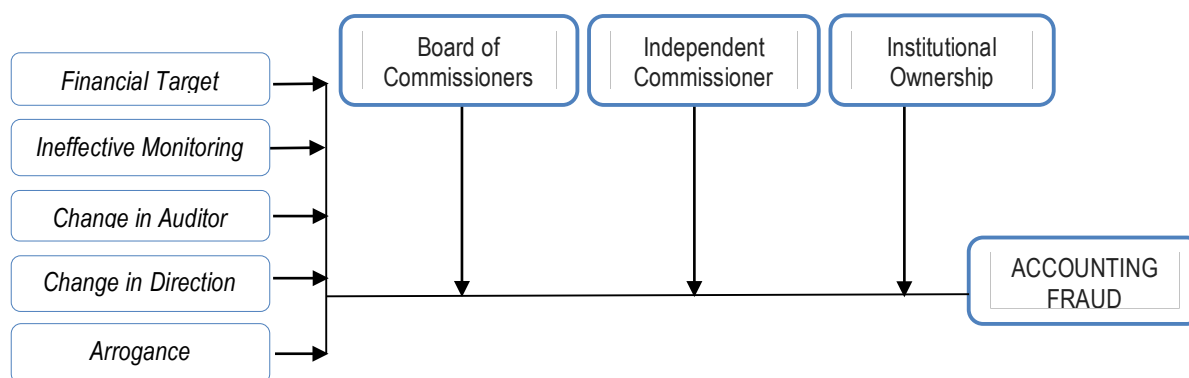
H8c: Institutional as Owners Moderator Negative on Change in Auditor relationship to Accounting Fraud.

H8d: Institutional Owners as moderator Negative on Change in Direction relationship to Accounting Fraud.

H8e: Institutional Owners as moderator Negative on the relationship of Arrogance to Accounting Fraud.

Theoretical framework for testing the effect of financial target, ineffective monitoring, change in auditor, change in direction, arrogance on accounting fraud and corporate governance mechanism as a moderating can be conveyed as shown below:

Figure 1. Theoretical Framework



Source: Secondary data are processed (2018)

2. Methodology

This research is a type of correlational research using quantitative approach because it leads to generalization, explaining the various phenomena and testing of the theory with variables in the form of numbers, data analysis and various evidences using statistical procedures. The population of this study is non-financial companies listing on the Indonesia Stock Exchange. Further selection of samples based on purposive sampling method where criteria as follows: 1). Non-financial companies listing on IDX in 2012-2016, 2). Companies subject to Bapepam-

LK sanctions in violation of Bapepam-LK regulation number VIII.G7 related to fraudulent financial statement presentation. 3). Companies that have complete data in 2012-2016.

The next step of the sample is obtained in pairs of companies that do accounting fraud and companies that do not commit accounting cheating in accordance with research Owen (2009). This study uses a sample of public companies listed on the Indonesia Stock Exchange (IDX) using the media of financial statements beginning from December 31, 2012 until December 31, 2016 (audited). The data analysis is using binary logistic method in analysing financial risk factors in identifying accounting fraud.

Operational Definition of Variables

All components of risk factors based on diamond Fraud cannot be observed directly. Furthermore, pressure is proxied with financial targets (ROA), opportunities proxied by ineffective monitoring (BDOU), rationalization proxied by change in auditor (Δ CPA), capabilities produced by Change in Direction (DCHANGE) and arrogance proxied with frequent number of CEO's picture in an annual report, as well as corporate governance mechanism proxied boards of commissioners, independent board of commissioners and institutional ownership.

Table 1. Operationalization Variable

Variable	Dimension	Indicator	Scale	Dimension
Accounting Fraud (Y) (Dependent Variable)	Annual Report and case reports of violation of article VIII.G.7 of OJK of non-financial listed companies 2012-2016 listed on BEI	Dummy Variables, companies that violate article VIII.G.7 on the guidelines for presentation and disclosure of financial statements with number 1. Furthermore, companies in violation of Article VIII.G.7 regarding the presentation and disclosure of financial statements shall be numbered 0 (zero).	Nominal Scale	Skousen <i>et al.</i> (2009)
Financial Target (Independent Variable)	Financial Information	Returns On Asset = $\frac{\text{Profit after Tax t-1}}{\text{Total Asset-1}}$	Ratio Scale	Skousen <i>et al.</i> (2009)
Ineffective Monitoring (Independent Variable)	Financial Information	BDOU = $\frac{\text{Number of Independent Commissioners}}{\text{Number of Board of Commissioners}}$	Ratio Scale	Skousen <i>et al.</i> (2009)
Rationalization (Independent Variables)	Financial Information	Change in Auditor (Δ CPA) Dummy variable, if a change of KAP within 3 years with number (one), if within 3 years do not experience change of KAP then given the number 0 (zero)	Nominal Scale	Skousen <i>et al.</i> (2009)
Capability (Independent Variable)	Financial Information	Change in Direction per(DCHANGE) Measured by Dummy variable, if experiencing Change in Direction within the period 2012-2016 with the number 1 (one), and if the company period 2012-2016 no change in direction then given the number 0 (zero).	Nominal Scale	Skousen <i>et al.</i> (2009)
Arrogance (Independent Variables)	Financial Information	Frequent number of CEO's Picture in an annual report	Nominal Scale	Crowe (2011)
Corporate Governance Mechanism (Board of Commissioners) (Moderating Variables)	Financial Information	The size of the board of commissioners is the proportion of the entire board of commissioners	Nominal Scale	Lipton dan Lorsch (1992)
Corporate Governance Mechanism (Commissioner Independen) (Moderating Variables)	Financial Information	Independent Commissioner is the number of members of the board of commissioners where from external or outside the company	Nominal Scale	Klein (2002)
Corporate Governance Mechanism (Institutional Ownership) (Moderating Variables)	Financial Information	Total ownership, by institutional investors	Nominal Scale	Jiang dan Andarajan (2009)

Source: Secondary data are processed (2018)

3. Case studies/experiments/demonstrations/application functionality

This research tested hypothesis with binary logistic regression to analyse influence of financial target, ineffective monitoring, change in auditor, change in direction and frequent number of CEO's Picture moderated by corporate governance mechanism to accounting fraud. According to Ghozali (2006) research with logistic regression ignores normality testing for independent variables. Since of this research used logistic regression where independent variables are combined non-metric and continue or metric categorical so that it will also ignores the problem of heteroscedasticity. Regression model 1 is on factors affecting accounting fraud. Furthermore, for model 2 with regression analysis technique based on interaction due to quasi moderating. Logistic regression model in hypothesis testing on model 1 is $\text{Ln} (F / 1-F) = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3 x_3 + \beta_4x_4 + e$ and testing model 2 hypothesis is $\text{Ln} (F / 1-F) = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3 x_3 + \beta_4x_4 + \beta_5x_5 + e$. Where, $\text{Ln} (F / 1-F)$ = The dummy variable, the firm commits the accounting fraud by the number 1 and who does not commit accounting fraud by 0, X_1 = Financial Targets, X_2 = Ineffective Monitoring, X_3 = Change in Auditor, X_4 = Change X_6 = Board of Commissioners, X_7 = Independent Commissioner, X_8 = Ownership of institutions, β_1 , β_2 , β_3 , β_4 , and β_5 (regression coefficients) and e = errors.

Based on the SPSS output then the test is done with various stages that must be passed such as: first, Assessing Hosmer and Lemeshow goodness of fit test or feasibility on the regression model. Second, coefficient is terminated and third, Assess Overall Model (Overall Model Fit). Furthermore, descriptive statistical analysis which includes the number of samples, mean, maximum and minimum and standard deviation.

Sample and Research Data

The following is the result of sample selection based on purposive sampling which resulted in 12 fraud companies and non-fraud companies of 32 for the period of 2012-2016. The details of the fraud and non-fraud sample selection procedures as shown in Table 2 and Table 3 are as follows:

Table 2. Sample Selection Procedure for Fraud Company

Sample Criteria	Companies that meet the criteria
The population of non-financial companies where the listing on the BEI in 2012-2016	411
Company violating article no. VIII.G.7 subject to sanctions from OJK in 2012-2016	39
The company has complete data in 2012-2016.	12
Number of Samples	12

Source: Secondary data are processed (2018)

Table 3. Sample Selection Procedure for Non-Fraud Company

Sample Criteria	Companies that meet the criteria
The population of non-financial companies where the listing on the BEI in 2012-2016	411
Has a period of time and sectors such as with fraud companies in violation of article no. VIII.G.7 subject to sanctions from OJK in 2012-2016	88
The company has complete data in 2012-2016.	32
Number of Samples	32

Source: Secondary data are processed (2018)

Descriptive Testing

The following is the result of statistical descriptive analysis data processing which helps to obtain a general picture related to independent variables, moderating variables and dependent variables. Descriptive statistical analysis is used to show the spread of research data. This analysis presents research data by looking at the mean (mean), standard deviation, maximum value and minimum value of research data. In this study using SPSS 22.0 program shown in Table 4 as follows:

Table 4. Descriptive Statistics Results

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Financial Targets	44	-.12	.44	.0921	.12124
Innefective Monitoring	44	.14	.50	.03510	.09081
Change in Auditor	44	.00	1.00	.6410	.48597
Change in Direction	44	.00	1.00	.4103	.49831
Arrogance	44	.00	28.00	7.5385	6.77397
Board of Commissioners	44	2.00	8.00	4.0513	1.45002

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Independent Commissioner	44	1.00	3.00	1.3846	.54364
Institutional Ownership	44	.25	.91	.5685	.14730
Accounting Fraud	44	.00	1.00	.3573	.46757

Source: Secondary data are processed (2018)

Based on the results of descriptive statistics test shows the number of samples of 44. The minimum value of the financial target has a value of -0.12 which indicates that the financial target (ROA) is considered very low. The maximum value is highest in the board of commissioner variables when compared to independent commissioners and other institutional or variable ownership. Furthermore, for the standard deviation is low, so the lower the standard deviation means the more homogeneous variables where the variation is less meaning that the data is good enough.

Hypothesis Testing

Testing the logistic regression hypothesis can be done by looking at the table of logistic coefficient test results in the significant column compared with the significance value used $\alpha = 5\%$. If the level of significance is < 0.05 , then H1 cannot be rejected or accepted. If the level of significance is > 0.05 , then H1 is rejected. The result of hypothesis testing with binary logistic regression is shown in Table 5 as follows:

Table 5. Hypothesis Test Results

Variable	Significance	Description
X1 → Y	0.113	Hypothesis 1 Rejected
X2 → Y	0.226	Hypothesis 2 Rejected
X3 → Y	0.121	Hypothesis 3 Rejected
X4 → Y	0.011*	Hypothesis 4 Accepted
X5 → Y	0.243	Hypothesis 5 Rejected
X1*Z1 → Y	0.567	Hypothesis 6a Rejected
X2*Z1 → Y	0.175	Hypothesis 6b Rejected
X3*Z1 → Y	0.831	Hypothesis 6c Rejected
X4*Z1 → Y	0.028*	Hypothesis 6d Accepted
X5*Z1 → Y	0.644	Hypothesis 6e Rejected
X1*Z2 → Y	0.253	Hypothesis 7a Rejected
X2*Z2 → Y	0.427	Hypothesis 7b Rejected
X3*Z2 → Y	0.550	Hypothesis 7c Rejected
X4*Z2 → Y	0.023*	Hypothesis 7d Accepted
X5*Z2 → Y	0.454	Hypothesis 7e Rejected
X1*Z3 → Y	0.645	Hypothesis 8a Rejected
X2*Z3 → Y	0.816	Hypothesis 8b Rejected
X3*Z3 → Y	0.240	Hypothesis 8c Rejected
X4*Z3 → Y	0.015*	Hypothesis 8d Accepted
X5*Z3 → Y	0.320	Hypothesis 8e Rejected

Note: *) Significant Value: 0.05 (5%)

Source: Secondary data are processed (2018)

The result of hypothesis test one (H1) proves that the financial targets variable (ROA) have positive but not significant effect to the possibility of fraudulent financial reporting with significance level of 0.113 and B 6,767. The results of this study support research conducted by Sihombing (2014) and Diany (2014). In the study stated that there is no influence between financial targets against the possibility of fraudulent financial reporting. The results of this study also support research conducted by Skousen *et al.* (2009) that the financial targets proxied with return on assets (ROA) have no effect on the possibility of accounting fraud.

The result of hypothesis two (H2) test shows that the ineffective monitoring (BDOU) has an insignificant effect on the number 0.226 and has a negative direction on the number B = -1,835. This is in line with the research that has been done by Skousen *et al.* (2009), Norbarani (2012), Martantya (2013), and Sihombing (2014) which also stated that ineffective monitoring (BDOU) has no significant influence in detecting accounting fraud. The result of hypothesis three (H3) showed that the variable of change in auditor (CPA) had negative and insignificant effect in detecting fraudulent financial reporting with significance level of 0.121 and B -0.389. This result is consistent with research conducted by Skousen *et al.* (2009), Diany (2014), and Sihombing (2014) who also stated that the change in auditor has no effect on accounting fraud.

The results of hypothesis four (H4) showed that the variable of company directors replacement (DCHANGE) had a negative and significant effect in detecting accounting fraud with significance level of 0.011 and B -0.007. Replacement of directors may be the company's attempt to get rid of directors who are deemed to know the fraud of the company and the change of board of directors is considered to require adaptation time so that initial performance is not maximal (Tessa and Harto 2016, 10). Wolfe and Hermanson (2004) argue that changes in directors are capable of causing a stress period that affects the more open opportunities for fraud.

The result of hypothesis five (H5) shows that the frequent number of CEO's picture (CEOPIC) variable has a positive and significant effect on accounting fraud with significance level of 0.243 and B0, 040. The test results prove that the more the number of CEO photos emblazoned in a report can indicate the high level of arrogance CEO in the company. A high level of arrogance can lead to fraud because with the arrogance and superiority of a CEO, the CEO feels that any internal control will not apply to him because of his status and position. According to Crowe (2011), there is also the possibility that the CEO will do whatever it takes to maintain the position and position it currently holds.

Based on Table 5 shows that H1 test results obtained significance value of 0.113 (>0.05) thus H1 is rejected. This is in line with the results of research Puspitrisnanty and Fitriyani (2014), Skousen *et al.* (2008); (2009) and Sukirman and Sari (2013) show ROA has no effect on accounting fraud. H2 test results obtained significance value of 0.226 (>0.05) thus H2 rejected. The results of this study are similar to the results of research Martantya (2013), Skousen *et al.* (2009), and Ratmono *et al.* (2013) showed that ineffective monitoring has no effect on accounting fraud. Furthermore, for testing H3 obtained significance value of 0.121 (>0.05) thus H3 rejected. This is in line with the results of research Firmanaya (2014) and Ratmono *et al.* (2013) where rationalization has no effect on accounting fraud. For H4 test, the significance value of 0.011 (<0.05) thus H4 is accepted change in direction is capable of giving birth to stress period, adaptation and adjustment which opens the opportunity for cheating. For testing of H5 we get the significance value of 0.243 (<0.05) thus H5 is rejected

Testing H6a with significance value of 0.567 (>0.05), H6b with significance value of 0.175 (>0.05), H6c with significance value of 0.831 (>0.05), H6d with significance value 0.028 (<0.05) and H6e with significance value 0.644 (<0.05). Thus H6a, H6b, H6c, H6e are rejected but H6d is accepted. The board of commissioners is able to moderate in this case weaken the change in direction relationship to accounting fraud because corporate governance mechanisms can be used by companies to align ownership and management interests.

H7a test result with significance value of 0.253 (>0.05), H7b with significance value of 0.427 (>0.05), H7c with significance value 0.550 (>0.05), H7d with significance value 0.023 (<0.05), H7e with significance value 0.454 (<0.05), then H7a, H7b, H7c, and H7e the hypothesis is rejected while H6d is accepted. Independent commissioners are able to moderate in this case to weaken the change in derision to accounting fraud because independent commissioners from outside the company are more focused and not easily influenced by anyone in monitoring, controlling and managing where a way is used to weaken the occurrence of accounting fraud.

Furthermore, the H8a test results with significance value of 0.645 (>0.05). H8b with significance value of 0.816 (>0.05), H8c with significance value 0.240, H8d with significance value 0.015 (<0.05), H8e with significance value 0.320 (<0.05). The test results show that H8a, H8b, H8c, H8e are rejected, but for H8d is acceptable. The ownership of the institution is able to moderate the change in direction to accounting fraud because the corporate governance mechanism focused on the owners of this company will certainly prevent accounting fraud.

