Towards a New Socially Embedded Intersectional Capabilities Theory (SEICT) in the 21st Century: Analysis of COVID-19 Policies in South Africa through Socio-economic Modeling and Indigenous Knowledge Base

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Abstract:

This paper examines pandemic relief and development policies through the case study of South Africa during COVID-19 to create a broader understanding about problems facing developing countries during such crises. Specifically, it evaluates the strengths and limits of the government's current policy approach.

Furthermore, it proposes a more socially relevant quantitatively derived package through a model based counterfactual policy experiment that can connect immediate relief with long-run development policies from a socially embedded capabilities perspective. The paper uses an intersectional approach and utilizes Social Accounting Matrix (SAM) to identify the production sectors that are not only the most impacted and are the most vulnerable, but also have room for maximal future development. It also makes a preliminary attempt to posit possible improvements in people's well-being based on indigenous knowledge. Indigenous knowledge systems can be integrated with modified existing public health models. Our multi sectoral analysis highlights the importance of the indigenous knowledge base in evaluations of people's well-being. Our study finds specific production activities such as agriculture, construction, land transport, mining, and real estate sectors to be labor-intensive and vital to the economy. With proper modifications, the methodology and framework used for South Africa will be applicable for other developing countries. This will help direct immediate resources strategically and efficiently to key areas of the developing economies for optimal development from a capability's perspective.

Keywords: Covid-19; socially embedded capabilities; intersectionality; social accounting matrix; development; South Africa.

JEL Classification:C3; F5; I1; O55; H3; H4; H5.

Introduction

By now it is a well-established empirical proposition that a global pandemic, particularly one of the scales and reach of COVID-19, places insurmountable policy challenges upon most governing bodies. These challenges are further exacerbated when the nation being governed is a country like South Africa with deep racial-ethnic and class inequalities even in the post-apartheid period. The disadvantaged groups face in their communities the constraints of limited resources, inadequate infrastructure and oftentimes multiple other obstacles that prevent them from receiving the full benefits even if the government is relatively successful in designing appropriate pandemic relief packages for their populations. Therefore, it is imperative that the economic and policy concerns of South Africa be examined through a different lens - one that prioritizes immediate issues like hunger and disease prevention, but also emphasizes both short, medium, and long-term recovery.

The goal is to present a plan that ultimately respects the poor and meshes with their own vision of development from a socially embedded intersectional perspective. For this to work, a socially embedded intersectional capabilities approach (SEICA) is necessary (Khan 1998, 2004ab, 2006, 2010, 2011, 2013, 2020ab, 2021a and 2021b forthcoming)[i]. One important debate in many parts of the world including South Africa has been centered around the role of indigenous knowledge in general and in healthcare and medicine in particular, that can also be part of our conversation. While there is criticism to be noted of all knowledge systems, including indigenous ones (Green 2012), there has been recent studies identifying the merits of incorporating indigenous knowledge

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systems (IKS) in improving health and public health education outcomes (Cocks, Alexander, Dolds 2012, Dahlberg and Trygger 2009, Botha 2010).

We make a preliminary attempt in this paper to include indigenous knowledge both as a complement to the standard public health model as well as an integral part of any formal multi sectoral model. In the latter area, our work points to important gaps in data gathering and focuses our attention on the kind and quality of data needed. This looms as an urgent socially relevant research task. Khan (1998, 2004 and 2012) raised the prospects of including indigenous knowledge-based innovations in national and regional (augmented) innovation systems and offered some formal guidelines. It will be possible to do this within the South Africa SAM by breaking down knowledge production activities along the lines of characteristics of non-indigenous (NIK) and indigenous knowledge (IK), their production functions and economy wide consequences and complementarities between NIK and IK.

This paper utilizes South Africa as a case study and examines the strengths and weaknesses of their current COVID-19 fiscal, monetary and sectoral policies. This case study also helps to present a comprehensive framework regarding the allocation of limited resources to the most vulnerable groups in a country. It addresses both immediate impact and the medium to long-run effects of economic stimuluses via multiplier analysis by examining both supply-side and demand-side elements of the economy.

The section below goes onto elaborate on South Africa, optimal decision-making strategies and then outlines the government's COVID-19 fiscal package. Following that, there is an extensive methodology section that elaborates on Social Accounting Matrix (SAM) and Susceptibility Exposure-Infection-Recovery (SEIR) calculations and the possible integrations of indigenous knowledge in both. The paper then focuses on its findings about the economy of South Africa and highlights areas that would require the highest priority and would ultimately help the most people, particularly the impoverished groups. The final section demonstrates this by presenting and examining the government's COVID-19 plan and highlighting its strengths and limitations.

1. Methodology

1.1. COVID-19 Model: An Economy Wide Multi Sectoral SAM-based Model Distributional, Employment and Growth Impacts of the Countervailing Public Policies to Overcome the Adverse Impacts of COVID-19

1.1.1. South Africa SAM-2015. A Brief Description

The SAM utilized for this paper was constructed for South Africa for the year 2015. It is a square table consisting of equal numbers of rows and columns. There are 197 rows and columns within the purposes of this table. The expenditures of each variable are noted by convention as flows from a column to the various rows intersecting that column, whereas the receipts of each variable are noted in the respective rows. The sum of expenditures for the variables must equal the sum of the receipts of the same variables, thus leading the total expenditures to match the total receipts (appearing in the bottom corner of the table). The SAM South Africa table contains four sets of endogenous accounts for our modeling approach *i.e.*:

- 62 activities numbered from 2-63;
- 104 commodities numbered from 64-167;
- factors which are broken down between labor with primary education, middle school education, secondary education, tertiary education and capital in the rows 169-173;
- and households which have been sub-divided by income deciles in the rows 175-188 [per decile until the top 10% which is divided per 2%].

There is also margins on 168 and enterprises on 174. The table also includes exogenous accounts including activity government (189), direct tax (190), import tax (191), direct tax (192), sales tax (193) savings-investment (194) change in stocks (195), and rest of the world (196).

Though not currently available, a possible improvement to the current SAM would be the integration of gender data and indigenous sectors (including, indigenous knowledge-based sectors). This indigenous knowledge inclusive SAM or IKI-SAM would allow for endogenous modelling of the indigenous sectors and allow the government to identify resource flows for this very essential sector.

1.1.2. Fixed Price Modelling in a SAM-based Framework

In this section the social accounting matrix and an IKI-inclusive framework is presented as a data gathering framework as well as an analytical tool for studying the effects of the COVID-19 on growth. The origins of social accounting can be traced as far back as Gregory King's efforts in 1681, but more recent work stems from the attempts by Richard Stone, Graham Pyatt, Erik Thorbecke, and others.

In the methodological framework of this study, the IKI-SAM is used for mapping production and distribution at the economy wide level. In this section, first a general SAM is described. Then it is shown how the method for studying the effect of growth within this framework follows logically from its structure. The model used in this paper is a simple version of a class of SAM-based general equilibrium models.[ii] However, presented below is an improvement based on the incorporation of indigenous knowledge-based activities. It summarizes succinctly the interdependence between productive activities (including indigenous knowledge-based activities), factor shares, household income distribution, balance of payments, capital accounts, and so on, for the economy at a point in time. Given the technical conditions of production, the value added is distributed to the factors in a determinate fashion. The value added accrued by the factors is further received by households according to their ownership of assets and the prevailing wage structure. In the matrix form the SAM consists of rows and columns representing receipts and expenditures, respectively. As an accounting constraint receipts must equal expenditures. As mentioned before, the existing SAM for South Africa does not separate out indigenous knowledge sectors, this is a shortcoming that we hope to come back to later.