Conclusion

Based on testing H1, H6a, H7a, and H8a rejected, test results H2, H6b, H7b, and H8c rejected. For test results H3, H6c, H7c, and H8c rejected. Further research results H4, H6d, H7d and H8d accepted test results H5, H6e, H7e, and H8e rejected. Limitations in this study that the number of samples is relatively small, due only to companies listed on the stock exchange alone.

Based on the result of analysis, conclusion, and limitations of this research, it is necessary to develop and improve for subsequent research to be better and there are some suggestions given for future research, among others: (1) Further research is suggested to expand the sector ie in sector government and in various countries. This is recommended because in the government sector there are also many cases of fraud but in the case of misuse of assets (2) Until now still rarely research that investigate cases of fraud in the financial and banking sector, whereas based on data from the Association of Certified Fraud Examiner (2014) fraud case most commonly in the financial and banking sectors. The next researcher is expected to develop research on the financial and banking sector or develop into the second most sectors that conduct fraud cases *i.e.* public sector government funds. (3) Related research fraudulent financial reporting, researcher hereinafter advised to use qualitative method in research methodology or use combination (Mixed Method) that is qualitative and

quantitative method. This is suggested because there are still many fraud elements that are difficult to measure when using only quantitative methods, such as rationalization and capability elements.

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Integrating Reputational Considerations in the Empirical Analysis of Dividend Smoothing Policy of Emerging Market Firms - A Quantile Regression Approach

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Abstract

Firm's prior tendency towards paying dividends and the reputational considerations arising from it have long been known as the primary drivers of dividend policies around the world. Taking these factors into account, we study the cross-sectional properties of dividend smoothing among emerging market firms from Pakistan under light of asymmetric information and agency cost theories. Distinguishing between the high- and low-smoothing firms based on their prior tendencies towards smoothing, our quantile regression estimates confirm significant heterogeneity in the cross-sectional determinants of smoothing among the two groups. The findings show that while dividend smoothing rises significantly with size, age, asset tangibility, and risk among the low-smoothing firms, and declines with higher growth, payout level, and free cashflow; it remains largely insensitive to these factors for the high-smoothing firms. The results thus confirm that the high-smoothing firms continue to smooth high regardless of their exposure to informational asymmetries and agency costs. We, thus, observe this anomaly in smoothing policies of high-smoothing firms which emphasizes the dominance of the reputational effects in the smoothing policy of these firms. Inconsistent with the theoretical predictions, these findings provide some explanation for the dividend smoothing puzzle that why firms with lesser or no need for dividend smoothing still smooth high. Moreover, these findings also offer empirical evidence for setting future theoretical directions.

Keyword: dividend smoothing; reputational effect; quantile regression

JEL Classification: G30; G35

Introduction

Since Miller and Modigliani (1961) questioned the relevance of dividends to the value of the firm, dividend policy has remained at the core of financial research. However, despite decades of voluminous research, the dividend puzzle continues to elude financial economists. According to Miller and Modigliani (1961), paying dividend involves a tradeoff leading to the lower retained earnings and hence the diminished capital gains. This argument leads to the conclusion that a dividend-paying stock is worth as much as the one paying lower or no dividend at all. Contrary to this postulation, however, Lintner (1956), in his seminal paper, finds that dividend policies of the US

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companies are non-random with a marked reluctance for making dramatic changes in dividends. More specifically, Lintner finds that dividends are smoothed as firms gradually steer their current dividend payments to a targeted payout ratio indicating the managerial belief in the value-maximizing role of dividend policy.

Studies around the world show that dividend smoothing is widespread¹. However, despite its pervasiveness, researchers still wonder why firms smooth their dividends high or low, and what characterizes a dividend-smoothing firm (Lambrecht and Myers 2012). Therefore, the very causes and motivations behind smoothing dividends are still empirically unclear. Dividend theory offers two main explanations for smoothing which are mainly based on the postulates of agency cost (Allen, Bernardo and Welch 2000, DeMarzo and Sannikov 2007, Fudenberg and Tirole 1995) and asymmetric information (Brennan and Thakor 1990, Guttman, Kadan and Kandel 2010, Kumar 1988). Accordingly, companies facing severe agency conflicts and higher opacity and severer agency conflicts are expected to smooth dividend more for conflict-mitigating and signaling motives. The recent studies investigating the causes of dividend smoothing, however, contradict these predictions showing that high-smoothing is more a property of firms with lower or no agency or information problems (Javakhadze, Ferris and Sen 2014, Jeong 2013, Leary and Michaely 2011).

A higher incidence of smoothing, reported in present studies, among the firms with no inherent need of it has left the researchers puzzled. Not only does this finding contradict the theory, but it also raises a more perplexing question that what makes a firm smooth high despite lower or no agency and information problems. However, one of the shortcomings of the present studies is that these studies have ignored firm's prior tendency towards smoothing in their analysis. The literature on dividend policy identifies firm's prior tendency towards paying dividends or its dividend history as one of the primary determinants of the firm's decision to pay or maintain dividends. For example, Skinner (2008) found a significant link between firm's dividend-paying history and the likelihood of paying dividends. In the same manner, Brav, Graham, Harvey, and Michaely (2005) observed that managers of firms with a long history of paying dividends were particularly inclined to pay stable or smoothed dividends. Brav *et al.* (2005) also witnessed that many managers believe that it was better not to pay at all than to initiate and fail to maintain it. Thus, managers believe that dividend requires a long-term commitment, which if unmet could damage firm's reputation. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000) suggest that, in the long run, paying a stable and high dividend builds a good market reputation for the firms, which could reduce firm's cost of capital.

This study aims to explain why firms continue to smooth dividends high despite facing lower or no information and agency problems. In other words, we attempt to provide an empirical explanation to the so-called dividend smoothing puzzle (Berk and DeMarzo 2007, Guttman *et al.* 2010). Our explanation of dividend smoothing is based on the premises of dividend history or firm's prior tendency towards smoothing and the reputational effect arising from it. We argue that firm's tendency to smooth high establishes its reputation as a high-smoothing firm over the time. Once a firm is reputed for its dividend stability, investors and markets' expectations and sentiments are formed accordingly. A high-smoothing firm attracts a particular class of investors preferring regular and stable payouts which sets in the so called clientele effect (Miller and Modigliani 1961). Therefore, the smoothing policy of a high-smoothing firm evolves in such a way that it aims primarily to cater to the needs and expectations of the investors and markets (Baker and Wurgler 2004).

Considering these reasons above we argue that high-smoothing firms face an additional concern of reputation that persuades them to smooth high to avoid harsh market backlash even when information and agency cost factors demand otherwise. On the other hand, we expect that reputational concerns are less binding for low-smoothing firms as markets treat them less severely if they deviate substantially from their current level of dividends. We, therefore, maintain that dividend smoothing policy of a high- and low-smoothing firm is fundamentally different from each other. Therefore, these factors warrant a particular attention in the analysis of dividend smoothing in the same way as they have been considered in the empirical literature of dividend policy in general (DeAngelo and DeAngelo 1990, Skinner 2008).

Extending the work of Leary and Michaely (2011), we employ the quantile regression model (Koenker and Bassett 1978), to investigate the impact of agency and information effects on the dividend smoothing policies of the high- and low-smoothing firms. Therefore, we examine (a) whether asymmetric information and agency costs affect the dividend smoothing level in most and least smoothing companies homogeneously, (b) whether the determinants of dividend smoothing are different among these companies, and (c) whether the information and agency effects are identical for the high- and low-smoothing firms or the reputational effect is more dominant.

¹ Many studies in the US and elsewhere have shown that dividend smoothing is prevalent. See for example, Brav, Graham, Harvey and Michaely (2005); Fama and Blahnik (1968); Javakhadze, Ferris and Sen (2014) among others.

We apply quantile regression for two main reasons. First, unlike the OLS estimators which estimate the regression coefficients only for the mean of the smoothing distribution, quantile regression model provides distinct regression coefficients for various quantiles of the distribution representing the relative intensity of smoothing among firms. Therefore, serving the main objective of this study, quantile regression enables us to assess the sign, size, and significance of dividend smoothing determinants among the high- and low-smoothing companies. Moreover, with quantile regression estimates, we hope our findings to be more robust to issues like distributional heterogeneity (Mata and Machado 1996), and non-linearities in cross-sectional relationships (Hallock, Madalozzo and Reck 2010).

Consistent to what this study hypothesizes, we find notable differences in the factors influencing the degree of dividend smoothing among the high- and low-smoothing firms. Results show that the degree of dividend smoothing increases significantly with age, size, tangibility, and risk among low-smoothing firms; whereas it decreases with growth, ownership concentration, free cashflows, and payout ratios. On the other hand, most of these factors turn insignificant for the firms in the high-smoothing group, which could be attributed to more dominant reputational effect on the dividend smoothing policy of these firms. We find that high-smoothing firms continue to smooth high for their reputational considerations regardless of their exposure to agency and information costs. Our findings have two major implications for the dividend smoothing puzzle. First, the significance of reputational effect among high-smoothing firms explains why these firms smooth high despite their lower agency and information costs. Moreover, it also adds to our understanding of the nature of the conflict between the dividend smoothing theory and empirical evidence. While the OLS estimates fall short to identify it, the quantile regression estimates enlighten us that much of the disagreement between theory and evidence in the present studies comes from the low-smoothing firms, while high-smoothing firms behave indifferently to information and agency effects. Taken together these findings helps understand the so called smoothing puzzle that why firms with lesser need of smoothing still smooth high.

The paper is structured as follows. Section 2 gives a brief review of the relevant studies. Section 3 presents the details about research sample and methodology. Our empirical findings are reported and discussed in Section 4. Section 5 concludes the paper.

2. Related studies

From being the most relevant factor in the firm value (Gordon 1959) to entirely impertinent (Miller and Modigliani 1961), the dividend has undoubtedly been one of the most debated areas in the corporate finance literature. Despite years of research, most researchers believe it as a puzzle (Black 1976, Brav, Graham, Harvey and Michaely 2005).

Dividend smoothing makes one of the most persistent features of dividend policy since Lintner (1956) discovered it first in his seminal study. A number of studies have attempted to explain the factors that shape up firm's smoothing behavior. For example, some studies (Guttman *et al.* 2010, Kumar 1988, Kumar and Lee 2001) claim that managers' smooth dividend for signalling motives to disclose their earnings prospects otherwise unknown to the markets. Dividend smoothing increases with equity (Kumar 1988), cashflow risks (Kumar and Lee 2001), improved growth opportunities and briefer stock investment horizon (Guttman *et al.* 2010). This suggests that firms with higher asymmetric information problems would smooth dividend more. Other explanations of dividend smoothing draw upon the agency cost models. According to Allen, Bernardo, and Welch (2000) and Fudenberg and Tirole (1995), dividend smoothing helps mitigate agency conflicts between the owners and managers. Therefore, firms with severer conflicts tend to smooth high. Likewise, the cashflow hypothesis (Easterbrook 1984, Jensen 1986) suggests that dividend smoothing could be a useful tool to free up excess cash from management's control and distribute it to the shareholders.

More recently, researchers' interest in the empirical analysis of dividend smoothing has grown after Leary and Michaely (2011) studied the determinant of dividend smoothing among the US firms. Following Leary and Michaely (2011), Javakhadze, Ferris, and Sen (2014) studied dividend smoothing in an international cross-country sample, while (Jeong, 2013) carried out the analysis on Korean firms. These authors have put the theories of dividend smoothing to the formal empirical tests. Findings show that regardless of the sample and period of study, dividend smoothing was common among larger, older, and firms with more tangible assets. As for other characteristics such as risk and growth opportunities, the results were largely mixed. The findings from these studies run counter to the most of the predictions of the information asymmetry models while gathering only a partial but less rigorous support for agency based explanations. Overall, the findings of these studies reinforce the so-called dividend smoothing puzzle, *i.e.*, higher incidence of dividend smoothing among firms with opposite characteristics.

3. Data and methodology

3.1 Description of data

This study employs firm-level financial and accounting data on 249 Pakistani firms from 2004 to 2015. The data are extracted from the OSIRIS database. Firms in the financial sector are excluded because of their typical nature of financial structures (Brav *et al.* 2005, Rajan and Zingales 1995). We follow Leary and Michaely (2011) in selecting the sample firms.

Accordingly, we require firm to have at least 5 years of continuous, non-missing data on the dividends, earnings, and other financial variables to be included in our sample. To obtain the continuous spell of firm's dividend payments to estimate the degree of dividend smoothing by the firm during the sample we dropped the years prior to the first and subsequent to the last dividend payments during the sample period. For regression analysis, cross-sectional data on variables were obtained by estimating the median firm characteristic over the sample period. All variables are explained in Appendix A.

3.2 Research methodology

Unlike previous studies relying mainly on the OLS estimators, this study applies conditional quantile regression to the analysis of dividend smoothing. We prefer quantile regression for at least two reasons.

First, given our objective, we are interested more in the dividend smoothing behavior of the high- and low-smoothing firms which lies at the extremes or tails of the smoothing distribution. While the OLS method is appropriate for capturing the marginal effects at the conditional mean of the distribution, its applicability is highly questionable at the tails. Quantile regression offers an appropriate tool by providing the coefficient estimates at various quantiles of the distribution, which facilitates comparison between the determinants of smoothing among firms at a different degree of smoothing (Koenker and Bassett 1978). Besides its aptness to our objective, quantile regression is also advantageous in handling distributional heterogeneity, skewness, and non-linear relationship (Hallock *et al.* 2010, Mata and Machado 1996).

In dividend smoothing setting, the quantile regression model can be expressed as follows.

$$DS_i = \beta_i X_i + \varepsilon_{\theta i} \text{ with } Quant_{\theta}(DS_i | X_i) = X_i \beta_{\theta} \quad (1)$$

where DS is the degree of dividend smoothing by firm i during the sample period, X_i denotes the vector of independent variables, and β_{θ} is the vector of regression parameters. The expression $Quant_{\theta}(DS_i | X_i)$ represents the θ th conditional quantiles of DS given X . The θ th quantile ranging $0 < \theta < 1$ is defined as a solution to the following equation:

$$\min_{\beta \in R^k} \sum_i \rho_{\theta}(DS_i - \beta_{\theta} X_i) \quad (2)$$

where $\rho_{\theta}(\varepsilon)$ is known as the check function defined as $\rho_{\theta}(\varepsilon) = \theta \varepsilon$ if $\varepsilon > 0$ or $\rho_{\theta}(\varepsilon) = (\theta - 1)\varepsilon$ if $\varepsilon < 0$.

The problem above is solved using linear programming, while the bootstrap method is used to obtain the standard errors for the coefficients (Buchinsky 1998). When the error term is non-normal, quantile regression estimates may be more efficient than OLS estimators (Buchinsky 1998).

3.3. Empirical model

Based on the theoretical relationship between asymmetric information, agency costs and dividend smoothing, we develop the following regression model:

$$DS_i = \beta_0 + \beta_1 IA_i + \gamma_1 AC_i \quad (3)$$

where DS_i is the degree of dividend smoothing by firm i during the sample period, IA and AC are the vectors of variables measuring firm-level information asymmetry and agency costs respectively.

In our approach to measure firm-level information and agency costs, we use several firm characteristics as proxies. Relying on the previous studies, firm size (Frank and Goyal 2009; Zingales *et al.* 1995), history (Jeong 2013), tangibility (Katper, Madun and Syed 2015; Kirch, Renato and Terra 2012), and risk (Javakhadze *et al.* 2014) are employed in the model as information measures; whereas, ownership concentration (Jeong 2013), growth (Jabbouri 2016), free cashflow (Jabbouri 2016), and payout ratio (Leary and Michaely 2011) are used as the measures of agency costs faced by the sample firms.