As is elaborated further in Khan and Thorbecke (1988), Khan (1999), Khan (2006), Khan (2010), the SAM framework can be used to depict a set of linear relationships in a fixed coefficient model. For deciding the question of determination, the accounts need to be divided into exogenous and endogenous ones. For instance, in the South Africa SAM, there are three endogenous accounts. These are factors, households, and production activities, leaving the government, capital, and the rest of the world accounts as exogenous.[iii]

Table 1. Simplified schematic of indigenous knowledge inclusive Social Accounting Matrix

			EXPENDITURES				
			Endogenous accounts			Exogenous	TOTAL
			1	2	3	4	5
RECEIPTS	Endogenous accounts						
	Factors	1	0	0	$T_{1.3}$	x_1	y_1
	Households	2	$T_{2.1}$	$T_{2.2}$	0	x_2	y_2
	Production activities, including indigenous knowledge (IK) activities	3	0	$T_{3.2}$	$T_{3.3}$	x_3	y_3
	Exogenous accounts						
	Sum. of other accounts	4	I_1'	I_2'	I_3'	t	y_x
	TOTAL	5	y_1'	y_2'	y_3'	y_x'	

Source: Author's schematization

Table 2. Schematic representation of endogenous and exogenous accounts in a SAM

		EXPENDITURES				
		Endogenous	Sum	Exogenous	Sum	Totals
RECEIPTS	Endogenous	T_{nn}	N	Injections T_{nx}	x	y_n
	Exogenous	Leakages T_{xn}	1	Residual balances T_{xx}	t	y_x
	TOTAL	y_n'		y_x'		

Source: Author's schematization

Looking at the table above which represents a SAM, we can see immediately that:

$$y = n + x \tag{1}$$

$$y = 1 + t \tag{2}$$

Now if we divide the entries in the matrix T_{nn} by the corresponding total income (that is, y_n), we can define a corresponding matrix of average expenditure propensities. Let us call this matrix *A*. We now have:

$$y = n + x = Ay + x \tag{3}$$

$$y = (1 - A)^{-1} x = Mx \tag{4}$$

M has been called the matrix of accounting multipliers by Thorbecke, for these multipliers, when computed, can account for the results (for example, income, consumption, and so on) obtained in the SAM without explaining the process that led to them. Let us now partition the matrix *A* in the following way (Khan and Thorbecke 1988).

$$A = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \end{bmatrix} \quad (5)$$

Given the accounts factors, household, and the production activities, now we see that the income levels of these accounts (call them y_1, y_2, y_3, respectively) are determined as functions of the exogenous demand of all other accounts. In this respect, what we have is a reduced-form model which can be consistent with several structural forms. This is quite satisfactory as far as tracing the effects of a certain injection in the economy is concerned or for prediction purposes when the structural coefficients are unchanged.

One limitation of the accounting multiplier matrix *M* as derived in equation (4) is that it implies unitary expenditure elasticities (the prevailing average expenditure propensities in *A* are assumed to apply to any incremental injection). A more realistic alternative is to specify a matrix of marginal expenditure propensities (C_n below) corresponding to the observed income and expenditure elasticities of the different agents, under the assumption that prices remain fixed. The C_n matrix can be partitioned in the same way as the A matrix above. The most important difference between the two partitioned matrices is that $C_{32} \neq A_{32}$. Expressing the changes in income (dy) resulting from changes in injections (dx), one obtains

$$\mathrm{d}\, y_n = C_n \,\mathrm{d}\, y_n + \mathrm{d}\, x \quad (6)$$

$$= \left(I - C_n\right)^{-1} \mathrm{d}\, x = M_c \,\mathrm{d}\, x \quad (7)$$

M_c has been called a fixed price multiplier matrix and its advantage is that it allows any nonnegative income and expenditure elasticities to be reflected in M_c. In particular, in exploring the macroeconomic effects of exogenous changes in the output of different product-cum-technologies on other macroeconomic variables, it would be very unrealistic to assume that consumers react to any given proportional change in their incomes by increasing expenditures on the different commodities by exactly that same proportion (that is, assuming that the income elasticities of demand of the various socioeconomic household groups for the various commodities were all unity). Since the expenditure (income) elasticity is equal to the ratio of the marginal expenditure propensity (MEP_i) to the average expenditure propensity (AEP_i) for any given good *i*, it follows that the marginal expenditure propensity can be readily obtained once the expenditure elasticity and the average expenditure propensities are known, that is,

$$\varepsilon_i = MEP_i/AEP_i \quad (8)$$

$$MEP_i = \varepsilon_i AEP_i \quad (9)$$

and $$\sum_i MEP_i = 1 \quad (10)$$

Thus, given the matrix A_{32} of average expenditure propensities, and the corresponding expenditure elasticities of demand, ε_i the corresponding marginal expenditure propensities matrix C_{32} could easily be derived.[iv]These multipliers can be further decomposed for more refined causal analysis of direct, indirect and feedback loop causal influence paths and graphs.

1.2. Targeting for Optimality, considering the Presence of IK within the SIR and SEIR Models of Epidemic/Pandemic Diffusion

The term targeting denotes in this paper some modifications of the classical SIR model in the manner described below to optimize the effects of countervailing policies. The simplest version of the SIR model consists of three differential equations and provides a good first approximation to the dynamics of a range of infections. Several recent papers cited in the references have started incorporating economic trade-offs and conducting optimal policy analysis within this framework for a country like South Africa targeting in formulating proper public policy response needs to consider the following:

First, demographically, different groups typically have different risks of infection and mortality implying specific health risks and aggregate costs of treatment differentiated for each group. Furthermore, each group might interact with other groups at rates that are variable. This fits the description of what Easley and Kleinberg (2010) call a “network version” in this case, a “network version” of the basic SIR model. Such network differentiation among

subgroups of South African population will necessitate treating different demographic subgroups appropriately considering relevant differentiating factors at play within each subgroup.

Secondly, the interactive term in SIR model which renders the relevant differential equation (see below) nonlinear may vary among subgroups. Finally, the parameters of contact and infection may not necessarily be constants. They may vary because of endogenous behavioral changes of individuals or because community norms vary from one subgroup to another.

The third point may be too difficult to assess in a country like South Africa; but the first two points may be addressed in a multi-risk version of the basic SIR model proposed by Acemoglu *et al.* (2020).

As a starting point for South Africa, we could focus following Acemoglu *et al*. (2020) on the special case of the MR-SIR model consisting of three groups - young (20-44), middle-aged (45-65) and old (65+). Like them we could also consider initially the lockdown policies, *i.e*., consider the special case where the only differences in interactions between the three groups come from differential parameters faced by them. To simplify a bit more initially, the simple epidemiological model can be used to analyze what might be called "zone-based social distancing" (ZSD). Here too we must be sensitive to indigenous knowledge base and emphasize culturally sensitive social distancing that can enhance social learning. Therefore, we expand the notion of ZSD to socially learned ZSD or SLZSD. The SLZSD can offer a framework for estimating the efficacy of alternative social distancing measures. For this purpose, we can develop a simple SIR epidemic model on a structured network, for which it is possible to compute the inter-zonal reproduction number that can be used to guide further empirical analysis and decision making.

By doing the above exercise based on rather incomplete and imprecise data for South Africa in this area, we can nevertheless derive results that are highly suggestive. Our model suggests that there are advantages of organizing people into zones (*i.e.,* a particular structure of groups) according to demographic characteristics and geographic locations. Therefore, it is possible to arrive at zonal demographic lockdown policies.

The Multi-Risk SIR model can be set in both discrete and continuous time. The latter permits the standard differential equation approach. For the most general scenario, individuals can be partitioned into risk groups $j = 1, \ldots, j$ with N_j initial members. The total population is normalized to unity so that sum over all groups equals 1.

At any point in time t, individuals in group j can be subdivided into those susceptible (S), those infected (I), those recovered (R) and those deceased (D), so that:

$$Sj(t) + Ij(t) + Rj(t) + Dj(t) = Nj \quad (11)$$

Agents move from susceptible to infected, then either recover or die. The states, in temporal order, are: *St* = Susceptible, *It* = Infectious; *Rt* = Resolving; *Dt* = Dead; *Ct* = Recovered based on several factors including *IK*-based *SLZSD*.

Any susceptible person might fall prey to the disease by encountering an infectious person. Therefore, the model needs a time-varying contact rate parameter. It varies over time to capture behavioral changes such as social distancing. In the SEIR model four differential equations can be solved with specified initial conditions and parameter values. However, to get the correct statistically defensible estimates of key numbers such as the number infected and the number recovered *etc*., we need large scale randomized testing and detection. That does not seem to have been the case in South Africa. Thus, there is a "calibration gap" in the model for such countries. In South Africa we need the best estimates we can get and then solve the differential equations to estimate the optimal lockdown, social distancing, and zonal compartmentalization along with demographic partitioning. Although some attempts have already been made these build these models, better testing will facilitate accurate results.