3.4. Variables and hypothesis

We apply speed of adjustment (SOA), estimated using Lintner (1956) partial adjustment model, as the measure of dividend smoothing. After a detailed survey of the US managers, Lintner (1956) concludes that most of the US firms follow a target payout ratio in the long run. Firms pay stable dividends despite volatile earnings which implies that dividends are smoothed. Firms increase dividends only after realizing that the new level is sustainable in the long run, while they resist cutting or omitting dividends during the temporary decline in earnings. Lintner expresses his observations in the following model, where γ represents the SOA.

$$\Delta D_{it} = D_{it} - D_{it-1} = \alpha + \gamma(TPR * E_{it} - D_{it-1}) + \varepsilon_{it} \quad (4)$$

where D_{it} denotes dividends paid in year t by firm i . TPR_{it} is the target payout ratio, and E_{it} are the firm's earnings in year t . However, the model above requires ex-ante knowledge of firm's TPR, which is seldom disclosed to the public. We use the following variant of Eq. 4 (Brav *et al.* 2005, Fama and Babiak 1968):

$$\Delta D_{it} = D_{it} - D_{it-1} = \alpha + \beta_1 D_{it-1} + \beta_2 E_{it} + \varepsilon_{it} \quad (5)$$

where D_t and D_{t-1} are the amounts of dividend per share in the current and previous periods respectively. E_{it} is the firm's earnings per share in the current period. ε_{it} denotes random error term. The coefficient of lagged dividend β_1 in the above equation represents the speed of adjustment, which measures how instantaneously firms adjust their dividends to the targeted payout ratio. The speedier the adjustment process, the lower the degree of dividend smoothing. The SOA, therefore, is inversely proportional to dividend smoothing. Prior to the estimation of Eq.3, we run model 5 for each firm in the sample to estimate its degree of dividend smoothing (DS).

Models built on asymmetric information premises argue that smoothing contains signaling power for the firms which are relatively less known and find it harder to convey their earnings potential to the investors and capital markets. Consequently, these opaque firms need smoothing as a signaling device to attract investors and create value. To test the information effect on dividend smoothing, we develop the following relational hypotheses for each firm characteristics mimicking firm's exposure to information costs.

Firm size and history: Firm size and its history are generally positively correlated. Larger firms tend to be older and therefore face lower problems of information inadequacy. Information about these firms is widely available and easily accessible attracting investors and their confidence. We, therefore, expect marginal utility of dividend smoothing to decline with firm size and history. We use natural logarithm of firm's total assets at book value¹ as a measure of firm size (Katper *et al.* 2015). Firm history is measured by using the number of years since firm's incorporation (Jeong 2013).

Tangible assets: Tangibility lowers costs of asymmetric information. Compared to intangible assets, tangible assets are also less vulnerable to value deterioration in case of bankruptcy (Akhtar and Oliver 2009). The asymmetric information view predicts smoothing to decline for firms holding a more significant proportion of tangible assets. We measure tangibility by the ratio of net property, plant, and equipment to total assets following Aivazian, Booth and Cleary (2006).

Risk: We apply risk as the third proxy for asymmetric information. Risk is primarily a direct consequence of asymmetric information among the transacting parties. Since riskier firms incur higher information costs, smoothing might benefit these firms in reducing information costs (Guttman *et al.* 2010, Kumar 1988). Following Javakhadze *et al.* (2014), our risk measure is based on earnings volatility which is worked out as the standard deviation of the ratio of EBIT to total assets for the sample period.

Growth: Growth is costly because it increases informational asymmetry and agency problems (Myers 1977). Unlike mature firms, growth firms tend to be newer and riskier with a higher concentration of intangible assets and more volatile cashflow patterns. Since the valuation of the growth firms is contingent mainly upon their future growth opportunities which by default are riskier and less reliable for the investors as compared to the managers, growth firms are exposed to higher costs of information asymmetry (Myers 1977). This leads to the hypothesis that growth and dividend smoothing are positively correlated.

The agency view about growth, however, is contrasting. Jensen (1986) and Fama and French (2002) contend that while free cashflow increase agency problems in firms in general, growth firms are spared as both managers and investors concede that growth demands more cash which lowers agency costs of free cashflows among these firms. Because greater growth opportunities coupled with higher profitability lower firm's cost of free

¹ We also apply total assets at market value, and firm sales as measures of firm size. Our results do not vary qualitatively.

cashflows substantially, we expect that growth is negatively related to dividend smoothing. Growth is measured by the average annual growth rate in total assets¹ over the sample period.

Ownership concentration: Most of the firm's agency costs are directly related to its ownership structure. When shares are held in the hands of a few, boards have greater ability to monitor the managers more closely, which results in lower agency and information costs (Chemmanur, He, Hu and Liu 2010, Dewenter and Warther 1998). Consequently, firms with concentrated ownership have a lesser need for smoothing to mitigate classical owner-manager agency conflicts. Based on this assumption, dividend smoothing would be a negative function of ownership concentration.

La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000), however, hinted at another form of agency conflicts, called *Type II* agency problems, which arise between the minority and controlling shareholders and are more relevant to the emerging and developing markets where the substantial ownership of firms are held by the largest shareholders. La Porta *et al.* (2000) argues that firms in emerging markets could signal minority shareholders of their importance and create market goodwill by paying regular and stable dividends. This version of hypothesis relates firm's dividend smoothing activity positively with its concentration of ownership. We follow Jeong (2013) to use the share percentage of the largest stockholder as the measure of ownership concentration².

Free cashflow: Free cash piles up when firms generate abundant cash with no immediate uses. This creates the classical free cashflow problem (Easterbrook 1984, Jensen 1986) for firms as managers tend to use this excess cash opportunistically in their personal interests. Since dividend serves a means to transfer free cash from managers to shareholders (Easterbrook 1984), it helps reduce agency costs arising from free cashflow. Given this, firms facing higher free cashflow problems are expected to smooth dividend more. We use a ratio of operating income before interest, taxes, and dividends to the total assets to measure free cashflow (Javakhadze *et al.* 2014).

Payout ratio: The relationship between payout ratio and dividend smoothing is imprecise. According to agency theory dividend lowers conflicts between managers and shareholders resulting in lowered agency costs (Easterbrook 1984, Jensen 1986). Paying higher level of dividend lowers free cashflow within the firms while also forcing management to access external financing for investing purposes. As a result, self-serving behavior among managers tends to decline as firms' dividend level increases. As firm paying higher dividend faces lower agency costs and hence lesser need for smoothing, the payout ratio is expected to have a negative relationship with dividend smoothing. Likewise, firms paying higher dividend generally attract more attention of investors and have greater analyst following consequently leading to a lowered cost of information asymmetry (Babenko, Tserlukevich and Vedrashko 2012). With lesser asymmetric information problems, high payout ratio firms might smooth less. A rise in dividend level attracts institutional investors who in turn would demand higher and stable dividend (Brav *et al.* 2005, Dhaliwal *et al.* 1999, Grinstein and Michaely 2005). Consequently, payout ratio might carry a positive relationship with dividend smoothing

4. Empirical results

We present our results and discussion in this section. Section 4.1 provides the summary statistics and correlation analysis. In Section 4.2, we first report the OLS estimates as a benchmark for quantile regression estimates and also for comparing our findings with those in the previous studies. We then proceed to present our quantile regression estimates to address our main concern that whether the information asymmetry and agency cost effects are heterogeneous along the conditional quantiles of the smoothing distribution representing the high- and low-smoothing firms. Or, in other words, is there is any the reputational effect? If so, does it dominate the agency and information effects? In the end, we apply sensitivity checks to show that our results are robust to different estimations and specifications.

4.1 Descriptive and correlation analysis

Table 1 reports the summary statistics for the variables. The mean SOA by Pakistani firms during the sample period is about 0.80, which is slightly higher than 0.62 reported in the Javakhadze *et al.* (2014). This difference could be due to the significant difference in the sample size of the two studies. Javakhadze *et al.* (2014) included only 17 firms from Pakistan in their international sample. We expect our estimates for the dividend smoothing to

¹ With an alternative specification, we replaced total assets with total sales in measuring growth. Our findings (unreported) remain unaffected.

² As a robustness check, we used average percentage of shares held by top three shareholders. We arrived at similar conclusions.

be more representative for our larger sample. The correlation between the variables is presented in Table 2. SOA is negatively correlated with size, history, and tangibility giving an indication that larger, older, and firms with more tangible assets generally smooth more in Pakistan. This indicates that the information effect is significant, but the direction of the relationship is not what is expected in asymmetric information models. Proxies of agency costs, however, show mixed results. Growth and ownership concentration is positive with SOA implying that smoothing declines with growth and ownership concentration or when agency conflicts are lower. However, free cashflow has positive correlation with SOA suggesting that smoothing level rises when firms have lower access to free cashflows negating agency cost effect. We explore these relationships in detail in multivariate analysis. The correlation analysis further reveals that most of the variables have a significant relationship, yet the relationship is not so strong to cause the issue of multicollinearity in our multivariate analysis.

Table 1. Descriptive statistics

Variable	Mean	St. Deviation	25 th percentile	Median	75 th percentile
SOA	0.80	0.68	0.99	0.80	0.48
Size	10.79	1.54	9.69	10.66	11.75
History	42.13	17.50	28.00	38.00	53.00
Tangibility	0.43	0.20	0.29	0.43	0.58
Risk	0.07	0.05	0.04	0.06	0.09
Growth	0.13	0.19	0.05	0.09	0.16
Ownership Concentration	0.55	0.20	0.41	0.57	0.70
Free cashflow	0.13	0.41	0.00	0.12	0.25
Payout ratio	0.26	0.31	0.00	0.17	0.42

Table 2. Correlation between variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOA (1)								
Size (2)	-0.057*							
History (2)	-0.037	0.028						
Tangibility (3)	-0.088*	-0.001	-0.134*					
Risk (4)	-0.086*	-0.170*	0.023	-0.128*				
Growth (5)	0.036	0.061*	0.232*	-0.004	0.137*			
Ownership Concentration (6)	0.023	0.063*	-0.009	0.201*	-0.177*	0.130*		
Free cashflow (7)	0.005	0.009	0.018	-0.129*	0.154*	0.127*	-0.153*	
Payout ratio (8)	0.040	-0.061*	-0.002	-0.084*	-0.032	-0.002	-0.046*	0.034

4.2. OLS and conditional quantile regression analysis

The results are reported in Table 3. The first row in the table presents the OLS results based on the conditional mean. The subsequent rows show the quantile regression estimates for different SOA quantiles representing the intensity of dividend smoothing among sample firms. Since SOA is inversely proportional to dividend smoothing, firms in the lowest quantiles smooth most, while those in highest smooth least. We employ various firms-level proxies of asymmetric information and agency costs to evaluate the information and agency effect on the dividend smoothing.

We first analyze the information effect on dividend smoothing level. Our main proxies include size, history, tangibility, and risk. The OLS estimates show that size influences smoothing significantly negatively. Since size, history and information accessibility are positively related (Frank and Goyal 2009), larger and older firms are better known and face lower information asymmetries. Consequently, these firms are less expected to smooth more. However, OLS estimates show that larger firms are high-smoothers, which is against the spirit of asymmetric information models. Likewise, the other two primary variables gauging firm’s visibility, firm history, and tangibility, also return negative with significant signs confirming further that dividend smoothing declines as information asymmetry rises. However, the quantile regression estimates tell a different story. We find that the coefficients of all these proxies including size, age, and tangibility enter significantly negative in the higher quantiles from 25th and above. None of these coefficients has a significant sign in the lower quantiles of 5th and 10th. This indicates that contrary impact of asymmetric information is significant but only in the case of low-smoothing firms. High-smoothing firms, on the other hand, smooth dividend independently of these effects, which conforms with our proposition that these firms are more sensitive to the reputational effects rising from their higher tendency towards smoothing. However, the coefficient of risk is significant and negatively related to SOA

across all the quantiles, which implies that dividends paid by risky firms are more smoothed. Moreover, the fact that its coefficient is significant regardless of high- or low-smoothing quantiles suggests that risk is an important consideration in dividend smoothing policy of Pakistani firms.

Collectively, our evidence is inconsistent with asymmetric information models but consistent with the findings of the previous studies of Leary and Michaely (2011) and Jeong (2013). We conclude that information effect is significant but not in the way as predicted by the asymmetric information models. However, more strikingly, we find that effect is non-existent for the high-smoothing firms whose smoothing policy is insensitive to the exposure of informational asymmetries as argued in this study.

Table 3. OLS regression and quantile regressions of dividend smoothing on its determinants

	Size (+)	History (+)	Tangibility (+)	Risk (-)	Growth (-/+)	Own. Con. (-/+)	Free cashflow (-)	Payout ratio (-/+)	Cons.
OLS Regression									
	-0.023**	-0.003**	-0.347***	-1.115***	0.137**	0.140	0.013***	0.124**	-0.417**
	(-2.10)	(2.77)	(3.51)	(-3.35)	(2.36)	(1.54)	(3.31)	(2.20)	(2.40)
SOA Quantile Quantile Regressions									
High-smoothing firms (HSF)									
Q5	-0.037	-0.002*	-0.514	-2.735***	0.177	-0.084	0.011	0.014	-1.914***
	(-0.25)	(-1.97)	(-0.49)	(11.11)	(3.03)	(1.02)	(0.15)	(0.23)	(-12.26)
Q10	-0.253	-0.014	-4.728	-7.611**	-4.756	0.498	0.164*	0.912	-1.542**
	(-0.23)	(-1.22)	(-0.06)	(-3.56)	(1.09)	(0.50)	(1.59)	(1.01)	(-10.79)
Moderately-smoothing firms (LSF)									
Q25	-0.011***	-0.002***	-0.197***	-0.894***	0.148	0.184***	0.007**	0.042**	-1.105***
	(-2.61)	(-3.69)	(-6.14)	(-11.86)	(0.30)	(5.07)	(2.28)	(2.16)	(-19.21)
Q50	-0.026***	-0.001*	-0.075**	-0.622***	0.082***	0.083*	0.039***	0.057**	-1.070***
	(-4.56)	(-1.91)	(-2.85)	(-6.42)	(3.67)	(1.77)	(2.96)	(2.42)	(-12.91)
Q75	-0.035***	-0.003***	-0.270***	-0.381***	0.022**	0.254***	0.040***	0.142***	-0.101***
	(-4.21)	(-4.86)	(-4.10)	(-2.55)	(0.30)	(3.47)	(2.66)	(3.49)	(-8.83)
Low-smoothing firms (LSF)									
Q90	-0.050***	-0.001**	-0.108**	-1.678***	0.033***	0.045***	0.091***	0.154***	-0.570***
	(-5.87)	(-2.61)	(-2.61)	(3.37)	(3.26)	(2.97)	(1.85)	(5.02)	(-4.15)
Q95	-0.049***	-0.002**	-0.002***	-0.897*	0.046***	0.063***	0.042***	0.232***	-0.571***
	(-5.87)	(-2.11)	(-3.02)	(1.78)	(3.12)	(3.90)	(0.74)	(4.94)	(-4.36)
This table reports the OLS and quantile regression estimates for the relationship between firm characteristics and SOA estimated using Eq. 5. SOA measures degree of dividend smoothing inversely. Therefore, higher quantiles represent low-smoothing firms while lower quantiles contain high-smoothing companies. All variables are defined in Appendix A. All the independent variables are the median estimates over the sample period (2000-2015). The OLS estimates are based on robust standard errors, while those of quantile regressions are based on bootstrapped standard errors obtained using 1000 replications. *, **, *** Significant at the 10, 5, and 1 percent levels, respectively									

The next four proxies are related to testing the agency effect on dividend smoothing. Growth firms are considered to have lower agency costs of free cashflows (Jensen 1986). Therefore, if smoothing takes place to mitigate agency conflicts, growth firms should smooth less. The OLS coefficient for growth is positive and significant in accordance with the agency explanations. However, our quantile regression estimates indicate that the growth coefficient loses its significance at 25th and lower quantiles of the smoothing distribution. As far ownership concentration, under agency cost explanations, we expect its negative (positive) impact on dividend smoothing given the Type I (Type II) nature of agency problems faced by firms (Jensen and Meckling 1976, La Porta *et al.* 2000). Our results from the OLS show that higher concentration of ownership is positively related to SOA, which is consistent with agency cost view based on Type I conflicts. We also note a similar tendency in the low-smoothing firms as indicated by the quantile regression estimates in the higher SOA quantiles. However, at lower SOA quantiles where high-smoothing firms are represented, ownership concentration becomes positive but insignificant. Next, the OLS results on free cashflow, however, contradict the agency cost explanation that suggests a higher smoothing as more free cash is available. However, when we look at the broader frame through quantile regression, we observe that even this relationship is contingent upon the location of the smoothing distribution. For the high-smoothing firms, the cashflow variation has no significant impact on the degree of dividend smoothing. Finally, we apply payout ratio as another agency cost proxy as higher payouts are

linked with lower agency costs. Estimates from both OLS and quantile regression at low-smoothing quantiles suggest that smoothing is tied to lower payout ratios. This means that firms in general and those smoothing low in particular pay lower level of dividends. This findings contradicts earlier findings by Leary and Michaely (2011) who reported that smoothing and payout levels are positively related. The fact that US firms have more financing options as compared to Pakistani firms explains these contrasting findings. As US firms might be able to get external financing more easily, they are able to pay higher and stable or smoothed dividends. Nonetheless, the evidence for high-smoothing firms is again supporting the reputational effect as the coefficients of payout ratio for the 5th and 10th quantiles are insignificant at the desired level of confidence.