While this important work is undertaken, we need nevertheless to find approximately optimal fiscal and monetary targeting in a multi-sectoral setting with differentially located labor and household groups. This is what we do in the main body of this paper.

2. Case Study: South Africa

The government of South Africa has taken some bold and timely steps for countering the negative impact of the COVID-19 global pandemic on the South African economy. Like many other countries, South Africa recognizes the need to effectively address the severe consequences of COVID-19, the resulting economic lockdowns with curtailed economic activities manifested in factory closures, sudden loss of employment and income with significant reduction in national output. Cancellation of export orders and depressed demand for domestically produced goods and services have already had an adverse impact. The services sector which includes trade, tourism, transport, communication, hotels, restaurants, banking, finance, education, *etc*. as in other countries, has predictably shrunk in capacity utilization. The recent IMF projections (World Economic Outlook 2020) depict overall economic decline

in 2020 at -5.8% but paints a picture of optimistic economic recovery in 2021 with GDP growth at 4.0%. In a more pessimistic scenario assuming a slower recovery, the UNDP estimates the GDP to have fallen by 7.9%, estimating nearly 5 years before the economy returns to its pre-pandemic state (UNDP 2020).

Though a R500 billion (amounting to approximately 10% of the GDP) stimulus package was introduced, only R130 billion was repurposed from the current budget and tax programs and utilized thus far. The rest of the R330 billion (approximately 65% of the stimulus) is expected to be financed through international loans, with approximately 4 billion USD coming from the IMF and 40-60 million coming from the World Bank; the entire amount is still not financed as of writing the paper (UNDP 2020). A stimulus package of this size is very necessary to combat both the immediate and long-run impact of this crisis, however it is also vital that it be distributed in a timely manner for maximal effectiveness. It is also important to optimize allocation by identifying the most affected sectors and their relative importance in terms of value added, employment and income generation, and their effects on other aspects of inclusivity within marginalized and disadvantaged populations (particularly in factors of gender, race, ethnicity, location amongst other things).

The fiscal package (better called a "relief package" rather than "stimulus package") includes a generous quantum of financial support to various groups of the vulnerable population. Our purpose of this note is to help direct the strategic allocation of this support to the affected population based on some preliminary data analysis and economic modeling using both sectoral data and the economy wide consistent multi-sectoral data captured by the detailed 2015 SAM. The paper also hopes to identify integrations of the socially embedded capabilities approach and the inclusion of indigenous productive sectors within its methodology for future policy analyses.

For optimal decision making it is necessary to think in terms of distinct but overlapping decision and implementation phases. To keep the different time frames of analysis distinct, we propose to deal with three different time scales: addressing the immediate crisis during the first 3-6 months of FY21 (March - June), the restorative phase during the 6-12 month for FY21 (June - December/June) and FY22, and a plan beyond that designed to be consistent with South Africa's long run economic goals.

The first two time periods are of utmost priority, where the main problem during the first phase would be containing the infection, preventing widespread hunger and shortages and being able to create incentives for the private sector to follow an optimal restorative path. It is imperative to pay attention to the SIR (Susceptibility-Infections-Recovery) or SEIR (Susceptibility Exposure-Infection-Recovery) model to derive optimal lockdown periods from and implement it strictly. As highlighted on this NIH paper, the March 15th lockdown period prevented 50,000 additional deaths (Garba, Lubuma and Tsanou 2020). It is also important in the near future to guide more resources to public health bodies like the NICD (National Institute for Communicable Disease) to be able to undertake more of these important analyses in a timely manner (Atkeson 2020a, 2020b). It also appears that a two-tiered strategic budgetary approach is appropriate in terms of directing aid towards testing and buying medical equipment, but this should still be utilized strategically based on areas that are likely to see most of the outbreak initially. It is thus imperative that significant investments are made into the public health research infrastructure for proper utilization of the limited healthcare resources in South Africa.