Taken as a whole, we find a distinct relationship between dividend smoothing and agency cost proxies for the high- and low-smoothing firms. Smoothing declines with ownership concentration, free cashflows, payout level and growth. These effects, however, hold largely for the low-smoothing firms while the reputational effect is more dominant in determining the dividend smoothing of high-smoothing firms.

Table 4. Tests for equality of beta coefficients across quantiles

		5 th Quant	10 th Quant	25 th Quant	50 th Quant	75 th Quant	90 th Quant
10 th Quant	<i>F-statistic</i>	8.30					
	<i>Sig</i>	0.00					
25 th Quant	<i>F-statistic</i>	22.80	6.46				
	<i>Sig</i>	0.00	0.00				
50 th Quant	<i>F-statistic</i>	18.86	10.25	9.58			
	<i>Sig</i>	0.00	0.00	0.00			
75 th Quant	<i>F-statistic</i>	47.19	14.32	20.75	27.64		
	<i>Sig</i>	0.00	0.00	0.00	0.00		
90 th Quant	<i>F-statistic</i>	16.16	10.07	16.66	21.52	5.13	
	<i>Sig</i>	0.00	0.00	0.00	0.00	0.00	
95 th Quant	<i>F-statistic</i>	17.56	13.75	16.10	13.31	7.62	2.14
	<i>Sig</i>	0.00	0.00	0.00	0.00	0.00	0.00

Note: This table reports the results of *F*-test and respective *p*-values performed to test the equality of estimated slope coefficients of all the independent variables across quantiles corresponding to Table 3. The tests are based on the bootstrap method involving 1000 replication.

4.3 Robustness checks

We ran a series of robustness checks to validate our findings. First, we employed a bootstrap method to test whether the differences in the estimated coefficients of the variables across various smoothing quantiles are significant (Chuang, Kuan and Lin 2009, Li, Sun and Zou 2009). The results for the *F*-tests and the related *p*-values for the equality of estimated slope coefficients are illustrated in Table 4. We find that in all pairs of the smoothing quantiles, the joint hypothesis that the covariates have an identical impact on the dividend smoothing is rejected at 1% level. This indicates that the relationships between the firm characteristics and dividend smoothing varies significantly across smoothing quantiles suggesting that the information and agency cost effects on dividend smoothing policies of high- and low-smoothing firms are distinct.

Isolating the impact of industry-specific factors such as business environment, payout policies trends, and competitiveness is important because of its possible influence on smoothing policy. Therefore, we performed the extended analysis adding the industry dummies in the model to test the robustness of our results to industry influences. Results are reported in Table 5. We note that almost all the firm-specific proxies of asymmetric information and agency cost exhibit the similar behaviour as in Table 3 above. The *F* tests for equality of coefficients across various quantiles are reported in Table 6.

We also applied the approach of estimating our regression model with alternative specifications and variables. To do this, we ran the regression (unreported) with an alternative proxy of dividend smoothing as proposed in Leary and Michaely (2011). Finally, we also used some alternative proxies for measuring information asymmetry and agency costs. For example, we estimated the model with different specifications using log of total sales for size (Kirch *et al.* 2012), years since the firm first appeared on OSIRIS database for history (Leary and Michaely 2011), and the average increase in sales for growth. Our results stood robust to all these sensitivity checks. The information and agency effect existed for all the regression using OLS method. In all these regressions our main findings supported the previous studies in that we found that dividend smoothing was more prevalent among the firms with lower agency and information asymmetry problems. These findings contradict the dividend smoothing theory. However, our quantile regression estimates revealed that much of this disagreement

was found among the low-smoothing firms; whereas for the high-smoothing firm's reputational effect was more profound.

Table 5. OLS regression and quantile regressions of dividend smoothing on its determinants with industry dummies

	Size (+)	History (+)	Tangibility (+)	Risk (-)	Growth (-/+)	Own. Con. (-/+)	Free cashflow (-)	Payout ratio (-/+)	Cons.
OLS Regression									
	-0.001***	-0.004***	-0.256***	-0.746**	0.050***	0.081	0.012**	0.076**	-0.127**
	(3.07)	(2.69)	(2.59)	(-2.26)	(2.82)	(0.81)	(2.32)	(2.31)	(3.20)
Quantile Regression									
SOA Quantile									
High-smoothing firms (HSF)									
Q5	-0.031	-0.002	-0.290	-2.921***	0.031	0.321*	0.025	-0.010	-1.524***
	(-1.01)	(-1.05)	(1.80)	(-7.73)	(2.13)	(1.66)	(0.18)	(0.14)	(-6.33)
Q10	-0.164	-0.034	1.383	-8.585***	9.287*	0.112	0.003	0.067	-1.095***
	(-1.19)	(-0.43)	(3.80)	(-2.73)	(1.25)	(0.40)	(0.01)	(0.28)	(-4.60)
Moderately-smoothing firms (MSF)									
Q25	-0.018***	-0.002***	-0.116***	-1.038***	0.053	0.070*	0.022***	-0.005	-1.105***
	(-3.74)	(5.35)	(2.96)	(-11.55)	(0.78)	(1.70)	(2.84)	(0.21)	(-19.42)
Q50	-0.033***	-0.002***	-0.051***	0.179***	0.044**	0.034	0.007**	-0.026	-1.069***
	(-6.18)	(6.49)	(-1.33)	(-3.30)	(2.18)	(0.80)	(2.43)	(1.18)	(-15.55)
Q75	-0.006***	-0.003***	-0.012***	-0.832***	0.139***	0.070	0.021***	0.013**	.100**
	(-4.85)	(5.36)	(0.18)	(-5.02)	(8.29)	(1.63)	(2.80)	(2.26)	(2.62)
Low-smoothing firms (LSF)									
Q90	-0.036***	-0.004***	-0.113***	-2.191***	0.115**	0.084**	0.043**	0.052**	.570***
	(4.94)	(3.30)	(-3.20)	(-10.50)	(2.47)	(2.42)	(3.86)	(2.09)	(3.34)
Q95	-0.024***	-0.003***	-0.036***	-2.959***	0.300***	0.003**	0.021**	0.012**	.571***
	(3.58)	(2.70)	(-2.62)	(-11.40)	(2.73)	(2.05)	(3.34)	(1.95)	3.17

Table 6. Tests for equality of beta coefficients across quantiles

		5 th Quant	10 th Quant	25 th Quant	50 th Quant	75 th Quant	90 th Quant
10 th Quant	<i>F-statistic</i>	3.65					
	<i>Sig</i>	0.00					
25 th Quant	<i>F-statistic</i>	3.95	3.92				
	<i>Sig</i>	0.00	0.00				
50 th Quant	<i>F-statistic</i>	10.49	41.60	4.71			
	<i>Sig</i>	0.00	0.00	0.00			
75 th Quant	<i>F-statistic</i>	15.02	91.05	14.03	16.72		
	<i>Sig</i>	0.00	0.00	0.00	0.00		
90 th Quant	<i>F-statistic</i>	24.68	17.96	113.81	20.06	3.60	
	<i>Sig</i>	0.00	0.00	0.00	0.00	0.00	
95 th Quant	<i>F-statistic</i>	46.26	114.67	50.83	59.63	40.42	7.45
	<i>Sig</i>	0.00	0.00	0.00	0.00	0.00	0.00

Note: This table reports the results of *F*-test and respective *p*-values performed to test the equality of estimated slope coefficients of all the independent variables across quantiles corresponding to Table 5. The tests are based on the bootstrap method involving 1000 replication.

Conclusion

Our goal in this study is to address this so-called dividend smoothing puzzle. We extend the work of Leary and Michaely (2011) to explain the causes of high-smoothing among the firms with lower information and agency problems. Invoking reputational considerations arising from the firm's prior tendency towards smoothing, we argue that higher propensity towards smoothing cultivates firm's market reputation as a high-smoothing firm over the time. Markets start expecting smoothed dividends from these firms making it difficult for the firms to deviate from their current level of smoothing. This reputational effect then plays a more dominant role especially in the dividend smoothing decisions of the high-smoothing firms. Our quantile regression estimates confirm these hypotheses. We show that while the information and agency effects are prevalent among Pakistani firms, their significance is confined only to the low-smoothing quantiles, or low-smoothing firms. On the other hand,

reputational effects dominate the high-smoothing quantiles, or high-smoothing firms, where most of the asymmetric information and agency cost proxies turn insignificant suggesting that high-smoothing firms continue to smooth high regardless of the changes in the market frictions.

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Appendix A: Variables Defined

Variables	Definition
<i>Dependent variables</i>	
Dividend Smoothing (DS)	(a) Speed of Adjustment (Lintner, 1956)
<i>Independent variables</i>	
Size (SIZ)	Natural logarithm of total assets
Age (AGE)	Number of years since incorporation
Tangibility (TANG)	Ratio of net fixed assets to total assets
Risk (RISK)	The standard deviation of the ratio of EBIT to total assets ratio over the sample period
Growth (GROW)	Average growth in total assets over the sample period.
Payout ratio (POR)	Ratio of ordinary dividends to net income
Ownership concentration (OWN1)	Percentage of shares held by the largest shareholder
Ownership concentration (OWN3)	Average of the percentage of shares held by the three largest shareholders.
Free cashflow (FCF)	Operating income before depreciation minus interest expense, taxes, preferred dividends, and ordinary dividends, scaled by total assets
Leverage (LEV)	Ratio of total debt to total assets

Inflation Rate, Exchange Rate Volatility and Exchange Rate Pass-Through Nexus the Nigerian Experience¹

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Abstract

In recent times, the Nigerian economy has been experiencing significant exchange rate fluctuations, particularly depreciation in the foreign exchange market which has been accompanied with inflation. Thus, this paper investigates the degree of pass-through of the official and parallel exchange rates to inflation as well as the relationship between exchange rate volatility and inflation in Nigeria based on monthly time series data (January 2006 to December 2015). In achieving its objectives, the study employs the Generalised Auto Regressive Conditional Heteroscedasticity (GARCH), technique, which was complemented using Co-integration, Vector Error Correction Model, Variance Decomposition and Impulse Response techniques. The results suggest that the parallel exchange rate passes through to inflation in the short run while the official exchange rate passes through to inflation in the long-run exclusively. It also reveals that exchange rate volatility has a positive and significant effect on inflation in the long-run

Keywords: Exchange rate pass-through; exchange rate volatility; inflation; GARCH models; trade

JEL Classification: E31; F31; F37

Introduction

Macroeconomic performance is adjudged by three wide measures - inflation rate, output growth and unemployment rate of an economy (Ugwuanyi 2004). It is no wonder then that the issue of price stability, in addition to being the main aim of fiscal and monetary policy in both developed and developing countries, has also gained a huge amount of attention from economists and policy makers around the world.

Inflation can be defined generally as the persistent rise in the prices of goods and services in an economy. It has positive as well as negative implications. Inflation might be emphatically corresponding with growth at some low levels, but at higher levels inflation is liable to be unfavorable for growth (Doguwa 2012). The Central Bank of Nigeria (CBN) targets about 2% rate of inflation which shows that inflation can be a serious advantage to the economy especially during periods of economic stagnation. Inflation helps in debt settlement, creates employment and boost growth. The negative effects of high inflation, on the other hand, cannot be overemphasised. Examining countries such as Germany in the early 1920s, Hungary in mid 1940s and Zimbabwe in late 2000s, further strengthens this fact (Lopez 2012). Rising level of Inflation reduces the value of a currency which further erodes the purchasing power of money. It is usually associated with higher interest rates which results in low savings and discourages investment and long-term growth. It also erodes export competitiveness and leads to balance of payment deficit.

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Since 1980, inflation in the developing countries has doubled that of developed countries (Bleaney and Fielding 1999). Average inflation rates in more advanced countries have taken various patterns in recent years, trending downwards after 2012 in developed countries, while remaining constant or expanding further in developing countries (Global Economic Prospects 2014). The trend of inflation in Nigeria has been characteristically positive ranging from creeping to running inflation. Doguwa (2012) finds that inflation is inimical to growth when it approaches 10.5 to 12% in Nigeria. According to CBN's Statistical Bulletin (2005) high inflation was recorded in the early 1970's from 13.8% in 1971 to 16.0% in 1972 which could be explained by the oil boom period and the economic controls and measures that were introduced after the Biafra (civil war) of 1967 to 1970.

The oil glut of the early 1980's which led to high prices of oil in the domestic market marked another period of inflation in Nigeria which recorded 23.2% in 1983 and 39.6% in 1984. This led to the Structural Adjustment Programme (SAP) in 1986 which presented another inflation period in the late 1980's. According to Adelowokan (2012), one major problem in the post SAP era was exchange rate instability which led to high output volatility, higher cost of foodstuffs, lower wages and salaries and high unemployment thereby creating burden on the poor. The early 1990's (1992-96) also recorded high inflation at an average of 57% and in 1995 inflation was seen to be as high as 72.8%. Nigeria has recorded high volatility in inflation rates and these fluctuations should therefore be a concern and should be checked by the monetary authorities.

The increasing overdependence of the economy of Nigeria on imports makes it essential to frequently check the degree to which exchange rate fluctuations transmits to inflation in Nigeria (Ogundipe and Egbetokun 2013, Osuagwu and Nwokoma 2017, Adeleye *et al.* 2017). By definition, exchange rate connotes the rate at which one currency is traded for one another currency (Taguchi 2002). The modelling of exchange rate volatility has noteworthy ramifications for some monetary and budgetary matters as it alludes to the swings or vacillations in exchange rates over a timeframe (Thorlie, Song, Wang and Amin 2014). It is seen as the risk connected with sudden, unpredictable fluctuations in the level of the exchange rate (Adelowokan 2012).

There are a number of reasons to study the relationship between exchange rate volatility and inflation. Both exchange rate and inflation are important for the macroeconomic goal of price stabilisation. Secondly, when exchange rate changes, particularly depreciation, passes through to consumer prices resulting in inflation, exports will no longer become competitive due to high prices (Ito and Sato 2008). This is due to the fact that the high inflation eliminates export competitiveness that would have resulted from exchange rate depreciation; therefore, exchange rate becomes an ineffective in correcting balance of payment deficits and relieving debt burden. Ogundipe and Egbetokun (2013) gave four main reasons for studying exchange rate volatility in Nigeria: Firstly, Nigeria's economy is driven by the external sector, secondly, there is the need for a stable and strong currency, thirdly, the inflation in Nigeria has become endemic and so there is need to check the extent to which exchange rate volatility contributes to it, and lastly but not least is the need to make the external sector competitive

Prior to 1986, Nigeria had embraced the fixed exchange rate system which was upheld by trade regulations that incited disequilibrium in the economy preceding the presentation of Structural Adjustment Programme-SAP (Adelowokan 2012). The exchange rate had been relatively stable during this period. The SAP programme then introduced a second tier foreign exchange market that introduced the determination of exchange rate by forces of demand and supply thereby introducing the regime of flexible exchange rate which also created uncertainty in the foreign exchange market. Since then, Nigeria experienced significant exchange rate depreciations till date (Osabuohien 2016). For instance, on 19th February 2015, the exchange rate was devalued from 168 to 199 Naira per dollar while the Naira exchange rate reached 213.2 from 196.13 Naira per dollar in the parallel market. Since March the CBN rate has remained almost fixed at about 197 Naira per dollar while creating a huge gap and severe exchange rate volatility in the parallel market due to dollar scarcity. Inflation during this period, however, increased gradually from 8.1 in February to 9.01 in December, which has remained on the increase to the end of 2016 (Ministry of Budget and National Planning 2017). These significant exchange rate depreciations coupled with speculations about 2015 general elections alongside dwindling oil prices and fuel scarcity adversely affected the economy, businesses and investments and led to an endemic inflation in the economy.

Thus, this study differs from other studies by separating the pass-through effects of the official and parallel exchange rates and establishing the effects of their volatility on inflation based on monthly time series data. The study has four sections; after this introductory Section is the brief literature review. Section Two covers the theoretical framework and methodology, while Section three is the presentation and discussion of results. Section Four concludes with some recommendations for policy and further research.

1. Insights from the Literature

Exchange rate pass-through denotes the impact of a unit change in the exchange rate on consumer prices; thus, it is domestic inflation that can be ascribed to an initial variation in the nominal exchange rate (Aliyu, Yakubu, Sanni and Duke 2010). Volatility in exchange rate is the unexpected movement either upward or downward of the exchange rate over a given period. Therefore, exchange rate volatility is the risk that occurs when a currency depreciates or appreciates and is a high frequency term referring to short term fluctuations in exchange rate (Oloba and Abogan 2013). From the perspective of policy making, a low exchange rate pass-through reduces the effect of exchange rate fluctuations or exchange rate volatility on domestic demand and enables the exchange rate to absorb external shocks without destabilising price or output (Global Economic Prospects 2014). Presenting the case of oil-exporting countries, Snudden (2016) gave the caveat that in making efforts to stabilise the volatility of macroeconomic variables, budget-balance is preferable to other fiscal policy instruments. The above differ slightly from the submission of Bodenstein and Guerrieri (2008) that economic policies respond to volatility in inflation and output gap, after momentary shock in energy prices, and percolate diverse impacts. Therefore, one can surmise that a low degree of pass-through would limit the degree to which exchange rate volatility transmits into inflation rate in the economy.

The need for adjustments to structural disequilibria in advanced countries sequel to the Great Depression led to development of vast researches on exchange rate pass-through so as to determine a nominal anchor for inflation (Aliyu *et al.* 2010). However, although many authors highlight the connection between exchange rate volatility and exchange rate pass-through, the literature on the effect of exchange rate volatility is not as comprehensive as the one available on exchange rate pass-through (Albuquerque and Portugal 2005). Consequently, many authors have found out that pass-through rates have been diminishing over time. Burstein, Eichenbaum and Rebelo (2007) investigated the reason why the prices of non-tradable goods and services responded by so little after large devaluations motivated by the devaluations in the UK (1992), Korea (1997) and Uruguay (2002). The author found that in Korea, inflation stayed stable after the devaluation.

On the other hand, inflation climbed considerably in Uruguay after the devaluation. The devaluation in UK was generally little and was trailed by a gentle expansion and stable inflation. The model attributed this result to two situations: First, is a sticky non-tradable goods price and second, is the effect of real shocks connected with large devaluations which prompted a decrease in the price of non-tradable goods compared to traded goods. Gagnon and Ihrig (2004) investigated declining pass-through rates over-time in twenty industrial countries and found out that exchange rate pass-through to domestic prices has been declining since the 1980s and asserted the monetary policy may be the reason for the declining rate of exchange rate pass-through. This is closely related to a study on G-7 countries where the nexus between exchange rate pass-through and domestic prices particularly the prices of producer and consumer goods was articulated (Jiménez-Rodríguez and Morales-Zumaquero 2016).

Frankel, Parsley and Wei (2012), investigated slow pass-through in 76 countries using VAR analysis and found out that low pass-through rates were no longer unique to advanced countries as conventionally perceived as developing countries have recently been experiencing rapid downward trends in the level of short-run pass-through, and in the speed of adjustment. Campa and Goldberg (2005) also discovered that levels of pass-through are largely uncorrelated with country size, among others based on 25 Organisation of Economic Cooperation and Development (OECD) countries and that there is partial exchange rate pass-through in the short-run, however over the long-run, pass-through is complete and common in imported goods. This is similar to the recent observation made by Goldberg and Tille (2016) regarding Canadian international trade and how it influences exchange rate given rigidities in prices.

Existing studies on exchange rate volatility on the other hand, have produced diverse results. Albuquerque and Portugal (2005) in order to investigate the relationship between exchange rate volatility and inflation in Brazil from 1999 found out that the relationship between exchange rate volatility and inflation is semi concave. Using bivariate Generalised Auto Regressive Conditional Heteroscedastic (GARCH) technique, the results from his results revealed that when volatility is very high, inflation response is low and the impacts are little, and therefore assumed that firms adopted a “wait and see” strategy when volatility is high in the short-run. This also aligns with the findings of Oloba and Abogan (2013) and Bobai, Ubangida and Umar (2013) in Nigeria. On the contrary, Adeniji (2013) investigated this relationship and found positive and significant relationship between exchange rate volatility and inflation from 1986 to 2012 in Nigeria using the Vector Error Correction Mechanism (VECM). Exchange rate volatility also has negative implications for other aspects of the economy. In a more recent study, Asaleye, Okodua, Oloni and Oguntobi (2017) using the VAR approach posit that high rate of inflation and

exchange rate fluctuations can hamper employment generation in Nigeria, and recommend the need for the government to use interest and exchange rates effectiveness in enhancing trade competitiveness and improving economic growth in Nigeria.

Arize, Osang and Slottje (2008) examined the effect of exchange rate volatility on export movements in eight Latin American countries from 1973 to 2004 using Co-integration and VECM and found out that the real exchange rate volatility affects the demand for exports negatively in these countries in the short-run and long-run. Egwaikhide and Udoh (2008) estimated exchange rate volatility and fluctuations in inflation rate using GARCH between 1970 and 2005 and investigated its effect on Foreign Direct Investment (FDI) in Nigeria. Their results revealed that exchange rate volatility and inflation uncertainty has an adverse effect on FDI in Nigeria. In the case of Ethiopia, Berga (2012) using structural VAR submits that exchange rate pass-through (ERPT) between 1991 and 2011 was substantial, modest and consistent with respect to the price of import but not so with the price of consumer goods.

Another line of reasoning stems from the fact that in order to achieve a stable output, low inflation and exchange rate stability would be traded off. This is consistent with the findings of Bleaney and Fielding (1999) that there is the existence of a trade-off in choosing an exchange-rate system between inflation or exchange rate volatility and output volatility and that inflation tends to be 10% higher in a country that adopts floating exchange rate regime than a country that adopts the regime of fixed exchange rate. However, Devereux and Engel (2002) used a two-sector dependent-economy model to compare the properties of a series of different monetary rules and argued that the trade-off differs according to regime and that a flexible exchange rate policy that stabilises output can do so without high inflation and exchange rate volatility. Following this same line of thought, Adeniran, Yusuf and Adeyemi (2014) studied the effect of exchange rate volatility on economic growth (1986-2013) using OLS method. The results support previous studies which state that developing countries are comparatively well off in choosing flexible exchange rate regimes and reveals that the relationship between exchange rate and economic growth is positive but insignificant. Conversely, Akpan and Atan (2012) did not find significant connection between exchange rate movements and economic growth using gross domestic products (GDP) based on quarterly time series data in Nigeria (1986-2010). Therefore, exchange rate management is essential but it is neither adequate nor sufficient condition for reviving an economy.

2. Methodology

The theoretical backing establishing the interactions that exist between exchange rate and inflation is the Purchasing Power Parity (PPP) doctrine. As Dornbusch (1976) has noted, PPP posits that the rate at which exchange rate between any two currencies changes over a time frame is determined by the change in the two countries' relative price level. The also stated that the theory has also been referred to as the "Inflation Theory of Exchange Rates" as the theory asserts that the price level between two countries mainly determines exchange rate movements.

It is a common knowledge that the exchange rate parity does not hold across countries at every instant (Parsley 2012). This is because pass-through tends to be incomplete and prices sticky in the domestic country. However, Boyd and Smith (1998) tested PPP in 31 developing countries and found out relative PPP holds almost exactly in the long-run. The result is also consistent with Taylor and Taylor (2004) elucidation of the general perspective of the PPP debate; that in the short-run PPP due to incomplete pass-through does not hold whereas in the long-run PPP may hold as the real exchange rate reverts to its mean. The Purchasing Power Parity theory was adopted in this study. Adeoye and Atanda (2012) analysed the consistency, persistency and severity of volatile exchange rate in Nigeria using the PPP axiom to analyse consistency and ARCH and GARCH models to analyse the sternness of exchange rate volatility (1986-2008). The result indicated the existence of extreme volatility shocks and that both the real and nominal exchange rates are not consistent with basic view of the long-run PPP model.

The model adopted in this study are in two strands namely; The Generalised Auto Regressive Conditional Heteroscedastic (GARCH 1,1) Model and the Vector Auto Regressive (VAR) Model. The GARCH model is used for the estimation of exchange rate. The GARCH model is preferred over the standard deviation because it is sensitive to outliers and volatility clusters. It consists of a mean equation and a variance equation. The mean equation is specified as follows:

$$INFL_t = \pi_0 + \pi_1 EXOF_{t-1} + \pi_2 EXPARL_{t-1} + \mu_t \quad (1)$$

where: $INFL_{t-1}$, $EXOF_{t-1}$ and $EXPARL_{t-1}$ are the current inflation rate, previous session of the official and parallel exchange rate respectively. π_1 is the coefficient of exchange rate while μ_t is the stochastic term of the

model. The a priori expectation sign is $\pi_1 > 0$ and $\pi_2 > 0$.

The GARCH model permits the conditional variance to depend on its lagged values, therefore the conditional variance in this case is:

$$\delta^2_t = \alpha_1 + \alpha_2 \mu^2_{t-1} + \lambda_1 \delta^2_{t-1} \quad (2)$$

where: α_1 is the log run average variance which is constant, μ^2_{t-1} is the news about volatility perceived in the previous period (ARCH term), δ^2_{t-1} is the lagged variance of exchange rate (GARCH term), δ^2_t is known as the conditional variance (i.e the variance of the error term derived from equation (1)). It is one-period forward forecast variance based on past information and is also known as the exchange rate volatility which would be plugged into VAR model.

Following this model, the econometric model for this study follows insights from Chuba (2015) but with slight modifications. The model consists of two equations in order to analyse the effects of the official and parallel exchange rates separately which is specified as:

$$\text{INFL} = f(\text{ERV}, \text{MSP}, \text{INTR}, \text{OILP}, \text{EXOF}, \text{EXPARL}) \quad (3)$$

The explicit form of equation 3 is denoted as follows:

$$\text{INFL}_t = \beta_0 + \beta_1 \text{ERV}_t + \beta_2 \text{MSP}_t + \beta_3 \text{INTR}_t + \beta_4 \text{OILP}_t + \beta_5 \text{EXOF}_t + U_t \quad (4)$$

$$\text{INFL}_t = \beta_0 + \beta_1 \text{ERV}_t + \beta_2 \text{MSP}_t + \beta_3 \text{INTR}_t + \beta_4 \text{OILP}_t + \beta_5 \text{EXPARL}_t + U_t \quad (5)$$

From equation 4 and 5, the VAR model can be expressed as:

$$\text{INFL}_t = \beta_0 + \beta_1 \text{ERV}_{t-1} + \beta_2 \text{MSP}_{t-1} + \beta_3 \text{INTR}_{t-1} + \beta_4 \text{OILP}_{t-1} + \beta_5 \text{EXOF}_{t-1} + U_t \quad (6)$$

$$\text{INFL}_t = \beta_0 + \beta_1 \text{ERV}_{t-1} + \beta_2 \text{MSP}_{t-1} + \beta_3 \text{INTR}_{t-1} + \beta_4 \text{OILP}_{t-1} + \beta_5 \text{EXPARL}_{t-1} + U_t \quad (7)$$

where INFL_t = Inflation Rate at time t, ERV_t = Exchange Rate Volatility at time t, MSP_t = Broad money supply at time t, INTR_t = Interest rate at time t, OILP_t = Oil price at time t, EXOF_t = Official exchange rate at time t, EXPARL_t = Parallel exchange rate at time t and U_t = error term. The a priori expectation is such that $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 > 0$.

To test the empirical evidence, the Johansen Co-integration technique was used to determine the long-run relationships among the selected variables. Co-integration ensures that the linear combination of variables are stationary while regression analysis using ordinary least squares (OLS) based on time series data discretely assumes all values to be stationary which may not always be the case. The regression of time series data that is non-stationary will lead to biased regression thereby leading to misleading results. The restricted VAR (or VECM) would also be used to define the short-run relationships among the variables. However, the coefficients from VAR are often difficult to interpret and so further interpreted with estimates from impulse response (IR) function (Gujarati 2003). Therefore, the impulse response (IR) function and the approach of Variance Decomposition (VD) was used to further investigate interrelationships among the variables for this study. A similar approach was done by Osabuohien and Egwakhe (2008) and Olokoyo, Osabuohien and Salami (2009). The econometric software that was used for this study was E-views 7. Monthly time-series data (January 2006 - December 2015) in Nigeria sourced from CBN was used in estimating the stated model above.

3. Results and Discussions

The unit root test was first conducted to test for stationarity of each variable. The GARCH model is used to test for volatility, the Johansen co-integration is used to estimate the long-term relationship among the variables, Vector Error Correction Model (VECM) is used to estimate the speed of adjustment while the IR and VD functions is show the reaction of inflation to shocks from the independent variables.

3.1 Unit Root Test

The Augmented Dickey-Fuller (ADF) test was used for this research. The rule of thumbs for the unit root test is such that; if the absolute value test (ADF test) statistic is higher than the critical value (e.g. at 5%), we reject the null hypothesis (H_0) that the variables are non-stationary and if less, we accept the null hypothesis.

Table 1 Unit Root Test results

Series	ADF Statistic	CV at 5%	Order of Integration	Rank
LINFL	-3.7814	-2.8861	I(1)	Stationary
LERV	-4.5565	-2.8884	I(1)	Stationary
LINTR	-12.5990	-2.8861	I(1)	Stationary
LMSP	-10.3739	-2.8861	I(1)	Stationary
LOILP	-7.3925	-2.8870	I(1)	Stationary
LEXOF	-9.0401	-3.4483	I(1)	Stationary
LEXPARG	-7.6718	-3.4483	I(1)	Stationary

Note: CV is critical value

Source: Authors' computation using E-Views 7.0

When the variables, namely: LINFL, ERV LINTR, LMSP, LOILP, LEXOF and LEXPARG are integrated of order I(1), the ADF test statistics are higher than their critical values at 1 and 5%, respectively, in absolute terms. So, it can be said that they are stationary at first difference. Co-integration hypothesis states that you only attempt a linear combination of series that are integrated of the same order. The study adopts the unit root at first difference; because all variables are stationary of order 1 (at first difference).

3.2. The Estimation of GARCH Model

The Generalised Auto Regressive Conditional Heteroscedastic (GARCH) model was engaged in testing for the impact of exchange rate volatility on Inflation from 2006M1 to 2015M12 and the results as reported in Table 2 shows that both the volatility of the official and parallel exchange rates have negative effects on inflation in the short-run. This implies that a 1% rise in the parallel exchange rate volatility or official exchange rate volatility would lead to a less proportionate decrease in inflation by about 0.003%.

Table 2. GARCH result

Mean Equation				
Variable	Coefficient	Std. Error	z-Stat	Prob.
DLEXPARG	0.114	0.065	1.751	0.080
DLEXOF	-0.046	0.048	-0.970	0.332
C	-0.003	0.002	-1.196	0.232
Variance Equation				
C	0.000	0.000	1.556	0.120
RESID(-1) ²	0.735	0.221	3.325	0.001
GARCH(-1)	0.067	0.256	0.261	0.794
DLEXPARG	-0.003	0.0014	-2.444	0.0145
DLEXOF	-0.003	0.0036	-0.087	0.9309
R-squared	0.2279	Mean var		-0.006
Adjusted R2	0.0059	S.D. var		0.0412

Note: Dependent Variable is DLINFL $GARCH=C(4)+C(5)*RESID(-1)^2+C(6)*GARCH(-1)+C(7)*DLEXPARG +C(8)*DLEXOF$

The mean equation reveals a positive and significant relationship between the parallel exchange rate and inflation in Nigeria at the 10% level however the co-efficient shows that pass-through is low and inelastic in the short-run. It also reveals a negative but not significant relationship between official exchange rate and inflation which means the official exchange rate does not pass-through to inflation that in the short-run. The addition of the ARCH and GARCH components (0.73 and 0.067) is less than one; therefore, we can conclude that volatility is not persistent.