Second, it is highly important to prevent starvation and hunger. Both cash transfers and aid-in-kind to affected groups have been and will be necessary. Some of these have already been done through the delivery of food parcels to affected populations, creating unemployment insurance, and via the creation of loan programs to keep small and medium run businesses running. Quick identification of poor families and effective delivery of food aid will be key required actions. Though, undoubtedly, there will be some leakage, working with reliable government officials, volunteers and local people who have a reputation for being reliable will be crucial.

The current package is not adequate to support the workers and families who will need at least R500 per month for the next 6 to months. The Quarterly Labor Force Survey for 2019 and SAM-2015 indicate that less than 20% of workers are in the informal sector. The unemployment levels for South Africa are at 30%, which implies that there are significant barriers to employment even in the informal sectors. However, if the economic stagnation continues, it is likely that unemployment will continue to rise and even more people will be pushed into lower wage jobs in the informal sector, particularly low-skilled workers. This poses further adverse implications of gender and racial inequality, as more women and black workers are currently employed in lower-skilled positions (UNDP 2020).

The fiscal stimulus package was designed to provide the necessary budget needed for medical equipment and healthcare services, prevent starvation, and provide the financial support needed by small and medium companies to keep their businesses to keep running until the eventual phasing out of the lockdown (UNDP 2020).

Additionally, the government had taken the following steps:

- food distribution and basic services for the poor;
- building a program for cash transfer to the targeted vulnerable population through social relief grants,

wage protection programs and a broader unemployment insurance;
- developing a state infrastructure fund; investing in remote education and renewable energy for job creation;
- promoting industrialization through easier licensing opportunities and encouraging local production;
- delayed tax programs and credit guarantee programs for small and medium sized enterprises (including informal business) to benefit from and promote employment.

All this including additional support for health services accounted for almost 90% of the stimulus package. More specifically, 10% was allocated for cash transfers, social grants, Covid relief and unemployment support grants (Bhorat and Kohler 2020). From the SAM-based multipliers derived, it is possible to confirm that all these measures will have immediate and longer-term impacts if implemented immediately with some degree of effectiveness. The objective should be to minimize leakage and deliver aid to the targeted groups immediately. This paper hopes to evaluate the impact of the current plan and make recommendations based on a quantitative approach to target the most benefits to the most vulnerable of the populations in developing countries like South Africa.

3. Results and Interpretations

For the purposes of this paper, the multiplier for South Africa is taken at 1.5 and 2 the first being close to the figure determined through the inclusion of direct, indirect effect, induced household consumption effects while the second is closer the estimate including the induced investment effects (Burrows and Botha 2013, Picek and Schröder 2018, Sibeko and Isaacs 2020). This suggests that a stimulus of R500 billion will lead to R750 billion in growth (assuming a multiplier of 1.5), and R1 trillion in growth (assuming a multiplier of 2). Being a more conservative estimate, the former is more likely and is poised to get back economic growth to 3.8% if enacted properly. Similarly, if the country-wide employment effects are to be held at 6.1, this package could lead to the creation of over 3 million jobs (Sibek and Isaacs 2020). So, while another stimulus package is not necessary immediately, though it may be necessary to augment this one to alleviate the increased levels of poverty resulting from the long-term effects of this crisis, it is important to make sure the current plan is implemented soon and, in the areas, and industries that need the most attention.

Table 3. presents the SAM-based calculations of direct and indirect effects of injection of funds into the top 10 value added sectors in the South African economy on the fourteen different household groups classified according fourteen different income groups. Due to the unavailability of data, gender, race, and location data could not be added to this but could have presented vital insights on the disparities present.

Scrutinizing Table 4. we can see that in addition to the public sector, which is the most prominent, there are other sectors that also contribute significantly in terms of total value added going to the various households including the poor households. If we follow the first row of the table which gives the sectoral value added for the top 10 sectors as a percentage of GDP, we can see that other sector such as the informal sector (specifically in household sector), land transport, real estate, wholesale trade and construction are also large sectors, and some are quite important in generating employment and incomes especially for impoverished households in the lower income deciles.