Table 3. Unrestricted Co-integrating Rank Tests

TRACE Statistic				
Hypothesised		Trace	5 %	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.3893	119.2191	95.7537	0.0005
At most 1	0.1991	61.5144	69.8189	0.1918
At most 2	0.1531	35.5317	47.8561	0.4203
At most 3	0.0853	16.0826	29.7971	0.7064
At most 4	0.0430	5.6570	15.4947	0.7356
At most 5	0.0043	0.5090	3.8415	0.4756
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				

MAXIMUM EIGENVALUE				
Hypothesised		Max-Eigen	5 %	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.3893	57.7047	40.0776	0.0002
At most 1	0.1991	25.9828	33.8769	0.3218
At most 2	0.1531	19.4490	27.5843	0.3806
At most 3	0.0853	10.4256	21.1316	0.7040
At most 4	0.0430	5.1480	14.2646	0.7230
At most 5	0.0043	0.5090	3.8415	0.4756
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				

Source: Same as Table 1

Based on unit root test, all the variables are integrated of order one $I(1)$, therefore we can then proceed to co-integration. The co-integration test was analysed with a view to determining the nature of the long-run nexus between exchange rate volatility. The result of the co-integration rank test in Table 3 reveals that there is one co-integration equation for both the Trace and the Max-Eigen statistics at the 5% level. The results from the Johansen cointegration test are displayed in Table 4. The test statistics is used to show the significance of the independent variable in the long-run. The rule of the thumb is that if the test (T) statistics is approximately equal to 2 or greater than 2, the variable is statistically significant; however, if the T-statistics is less than 2, the variable is not statistically significant. Another quick way of checking the significance (or not), is to look at the probability value (p-value); where less than 0.01, 0.05 and 0.1 indicate significant at 1, 5, and 10%, respectively.

From the results in Table 4, it is established that there is a positive and significant relationship between exchange rate volatility and inflation rate in the long-run. An increase of 1% in exchange rate volatility leads to a more than proportionate increase in inflation by about 2%. This means that a stable exchange rate is necessary to curb inflation in Nigeria. The result shows that there is a negative relationship between interest rate and inflation. An increase of 1% in interest rate would lead to about 0.06% and 0.6% less proportionate decrease in inflation for model 1 and 2, respectively and vice versa. This is theoretically expected as increased interest rates increases savings rate and decreases current consumption. However, this relationship is insignificant judging by the t-stat of 0.0990 and 0.7282, respectively. There is also a positive and significant relationship between money supply and inflation in the long-run based on the result. This is expected following the quantity theory of money. Thus, when money supply increase by 1%, it will lead to a more than proportionate increase in inflation by about 3% for the official exchange rate equation and 6% for the parallel exchange rate equation, and vice versa.

Table 4. Co-integration result

Normalised co-integrating coefficients		T- statistic []			
LINFL 1	LERV	LINTR	LMSP	LOILP	LEXOF
	-1.9852	0.0634	-3.1374	0.6036	-3.8314
	[-7.4208]	[0.0990]	[-2.76]	[0.5776]	[-0.9513]
LINFL 1	LERV	LINTR	LMSP	LOILP	LEXPART
	-2.2124	0.6020	-8.0564	5.1675	8.597
	[-6.3079]	[0.7282]	[-6.46]	[3.8243]	[2.2644]

Source: Same as Table 1

The result however reveals a negative relationship between oil price and inflation. A reduction of 1% in oil price would increase inflation less proportionately by about 0.6% and more than proportionately by 5% for model 1 and 2, respectively and vice versa. This is not theoretically expected but could be attributed to the structure of the Nigerian economy during this period. Since, the Nigerian economy depends mostly on oil for her exports, a decrease in oil price worsens the terms of trade balance and depreciates the exchange rate, thereby making imports more expensive and making consumer prices to rise. This relationship however is insignificant for the official exchange rate equation but significant for the parallel exchange rate equation.

Also, in the long-run, an increase of 1% in the parallel exchange rate would lead to a more than proportionate decrease in inflation by about 9% which is significant while 1% increase in the official exchange rate would lead to more than proportionate increase in inflation by about 4% but is insignificant. This shows that in the long-run, the official exchange rate passes through to inflation while the parallel exchange rate does not.

The presence of co-integration relationship between the variables means that the restricted VAR (VECM) should be used for the estimation. The VECM limits the log run behaviour of dependent variables to incorporate

short-run disequilibria. The short-run deviations are corrected through series of adjustments. To satisfy the stability condition the VECM should have a negative sign, lie between 0 and 1 and be statistically significant.

The co-efficient of the stochastic term is negatively signed and statistically significant for both models. This shows that there a long-run convergence between inflation and the exogenous variables. The co-efficient shows that for model 1 and 2 about 0.46% and 0.3% of errors in the current period will be corrected in the subsequent period respectively which implies a slow speed of adjustment. This slow speed could be attributed to sticky prices *i.e.* prices take time to adjust downwards and so when there is short disequilibrium, it takes a long time before it converges to its long-run equilibrium.

Table 5. Vector Error Correction Results

Equation 1		Equation 2	
Dependent	D(LINFL)	Dependent	D(LINFL)
ECM	-0.0046 [-3.9814]	ECM	-0.003 [-3.5014]
D(LINFL(-1))	0.8621 [20.5290]	D(LINFL(-1))	0.825 [18.1068]
D(LERV(-1))	-0.0064 [-2.5331]	D(LERV(-1))	-0.0048 [-1.9846]
D(LINTR(-1))	-0.02786 [-1.4436]	D(LINTR(-1))	-0.0216 [-1.1072]
D(LMSP(-1))	-0.00486 [-0.1188]	D(LMSP(-1))	-0.0158 [-0.3857]
D(LOILP(-1))	0.0329 [1.6813]	D(LOILP(-1))	0.0393 [1.8678]
D(LEXOF(-1))	-0.03628 [-0.4574]	D(LEXPARG(-1))	0.0067 [0.1112]
C	-0.00018 [-0.10044]	C	-0.0003 [-0.1815]
R-squared	0.8273	R-squared	0.8230
Adjusted R-squared	0.8162	Adj. R-squared	0.8116
F-statistic	74.5810	F-statistic	72.3860

Source: Same as Table 1

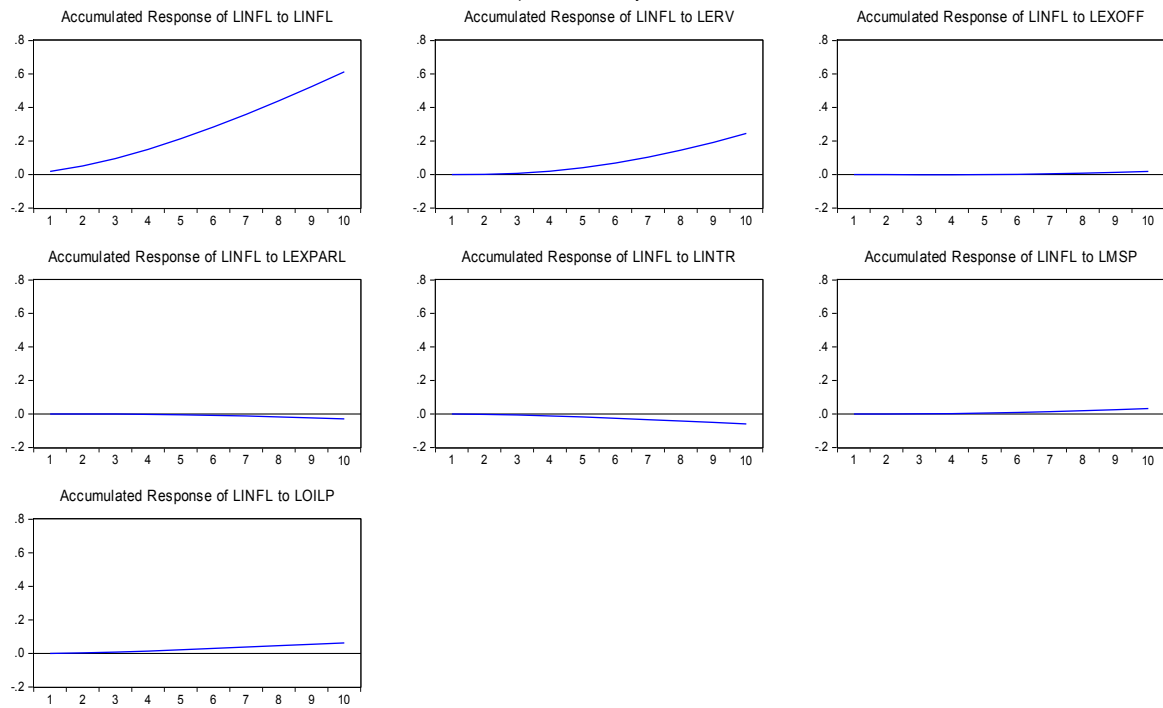
The result of the estimation for the official exchange rate equation shows that the explanatory variables account for about 83% of the variations in inflation and 82% for the parallel exchange rate equation. The results of the estimation give the short-run relationships among the variables. The result reveals that exchange rate volatility is the only significant variable and has a negative relationship with inflation in the short-run. The results of the estimation of the remaining variables follow a priori expectations apart from money supply. The negative relationship between money supply and inflation could be due to the fact that broad money supply includes time and savings deposits which are not yet in circulation and do not contribute to inflation in the short-run.

3.3. Impulse Response and Variance Decomposition Analyses

The impulse response function displays the accrued reaction of inflation to a shock in standard deviation to each of the variables. From the plots in Figure 1, the influence of exchange rate volatility on inflation over the 10 period interval is evident. From the Figure 1 below the immediate effect of a shock to LERV at say period 9 is about 24% increase in inflation. The impact of the above shock is pronounced as the interval increases.

The information in Figure 1 shows that there is no relationship between inflation and shocks to the variables throughout the 1st period. However, from the 2nd to the 10th period inflation showed a positive response to shocks from exchange rate volatility and oil price throughout, while the positive response started from the 3rd period for money supply shocks and 6th period for the official exchange rate. The accumulated reaction of inflation to the parallel exchange rate and interest rate is negative throughout the period.

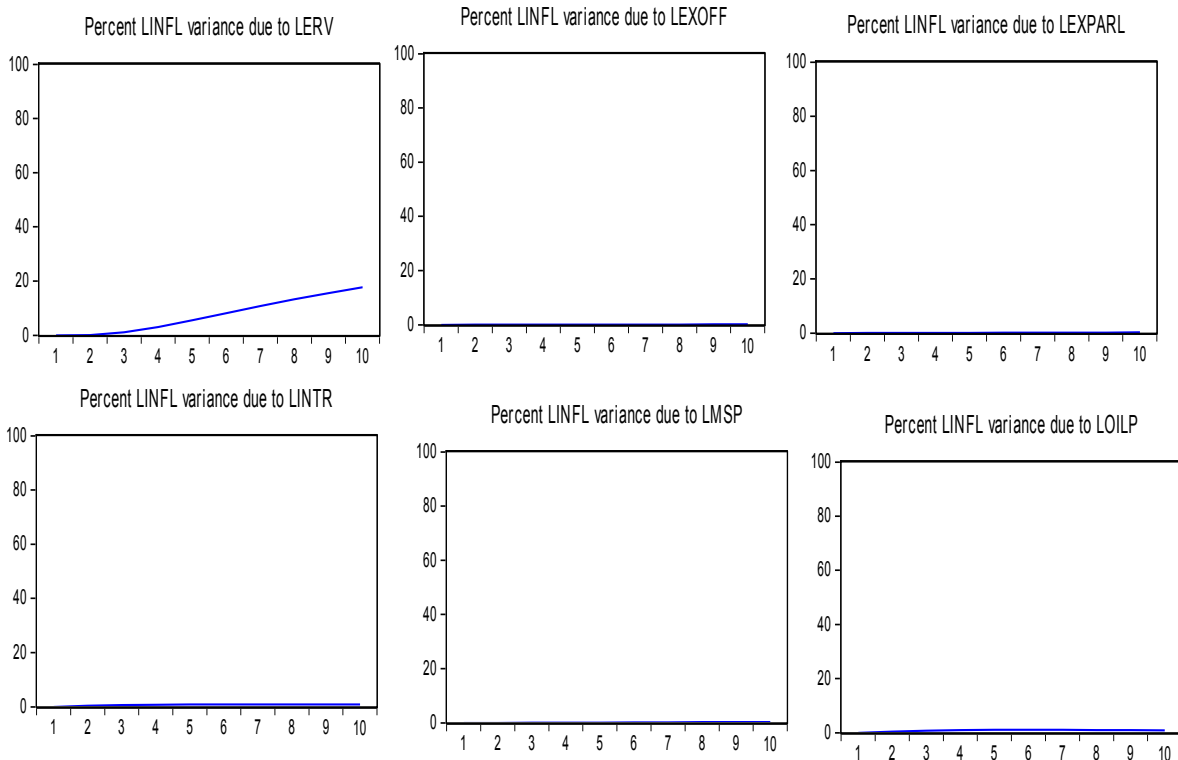
Figure 1. The Accumulative Response of Inflation



Source: The Authors'

Variance decomposition analysis represented in Figure 2 shows the relative contributions of shocks in the independent variables to inflation variance (*i.e.* changes in inflation). The variance decomposition of inflation has shown that in the first period none of the independent variables could explain changes in inflation. While exchange rate volatility caused significantly large changes in inflation, other variables caused relatively smaller changes in inflation. For instance, in the 7th period, exchange rate volatility, interest rate, money supply and oil price account for about 10 units, 0.87 unit, 0.19 unit. and 1 unit changes in inflation, respectively.

Figure 2 Variance Decomposition of Inflation



Source: The Authors'

Conclusion and Recommendation

This study examines the degree of pass-through of the official and parallel exchange rates to inflation as well as the relationship between exchange rate volatility and inflation in Nigeria based on monthly time series data from January 2006 to December 2015). The Generalised Auto Regressive Conditional Heteroscedasticity (GARCH), Cointegration, Vector Auto Regression (VAR) analysis, Impulse Response Function and Variance Decomposition techniques were used in examining the relationship. Inflation is modelled as a function of exchange rate volatility, official and parallel exchange rate, interest rate, money supply and oil price.

The GARCH and VECM results reveal that there is a negative and significant relationship between exchange rate volatility and inflation in the short-run while the co-integration result reveals a positive significant relationship in the long-run. The short-run result supports the work of Albuquerque and Portugal (2005), which showed that when volatility is high, inflation response is reduced as firms adopt a “wait and see” strategy. The impulse response and variance decomposition functions also reveal that exchange rate volatility is very significant in determining inflation response and variance. The results also reveal that the parallel exchange rate only passes through to inflation in the short-run while official exchange rate only passes through to inflation in the long-run. This means that the higher official exchange rate would generate a poor inflation response in the short-run and its effects would only be revealed in the long-run. Also, the results in this present study suggest that exchange rate pass through is low in the short-run. This corroborates previous studies such as Frankel, Parsley and Wei (2012), Campa and Goldberg (2005), and Thameur and Daboussi (2014) where it has been established that the notion of sticky prices is expected.

Furthermore, it was found that interest rate is negative but not significant in determining inflation both in the long and short-run. Broad money supply has a negative insignificant relationship with inflation in the short-run due to time deposits but positive and significant in the long-run as theoretically expected. Oil price has a positive insignificant relationship with inflation in the short-run but negative in the long-run due to unfavourable terms of trade balance. Finally, the coefficient of error correction term indicates a rather a slow but significant speed of adjustment from the short-run distortion to long-run equilibrium due to sticky prices in the short-run.

From the results of the empirical study, the following recommendations are proposed to ensure price stability in Nigeria. Firstly, the Central Bank should strengthen the managed float system, such that the parallel exchange rates are left to freely operate through the workings of demand and supply, while the official exchange rate is strictly managed by the central bank so that it is not devalued to reflect the value of the currency operating in the parallel market. This is due to the fact that, the increases in the parallel exchange rate would affect inflation or may cause economic hardships only in the short-run but not in the long-run. However, a depreciation or devaluation of the official exchange rate would ultimately increase inflation over the long-run. Secondly, the government should set up proper approaches and procedures that will guarantee the support of an exceptionally stable exchange rate as this is an important determinant of inflation. Thirdly, there is need to provide foreign exchange in order to reduce dollar scarcity and bridge the parallel and official exchange rate. Therefore, the government should direct its spending to the yielding sectors of the economy including agriculture and manufacturing as this would go far in expanding the production of goods and services thereby stabilising the exchange rate.

This current study is confronted with some limitations as it relies on the dollar exchange rate for the model therefore the relationship may not be the same if other major currencies were added in the model. The scope (*i.e.* January 2006 to December 2015) was also limited by available data. Thus, complementing what has been done in this study, it is recommended future scholars should focus on using other alternate currencies such as the Euro to model the relationship between exchange rate and inflation. In further research, it may also be worthwhile to carry out a panel data analysis across countries to complement our findings.

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Earnings Quality: Does 'Principles Standards versus Rules Standards' Matter?

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Abstract:

This study examines the effect of adopting different accounting standards on earnings quality. Specifically, this study determines whether principles-based accounting standards provides different effect on earnings quality compared to rules-based accounting standards in terms of conservatism. This study uses content analysis on the annual reports of firms listed on the LQ-45 index at Indonesian Stock Exchange (IDX) in Indonesia to represent the principles-based accounting standards and the S&P 500 Dow Jones indices in the US to represent the rules-based accounting standards. The results of this study show a positive correlation between unconditional conservatism and earnings quality regardless whether the firms are adopting the principles-based accounting standards or the rules-based accounting standards. The results also show that principles-based accounting standards do not necessarily elevate earnings quality and are not necessarily better than the rules-based accounting standards. The findings in this study implicate that firms would have more opportunities and flexibilities to imply judgment in presenting their financial statements when adopting the principles-based accounting standards. This study provides evidence that earnings quality of principles-based accounting standards is not necessarily higher than the rules-based accounting standards.

Keywords: earnings quality; conservatism; principles-based accounting; rules-based accounting.

JEL Classification: L25; M41

Introduction

Earnings measurement is an important aspect for the external users of financial statement such as the investors as they often rely on the financial statements in deciding whether to invest or not to invest in a firm (Suprianto *et al.* 2017). The issue of earnings quality has received increased attention following the several number of fraud scandals such as the Enron and WorldCom in 2001. This issue was further aggravated with the significant requests of financial restatements during that period. The more recent accounting scandals such as Toshiba, Olympus, and Tesco in 2011 to 2015 have provided further indication that the new accounting standards have not been able to alleviate the weaknesses in the previous accounting standards. The consequence of poor earnings quality affects the reliability and relevance of financial information (Ismail and Elbolok 2011). Thus, it is important to understand the measurement process of earnings and the factors that may create distortion during such process (Lyimo 2014).

The recent shift of the accounting standards from the rules-based accounting standards to the principles-based accounting standards in Indonesia have somewhat affect the way the accountants account earnings in

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their firms. The accountants account for earnings differently from the past, as they are given more freedom in deciding which method to use in measuring earnings (Ismail and Elbolok 2011). Although the principles-based accounting standards have yet to identify specifically which method in measuring earnings, these standards are not as strict as the rules-based accounting standards. That is, the reporting and measuring of earnings are tailored towards fulfilling specific demands of related parties. However, such reporting and measurement of earnings quality are somewhat questionable.

One distinct difference between the principles-based accounting standards and the rules-based accounting standards is conservatism. While the Generally Accepted Accounting Principles (GAAP) permits the use of conservatism, the International Financial Reporting Standards (IFRS) attempts to eliminate conservatism in the accounting practices (Lawal, Olufemi, Adewuyi, & Olubukoye, 2018). Several studies supported the elimination of conservatism as it is considered to be meaningless and reduces earnings quality (Penman and Zhang 2002, Basu 2005). Other studies argued that conservatism can be used to prevent overstatement of assets and earnings and hence, increasing the earnings quality (Watts 2003, LaFond and Watts 2008). However, there is a lack of comparative study that has examined the effect of principles-based accounting standards versus the rules-based accounting standards on conservatism.

This study aims to examine the effect of adopting different type of accounting standards on earnings quality. Specifically, this study compares the effect of adopting principles-based accounting standards in Indonesia with the rules-based accounting standards adopted in the US on earnings quality. The results of this study can assist the regulatory bodies in determining the best approach to earnings measurement in the accounting standards.

1. Literature Review

1.1. Earnings Quality

Information about earnings is vital for analysts, since that is what major investors will look at when making decision. Analysts who often act on behalf of the investors and other capital provider lenders are afraid of misleading information, as it will cause wrongful transfers of wealth. Overstating earnings can cause overcompensation to managers and of consequence, the quality of the information in the financial report including the earnings needs critical attention from the accounting preparers. Consistent with the objective of financial reporting stated in the conceptual framework, which is to provide the external users with useful information for decision-making purposes, earnings quality is of interest to those who use financial information for investment purpose (Schipper and Vincent 2003). In general, earnings quality refers to as reported earnings before extraordinary items that are readily identifiable in the income statement (Penman and Zhang 2002). It provides an indication on the extent to which a firm's reported earnings are accurately reported in a particular period. High earnings quality provides good indicator of the future earnings namely, sustainable earnings (Ismail and Elbolok 2011). Therefore, a firm that would want to portray a strong signal about future earnings should avoid portraying low earnings quality. The earnings reported by the firms are often a function of their accounting methods since they are used as a measure of their firm success. The measurement of earnings quality however, is often subjective.

A surprising fact is that the accounting standards do not have definite specification on the earnings quality measurement. Although the conceptual framework provides the qualitative characteristics of financial statements namely, fair, relevance, faithful representation, comparability, verifiability, timeliness, and understandability, the accounting standards do not contain the exact measurements of those characteristics. The lack of coverage regarding measurements has prompted researchers to have different concepts of earnings quality. It is common for regular civilians and economy experts to measure a business performance based on earnings. Dechow and Schrand (2004) suggest that earnings quality reflects current operating performance. They note that high earnings quality could indicate future operating performance and accurately capitalizes the intrinsic value of the firm. Such notation aligns well with one of the qualitative characteristics of faithful representation. Dechow, Ge, and Schrand (2010) agree that earnings quality should reflects current operation performance. Specifically, based on reviewing over 300 studies of earnings quality, they suggest that high earnings quality provides information about a firm' financial performance that is relevant for decision-makers when they making specific decisions.

Dechow, Ge, and Schrand (2010) also provide three features of earnings quality: First, earnings quality is situational on the decision-relevance of the information. Thus, the term 'earnings quality' alone is meaningless and defined only in the context of a specific decision model. Second, the quality of a reported earnings depends on whether it is informative about the firm's financial performance and other aspects of which are unobservable.

Third, earnings quality is jointly determined by the relevance of underlying financial performance to the decision and the ability of the accounting system to measure performance. Schipper and Vincent (2003) relate earnings quality with decision-usefulness and Hicksian income. They define earnings quality as the measurement of how good or bad earnings faithfully represent Hicksian income, which is, conceptually, a change in total wealth. They focus on Hicksian income because it comes from the user-decision contexts; the accounting recognition rules, the effects of management's judgments and estimates, and the influence of auditors. According to Schipper and Vincent (2003), the idea of earnings quality comes from 1) time-series properties of earnings; 2) qualitative characteristics in the conceptual framework; 3) relationship between income, cash and accruals; and 4) decision. These concepts of earnings quality have one thing in common. The measurements are based on the qualitative characteristics provided by the conceptual framework. Ewert and Wagenhofer (2005) define earnings quality as the reduction of the market's assessment of the variance of the terminal value (liquidating cash flow) due to the earnings report.

1.2. Conservatism in Principle-Based Accounting

Even though it is clear that IFRS eliminates the aspects of conservatism, it does not indicate that the accountants are unable to act conservatively (Embring and Wall 2012). It indicates the freedom given to the accountants in applying their judgments that cause the conservative accounting to exist. For example: The fair value principle that is regulated in IFRS 13 (PSAK 68 in Indonesia). There are three levels of hierarchy in IFRS 13 namely, level 1, level 2, and level 3. Level 1 is the most prioritised over the other levels, as it is observable and available for many assets and liabilities. Level 2 involves observing how IFRS induces the accountants' judgment. Few of the level 2 inputs are quoted price for similar assets or liabilities from active or inactive market and observable implied volatility for specified assets or liabilities, *etc.* The inputs are also adjusted with the condition or the location of asset, the level in which the input is related with items comparable with asset or liabilities, or the volume of activities in the market where input is observable. Hence, the word "similar" can lead the accountants to provide different judgments. Level 3 inputs are by far provide the highest freedom given to the accountants in using their judgments because they are unobservable. The accounting standards further state that unobservable inputs reflect the assumptions, including the assumptions on risk. This is more or less the same reason used to apply conservative accounting mentioned by FASB. It is irony that even though the accounting standard permits a firm to develop unobservable inputs with their own information, the "weapon" for combating conservatism is the one that opens the way for conservatism.

Another example showing room for conservative actions is IAS 37 "Provisions, Contingent Liabilities, and Contingent Assets". The accounting standards clearly display reliance on probability that requires the accountants' judgment to recognise provisions. IAS 37 suggests that risks and uncertainties should be accounted in estimating the provisions related with conservatism. In addition, the treatment for contingent liabilities and contingent asset is somehow conservative. The accounting standards prioritise the reporting of contingent liabilities (as provision) that have high percentage of occurrences compared to contingent assets with high probability of occurrences that only require disclosure.

1.3. Relationship between Unconditional Conservatism and Earnings Quality

Unconditional conservatism is a form of conservatism that accountants perform regardless of the circumstances that they are going to face in the future (André and Filip 2012). It is more likely that accountants become conservative just because they feel that it is much safer to report assets and earnings lower than usual in preparing themselves in facing future uncertainties. Unconditional conservatism does not consider bad earnings news. The accountants are free to use their judgments in choosing the conservative accounting policy that they feel is appropriate. The absence of "news constraint" enables unconditional conservatism to be performed continuously over the period as long as the firm is operating. This indicates that the firm can consistently understate its assets and earnings. Consistent understatement of assets and earnings would negatively affect the information provided in the financial statement as it does not reflect the true financial performance of a firm. Hence, the financial statement would not be of good quality since it is not faithfully represented. Investors would lose their interest towards the firm as they feel that the firm is running its business pessimistically. When earnings quality is measured with earnings response coefficient (ERC) showing the magnitude of investors' response upon earnings information, it would probably show that the investors respond negatively towards unconditionally conservative firms.

It is reasonable that IASB demanded elimination of "prudence" from the accounting conceptual framework. If unconditional conservatism is the way meant by FASB to face uncertainties prudently, then it can be concluded

that prudence is unnecessary. Prudence is unnecessary because it hinders the firm from producing quality financial statement and obtaining required capital for its developments. If a firm is consistently behaving conservative for the last ten years and yet, nothing bad has happened. This would cause the firm to lose big opportunities in strengthening its economic position from the investors' fund that the firm can use to develop its business operations. As investors have negatively viewed the firm's conservative actions, they would decide to move away from the firm and find other promising firms.

Earnings quality is considered high if it contains minimum amount or even no perception interference and is able to reflect true firm performance. Lipe (1990) states that increase in earnings prediction ability can make current earnings information becomes beneficial to predict future earnings. Hence, investors may become more sensitive about earnings information and use present earnings information in investment decision-making. Kieso, Weygandt, and Warfield (2012) note that earnings quality is tightly related with earnings management, in which higher earnings management leads to lower earnings quality. The same goes with conservatism that affects earnings quality. Several researchers that have rejected conservatism argue that the principle is a problem for earnings quality as it hinders full disclosure of relevant information (Klein and Marquardt 2005, Kieso, Weygandt, and Warfield 2012). They argue that earnings under conservatism principle are not good, relevant, and beneficial. Klein and Marquardt (2006) state that there are two aspects of why conservatism reduces financial statements quality, particularly on relevance. The first aspect is that conservatism reports assets or profits undervalued and hence, affects relevance and neutrality due to pessimism and thus, affecting the financial reports. The second aspect is that conservatism delays recognition of good news, while quickly account for bad news that causes current understatement and future overstatement. Furthermore, it causes earnings to fluctuate and decreases the ability to predict future cash flow. Feltham and Ohlson (1995) and Penman and Zhang (2002) suggest that conservatism induces earnings to be less relevant and lower quality.

The second aspect that becomes the reason why conservatism affects earnings quality is unconditional. Klein and Marquardt (2006) argue that conservatism causes earnings to be understated for current period and higher for future periods that would lead to fluctuation and consequently, distorts earnings. In contrast to Klein and Marquardt (2006), Watts (2003) opine that systematic understatement of net assets as a result of conservatism can generate high quality earnings. This is because conservatism prevents firms from inflating earnings and assists investors by providing profits and assets that are free of overstatements.

1.4. Relationship between Conditional Conservatism and Earnings Quality

Conditional conservatism is the type of conservatism based on the news received regarding the accounting elements such as assets and earnings. Conservative actions are validated through bad news that allows a firm to report at lower values (André, Filip and Paugam 2015). In contrast to unconditional conservatism, conditional conservatism needs to be preceded by "news" as a justification. Then, the accountants are allowed to proceed with conservative accounting. Since it requires "news", conditional conservatism cannot be performed continuously. Arguably, conditional conservatism is a news-dependent conservatism. In addition, conditional conservatism does not allow immediate increase of asset or earnings even though the firm receives good news related to asset earnings (Wang, Hogartaigh and Zijl 2008).

The accountants may increase values, but only after they can verify that the news are true and the firm is in a currently good condition. Conditional conservatism does not allow deliberate understatement in order to increase earnings for future periods and thus, misses the essence of acting conservative, which is "prudence". Conditional conservatism does not mislead because it is not earnings management. Compared to unconditional conservatism, conditional conservatism has the ability to improve the quality of earnings information (Ahmed, Neel and Wang 2013). This is because even though the core action is still the same with the previous type of conservatism, conditional conservatism is practiced based upon reliable information that permits the firm to understate their assets or profit. The timing of conservatism prevents the firm from recklessly understating important information for decision making necessities. A well-timing conservatism can further improve earnings quality as it not only reflects the true financial performance of a firm, it can also show the investors that the firm has already taken preventive actions on upcoming events that may negatively affect the firm. With that, it is logical to expect positive response from the investors based on high ERC value.

The need of higher degree of verification of good news creates an "asymmetric timeliness" of asset and profit. This is the main trait of conditional conservatism that really distinct it from the unconditional conservatism. The need of preceding relevant information before committing conservatism shows that conditional conservatism is the true form of prudence that the accountants have to commit. Being prudent is not realised by directly understating the assets and profits for the sake of playing safe. If the assets and profits are understated without

clear reason, it would create bias of reporting lower than the amount supposed to be. Furthermore, earnings information would not be able to reflect the true financial performance.

1.5. Research Hypotheses

The revised IFRS accounting standards have their own underlying conceptual framework which is different from the FASB's conceptual framework. The FASB's conceptual framework includes conservatism as one of the limitations in financial reporting. Therefore, the accountants need to be prudent in facing uncertainties. The revised IFRS conceptual framework completely eliminates conservatism since the IFRB thinks it is unnecessary. André and Filip (2012) agree that unconditional conservatism consistently understates the book value of net asset. Of consequence, this leads to reporting of lower earnings and stockholders' equity. André and Filip (2012) suggest that continuous understatement is the main reason to the elimination of conservatism from the conceptual framework. Hence, unconditional conservatism can cause lower reporting of earnings for the current period and higher earnings for the next period. Therefore, the following hypothesis is developed:

H₁: Unconditional conservatism negatively affects earnings quality.

The FASB's conceptual framework has also included conservatism as a limitation and uses this limitation to promote prudence. FASB argues that earnings information can reflect not only financial performance, but also risk. IASB also eliminates conservatism but that does not mean that IASB does not promote prudence. The IASB's previous conceptual framework states prudence as a characteristic of reliable information (IASB 2010). However, in the revised conceptual framework, IASB has deleted prudence and instead put the phrase 'faithful representation' and put 'neutrality' as one of the required characteristics (IASB 2013). Arguably, based on this development, the revised conceptual framework is still supporting the need of prudence in the accounting practice. That is, conditional conservatism provides positive effects towards earnings quality as the earnings can reflect unforeseen circumstances that are deemed unfavourable for the firms. In addition, conditional conservatism is not a straightforward form of conservatism that accountants perform this just because they 'feel that it is needed'. Therefore, the following hypothesis is developed.

H₂: Conditional conservatism positively affects earnings quality.