Table 3. Multipliers for 14 different household groups for the top 10 Value Added sectors (in million Rands)

	Government	Informal Sector, Households	Land Transport	Real Estate	Wholesale Trade	Financial Intermediation	Retail Trade	Mining	Business Activities	Construction
Sectoral VA	619,302	301,764	203,225	179,497	174,356	161,420	141,811	127,527	124,240	122,310
Rank	1	2	3	4	5	6	7	8	9	10
GTVA %	17.43%	8.49%	5.72%	5.05%	4.91%	4.54%	3.99%	3.59%	3.50%	3.44%
hhd-0	0.005	0.012	0.004	0.002	0.004	0.003	0.006	0.006	0.004	0.005
hhd-1	0.008	0.018	0.007	0.005	0.007	0.005	0.010	0.009	0.007	0.008
hhd-2	0.011	0.020	0.010	0.007	0.010	0.008	0.013	0.011	0.009	0.009
hhd-3	0.016	0.025	0.013	0.009	0.013	0.011	0.017	0.015	0.013	0.012
hhd-4	0.022	0.030	0.018	0.013	0.018	0.017	0.022	0.019	0.018	0.016
hhd-5	0.037	0.043	0.028	0.021	0.028	0.029	0.035	0.030	0.029	0.025
hhd-6	0.055	0.050	0.038	0.030	0.040	0.045	0.047	0.041	0.042	0.034
hhd-7	0.095	0.072	0.059	0.048	0.065	0.078	0.074	0.064	0.070	0.053
hhd-8	0.203	0.111	0.105	0.091	0.127	0.170	0.135	0.119	0.142	0.096
hhd-91	0.055	0.030	0.030	0.027	0.035	0.048	0.037	0.033	0.039	0.026
hhd-92	0.060	0.030	0.031	0.027	0.037	0.051	0.039	0.034	0.042	0.028
hhd-93	0.087	0.043	0.043	0.040	0.054	0.075	0.054	0.049	0.060	0.039
hhd-94	0.106	0.043	0.046	0.043	0.061	0.089	0.060	0.054	0.071	0.043
hhd-95	0.172	0.073	0.081	0.078	0.104	0.151	0.101	0.092	0.118	0.073

Source: Author's calculation based on 2015 South Africa SAM.

Table 4. Employment outcomes in skilled and unskilled sector for 10-million-rand injection (using standard industry wages)

	Government	Informal Sector, Households	Land Transport	Real Estate	Wholesale Trade	Financial Intermediation	Retail Trade	Mining	Business Activities	Construction
Rank %	1	2	3	4	5	6	7	8	9	10
%GTVA	17.43%	8.49%	5.72%	5.05%	4.91%	4.54%	3.99%	3.59%	3.50%	3.44%
No. of Extra Labor w/ Primary	5.97	55.68	39.58	37.79	1.78	22.70	1.69	2.30	23.56	16.08
No. of Extra Labor w/ Middle	6.52	55.40	35.34	40.35	1.77	23.94	1.71	2.23	23.96	15.78
No. of Extra Labor w/ Secondary	6.96	52.91	25.38	41.31	1.66	24.58	1.64	2.05	23.71	14.17
No. of Extra Labor w/ Tertiary	6.95	48.13	13.97	39.96	1.48	23.86	1.51	1.78	22.64	11.73

Source: Author's calculation based on 2015 South Africa SAM.

Industrial energy consumption data suggests that COVID-19 has particularly hit industries like mining, manufacturing, and construction very hard, with energy consumption falling by over 50% in these sectors (Norland 2020). These are also sectors primarily employing low skilled workers, earning low wages in the lower and medium income deciles. Overall, earnings for lower educated workers are expected to fall by 40% (compared to 30% for skilled labor) which could make these groups more vulnerable and susceptible to food insecurity (Arndt *et al.* 2020a, 2020b, Karl Pauw 2020). When contextualized against the fact that more women and black Africans are likely to be employed in lower-skilled jobs, it is not surprising that more female-headed and black households are likely to fall below the poverty line than their male and white counterparts This also poses additional implications for increased gender and race-based inequality on top of the income inequality expected to rise by 0.23 on the Gini coefficient (UNDP 2020).

However, it is also important to note that those in the middle-income deciles are less likely to receive government transfers while also being vulnerable to income loss during the pandemic. Unlike wealthier households, those in the middle-income deciles are more likely to be employed in lower educated jobs, but less cushioned during a crisis than lower-income deciles due to not having access to government transfers at the same rate. It is important for cash transfer programs to acknowledge recent loss of income in these income groups or in the long run far more families maybe pushed down to poverty.