Hypothesis 1 and hypothesis 2 contradict because of a single characteristic that distinct each type of conservatism. As mentioned before, conditional conservatism is carried out based on new information about a firm's values and earnings (Wang, Hogartaigh and Zijl 2008). This information is called as 'new'. The term 'new' information suggests that it is an unexpected shock to the firm's value (Wang, Hogartaigh and Zijl 2008). It is expected that the information that underlies decision to report conservatively can improve earnings quality because the earnings are able to reflect uncertainties the firm will face in the future. On the other hand, unconditional conservatism is carried out independent of any 'news'. Firms become unconditional conservative 'based on predetermined aspects of the accounting process' (Beaver and Ryan 2005). Based on the generally accepted mechanism of conservatism, lowering assets and earnings, the continuous understatement of those elements would result to biasness in the financial statements become in a negative way due to the lack of underlying information and thus, leading to worse effect for earnings quality. Therefore, this study aims to examine both types of conservatism as firms may view both as complement in achieving reporting objectives (Basu 2005). Basu (2005) suggests that the two types of conservatism may have different costs and benefits to different parties, and the cost-benefit trade-offs influence the choice between the two types of conservatism in different environments.

2. Methods

2.1. Sample

The Indonesian firms and US firms listed in the stock exchange from 2014 to 2016 are chosen as the sample study. All data of Indonesian firms are taken from the Indonesian Stock Exchange (LQ45 index), and data from the US firms are taken from US Stock Exchange. Indonesian firms are used to represent firms that are relying on the principles-based standards, which is based the Indonesian Financial Reporting Standards (SAK). On other hand, the US firms are used to represent the firms that are relying on the rules-based standards, which is the Generally Accepted Accounting Standards (GAAP), in its accounting activities. The firms must have published completed financial statements from the specified period. The criteria that must be fulfilled by the sampled firms are as follows:

- 1) The firms have the best share performance in both countries (45 from Indonesia and 45 from US),
- 2) The firms have published their financial statements in Rupiah or US Dollar currency,
- 3) The firms have complete data, and
- 4) There is financial report submission date.

The firms are then classified into two groups based on the origin of the firms. The first group consists of the Indonesian firms that are currently using SAK. The second group consists of US firms that are using GAAP-based accounting standards.

2.2. Data Collection

This study uses content analysis in examining the magnitude of conservatism and the earnings quality of the Indonesian firms and US firms. The scope of this study is limited to the effect of conditional conservatism towards earnings quality before and after the implementation of principles-based accounting standards. Content analysis was performed by reviewing the annual reports of the firms over a 3 years' period from 2014 to 2016. Specifically, the data was extracted from the income statement, statement of cash flow, and statement of financial position and the share price of the firms listed in Indonesia and US Stock Exchange. The data extracted was then keyed into the SPSS for analysis.

2.3. Variable Operationalization

The most used measurement for conditional conservatism is Basu (2005) asymmetric timeliness that relies on share price to capture good or bad news. However, this study relies on the Asymmetric Accrual to Cash-flow Measure (AACF) developed by Ball and Shivakumar (2005). This model is developed to measure conservatism in private firms using information provided in the statement of cash flow. The AACF was measured as follows:

$$ACC_t = \beta_0 + \beta_1 DCFO_t + \beta_2 CFO_t + \beta_3 DCFO_t \times CFO_t + \varepsilon_t$$

where: ACC_t: Accruals measured as Δ inventory + Δ Debtors + Δ other current assets – Δ Creditors: Δ Other current liabilities – Depreciation; CFO_t: Cash flow from operation for period t, measured as earnings before exceptional and extraordinary items less accruals; DCFO_t: Dummy variable that is set to 0 if CFO_t \geq 0, and is set to 1 if CFO_t < 0.

The level of unconditional conservatism (UnCon_{it}) is measured with accrual proxy or earnings/accrual measures as used by Ahmed, Neel, and Wang (2013) in their study. If the accrual value is negative (<0), then the earnings would be classified as conservative. In contrast, when the accrual value is positive (>0), the earnings would be classified as not conservative. UnCon_{it} was formulated by using this model:

$$UnCon_{it} = N_{it} - Cf_{it}$$

where: UnCon_{it}: Level of unconditional conservatism net; N_{it}: Income before extraordinary item; CF_{it}: Operational cash flow

In this study, earnings quality was measured by using ERC. ERC is a coefficient resulted from the regression between share price proxy (Cumulative Abnormal Return or CAR) and accounting earnings (Unexpected Return or UE). Cumulative Abnormal Return (CAR) is the share price proxy that shows the magnitude of market's response towards accounting information published and calculated with market model. CAR was formulated by using this model:

$$CAR_{i(t1,t2)} = \sum AR_{it} \qquad AR_{it} = R_{it} - R_{mt}$$

where: CAR_{i(t1,t2)}: firm's CAR during \pm 5 days of window period from financial report publication date (with t = 0 is publication date); AR_{it}: i firm's abnormal return at day t; R_{it}: real return of i firm at day t market; R_{mt}: return at day t

Real return was calculated with the following formula:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}$$

where: P_{it} = closing price of i share at day t; P_{it-1} = closing price of i share at day t-1

Meanwhile, market return was calculated with the following equation:

$$R_{mt} = \frac{IHS G_{it} - IHS G_{it-1}}{IHS G_{it-1}};$$

where: $IHS G_t$: IHS G at day t ; $IHS G_{t-1}$: IHS G at day $t-1$.

Unexpected earnings (UE) act as the proxy for accounting earnings that shows a firm's performance result for a certain period of time. UE is the difference between the expected earnings with the actual earnings. UE was calculated as follows:

$$UE_{it} = \frac{E_{it} - E_{it-1}}{E}$$

where: UE_{it} = firm's unexpected EPS at period t ; E_{it} = firm EPS at period t ; E_{it-1} = firm EPS at period $t-1$.

3. Results and Discussion

3.1. Effect of Conditional and Unconditional Conservatism on Earnings Quality in Indonesia

This section presents the results of testing the first model that examines the effect of conditional and unconditional conservatism towards earnings quality from firms under LQ45 index in Indonesia. The multiple regression analysis was used. The results are shown in Table 1.

Table 1. Multiple Regression Analysis for Indonesian Firms

Model	Unstandardized Coefficients		Standardized Coefficients Beta	T	Sig.
	B	Std. Error			
(Constant)	0.081	0.013		6.442	0.000
CC	0.014	0.006	0.323	2.190	0.033
UC	0.006	0.002	0.420	2.847	0.006

Table 1 shows that the regression equation between the independent variables (UC and CC) with dependent variable (ERC) for LQ45 firms is as follows:

$$Y = 0.081 + 0.014X_1 + 0.006X_2$$

From the regression analysis, the result shows a constant value of 0.081. This indicates that if the earnings quality (Y) is not affected by both independent variables (UC and CC), then the average earnings quality generated by LQ45 firms is 0.081. The Coefficient signs show the direction of relationship between the dependent variable with the independent variables. The sign for independent variable X_1 (conditional conservatism) is positive. This indicates that this variable has a positive relationship towards earnings quality. The coefficient value of 0.014 indicates for each increase in conditional conservatism by 1 point would be followed by an increase of 0.014 point in earnings quality. The positive sign for X_2 (unconditional conservatism) shows that there is also a positive relationship between unconditional conservatism and earnings quality. The coefficient value of 0.006 indicates that for each 1 point increase in unconditional conservatism, the earnings quality would be also increased by 0.006 point. Take note that for this regression, the value of X_2 has been divided first by 100000 for normalisation purpose.

To determine the magnitude of effect from both independent variables towards earnings quality, Table 2 presents the model summary that shows the determination coefficient (R^2) as 0.489 or 48.9%. This indicates that both conditional and unconditional conservatism are 48.9% responsible in affecting the earnings quality. The remaining 51.1% is affected by other factors.

Table 2. Model Summary for Indonesian Firms

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
1	0.700 ^a	0.489	0.472	0.06523	2.207

Note: a. Predictors (Constant), UC, CC; b. Dependent Variable: ERC

The F-statistic test was carried out to test whether all independent variables simultaneously affect the dependent variable significantly. The F score is taken from the ANOVA as shown in Table 3. These are the tested hypotheses:

$$H_{01}: \beta_1 = \beta_2 = 0$$

Conditional and unconditional conservatism do not significantly affect the earnings quality in simultaneous manner.

H_{a1} : at least one $\beta_i (i = 1, 2) \neq 0$

Conditional and unconditional conservatism significantly affect the earnings quality in simultaneous manner.

Table 3. ANOVA for Indonesian Firms

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	0.237	2	0.118	27.799	0.000
Residual	0.247	58	0.004		
Total	0.483	60			

Table 3 presents the F calculated and significance value of 27.799 and 0.000. With $df_1 = 1$, $df_2 = 57$, and 5% significance, it is obtained that F table score is 4.0012. Since F calculated (27.799) > F table (4.0012) and sig. score 0.000 < 0.05, it can be concluded that the conditional and unconditional conservatism simultaneously affect the earnings quality in significant level.

To test the significance of independent variables partially from dependent variable, the partial t-test was conducted by comparing t calculated with t table. The t table score with 5% mistake rate and $df = 57$ is 1.671. The t scores for each independent variable in the regression model can be found out in Table 4.

Table 4. Partial Hypothesis Testing for Indonesia Firms

Var.	B	t calculated	t table	p-value (sig.)	Decision
CC	0.014	2.190	1.671	0.033	H_0 rejected
UC	0.006	2.847	1.671	0.006	H_0 accepted

From Table 4, the t calculated score of the conditional conservatism variable is 2.190 with p-value of 0.033. Since the t calculated > t table and p value (sig.) < 5%, it can be concluded that the partially conditional conservatism affects earnings quality for firms from LQ45 index. The coefficient score is positive, indicating that CC positively affects earnings quality. Thus, the null hypothesis for conditional conservatism is rejected for LQ45 firms. Table 4 also shows that the t calculated score for unconditional conservatism is 2.847 with p-value of 0.006. Since the t calculated > t table and p-value (sig.) < 5%, it can be concluded that the partially unconditional conservatism affects earnings quality for firms from LQ45 index. The beta score is positive, an indication that unconditional conservatism positively affects earnings quality. Thus, the null hypothesis is accepted.

3.2. Effect of Conditional and Unconditional Conservatism on Earnings Quality in US

This section presents the results of testing the first model that examines the effect of conditional and unconditional conservatism towards earnings quality from firms under S&P 500 in the US. The multiple regression analysis was used. The results are shown in Table 5.

Table 5. Multiple Regression Analysis for US Firms

Model	Unstandardized Coefficients		Standardized Coefficients Beta	T	Sig.
	B	Std. Error			
(Constant)	0.140	0.004		37.905	0.000
UC	7.493E-005	0.000	0.970	48.048	0.000

Table 5 shows that the regression equation between the independent variable (UC) with dependent variable (ERC) for S&P 500 firms is as follows:

$$Y = 0.140 + 7.493 \cdot 10^{-5} X_2$$

The regression analysis in Table 5 provides a constant value of 0.140. The result indicates that the average ERC generated for the US firms is 0.140 if the earnings quality is not affected by unconditional conservatism and conditional conservatism. Notice that there is no conditional conservatism in the regression analysis. This is because the conditional conservatism does not affect the earnings quality at all. The coefficient signs show the direction of the relationship between ERC with unconditional conservatism. The sign for the unconditional conservatism is positive that indicates a positive relationship towards earnings quality. The coefficient value of $7.493 \cdot 10^{-5}$, indicating an increase in conditional conservatism by one point will influence the earning quality to be increased by $7.493 \cdot 10^{-5}$.

To determine the magnitude of effect from both independent variables towards earnings quality, Table 6 presents the model summary that shows the determination coefficient (R^2) as 0.941 or 94.1%. This indicates that both conditional and unconditional conservatism are 94.1% responsible in affecting the earnings quality. The remaining 5.9% is affected by other factors.

Table 6. Model Summary for US Firms

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Durbin-Watson
1	0.970 ^a	0.941	0.940	0.02959	2.209

Note: a. Predictors (Constant), CC; b. Dependent Variable: ERC

To test the significant of the independent variable partially from dependent variable, the t-statistic test was performed. The partial test was conducted by comparing the t calculated with t table. The t table score with 5% error rate and $df = 147$ is 1.66. The t scores for the independent variable in the regression model can be found in Table 7.

Table 7. Partial Hypothesis Testing for US Firms

Var	B	t calculated	t table	p-value (sig.)	Decision
UC	7.493×10^{-5}	48.048	1.66	0.000	H_0 accepted

Based on Table 7, the t calculated score of the conditional conservatism variable is 48.048 with a p-value of 0.000. Since the t calculated $>$ t table and p-value is below 5%, it can be concluded that partially conditional conservatism affects earnings quality for firms from S&P 500 index. The coefficient score is positive, an indication that UC positively affects earnings quality. Therefore, the null hypothesis for conditional conservatism is accepted for S&P 500 firms.

This study shows that the conditional conservatism for the Indonesian firms is 0.014 but there is no value for the US firms. Such results indicate that conditional conservatism positively affects earnings quality in Indonesian firms. The results also indicate that the investors for Indonesian firms would positively react to conditionally conservative earnings. On the other hand, the non-existence of this variable in the US model may indicate either the firms are reporting according to the true financial condition, or they are actually being conservative but not according to good or bad news signals. The findings in this study show that the Indonesian firms have the tendency to act conditionally conservative when reporting their financial information to the public. On the other hand, based on the results of this study that show conditional conservatism does not affect earnings quality at all, the US firms are not conditionally conservative. The indicator for conditional conservatism is that the higher the number being positive, the more conservatism is the firm. The value zero indicates that no matter whether a firm is experiencing unfavourable condition or otherwise, it will still report the financial conditions as it is happening in the current period. The fact that Indonesia decided to converge with IFRS shows that IFRS does trigger the Indonesian firms to become conservative. This is logical to note that IFRS provides more freedom to accountants in performing their duties.

The shift from rules-based to principles-based accounting shows that the accountants are tempted to use their own judgments when performing their duties. Compared to IFRS, US GAAP seems to limit the movements of accountants for at least 3 years starting from 2014-2015. It is evident that all firms from S&P 500 firms were currently on 'good news period' which is shown from the positive cash flows generated by the firms. This study uses Ball and Shivakumar (2005) AACF (asymmetric accruals to cash flows) and this model assumes that "good news" can be reflected from positive operational cash flows.

The unconditional conservatism coefficient for Indonesia and US firms are 0.006 and 7.493×10^{-5} . The positive values signal that unconditional conservatism is actually improving earnings quality in the eyes of investors. Furthermore, the significant value from the statistical tests implies that the effects are significant for earnings quality. The results in this study contradicts with (LaGore 2008) and Ball and Shivakumar (2005) that believed unconditional conservatism is an inefficient form of prudence.

This study shows that the association between unconditional conservatism and earnings quality is a positive one and significant. Such finding is consistent with Santi (2014) that show unconditional conservatism is positively related to earnings quality. The positive effect may derive from the systematic manner and relatively permanent and hence, responsible for improvement of earnings quality (Watts 2003). This constant understatement smooths the net assets and earning and become less fluctuate. Wang and Williams (1994) found that stable or non-fluctuate earnings are more favour by the market as they perceived this kind of earnings as less risky. This influences the investors to act faster towards earnings information provided by firms.

Conclusion

This study examines the effect of adopting different accounting standards on earnings quality. Specifically, this study compares to determine whether applying principles-based accounting standards on the financial statement would provide different effect on the conservatism and earnings compared to the rules-based accounting standards, with specific focus on conservatism. Based on the results shown in this study, this study found that the rules-based accounting standards are better compared to the principles-based accounting standards when measuring earnings quality. Judging from the r-squared, the independent variable in the US model is able to explain the dependent variable better compared to the Indonesian model. Hence, the GAAP seems to be a better accounting standard compared to IFRS. That is, the principles-based standards may prompt the accountants to provide different opinions and judgments in carrying their duties. Thus, the quality of the accountants in providing judgment may become less reliable.

This study is not without limitations. First, this study used data over a 3 years' period. Future study could use longer observation period in order to generate more convincing results, especially for conditional conservatism, as it includes dummy variables. In addition, the financial data is somehow volatile or unpredictable since they are affected by a lot of variables that could not be explained clearly in this study. Secondly, the number of sample firms in this study is 90. Future study can replicate this study using a higher number of sample firms. This would provide a more robust finding that would contribute further to the body of knowledge.

In sum, this study concludes that principles-based accounting standards do not always elevate earnings quality. That is, the earnings quality of the principles-based accounting standards is not always superior compared to the rules-based accounting standards on earnings quality. This could be due to the use of principles-based accounting standards that provide opportunities and flexibilities to the firms to imply judgments in presenting their financial statements which may not represent the reality of the transactions.

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