There are other steps the government has taken all of which need to be channeled efficiently. There are issues regarding financing efficiently these and other expenditures that do not necessarily require austerity. The approach to public finance in difficult times discussed in the context of Global Financial Crises (Khan 2004b, 2011, forthcoming 2020) prefigures what Krugman (2013) and others have suggested more recently. In times of crisis such as the present one, out-of-the box anti-austerity financing is the needed call of the hour.

Here are tables representing the impact on employment that would result from a 10-million-rand injection in the top 10 value added sectors. The results have been differentiated by education level closer analysis and using standard wages for the industry. It appears that the informal sector (specifically in household sector), land transport and real estate sectors will see the most job growth upon this injection. A lot of the jobs created will be in sectors that employ lower educated workers; targeted aid could not only sustain these industries but also low-skilled worker who are most at risk.

Table 5. Employment outcomes in skilled and unskilled sector for 10-million-rand injection (using standard industry wages)

	Government	Informal Sector, Households	Land Transport	Real Estate	Wholesale Trade	Financial Intermediation	Retail Trade	Mining	Business Activities	Construction
Rank %	1	2	3	4	5	6	7	8	9	10
%GTVA	17.43	8.49	5.72	5.05	4.91	4.54	3.99	3.59	3.50	3.44
No. of Extra Labor w/ Primary	5.97	55.68	39.58	37.79	1.78	22.70	1.69	2.30	23.56	16.08
No. of Extra Labor w/ Middle	6.52	55.40	35.34	40.35	1.77	23.94	1.71	2.23	23.96	15.78
No. of Extra Labor w/ Secondary	6.96	52.91	25.38	41.31	1.66	24.58	1.64	2.05	23.71	14.17
No. of Extra Labor w/ Tertiary	6.95	48.13	13.97	39.96	1.48	23.86	1.51	1.78	22.64	11.73

Source: Author's calculation based on 2015 South Africa SAM

4. Further Observations and Evaluation of South Africa's Covid-19 Relief Plan

There are non-export sectors such as construction and transportation sectors shown in Table 5 and others in the subsequent tables in the text that make a large contribution to GDP and employment. In fact, through the input-output table and SAM we can identify and derive a larger list of sectors which should receive government support. If gender, race, and location-specific data were available, adjustments could be made to improve disparities in those areas as well.

We now separate out the different worker situations for the top 10 sectors in our attempt to look closely at the component of household income coming from labor. Here we can see that Food Manufacturing is the sector that comes out on top from this angle. However, machinery, chemical products, fabricated metals, and production

of motor vehicle parts are also significant. Thus, the package for increasing aggregate demand through aid to various sectors will need to include these sectors as strategic also.

Table 6. Multipliers for top 10 Value Added (VA) in manufacturing sector for different labor levels

Commodity	Sectoral Value Added	Rank of % of GTVA	% of GTVA	Multiplier for Labor w/ Primary Ed.	Multiplier for Labor w/ Middle Ed.	Multiplier for Labor w/ Secondary Ed.	Multiplier for Labor w/ Tertiary
Food	88,002	1	2.48%	0.015	0.035	0.090	0.286
Machinery	31,420	2	0.88%	0.017	0.043	0.104	0.284
Other Chemical Products	27,789	3	0.78%	0.015	0.038	0.104	0.284
Fabricated Metals	26,551	4	0.75%	0.030	0.079	0.156	0.243
Motor Vehicle Parts	25,367	5	0.71%	0.013	0.032	0.078	0.209
Basic Chemicals, Nuclear	21,963	6	0.62%	0.030	0.079	0.156	0.243
Misc. Manufacturing	20,228	7	0.57%	0.014	0.031	0.079	0.148
Paper	18,843	8	0.53%	0.021	0.039	0.084	0.219
Plastic	12,626	9	0.36%	0.017	0.085	0.195	0.272
Computer Related Activities	7,739	10	0.22%	0.013	0.026	0.081	0.360

Source: Author's calculation based on 2015 South Africa SAM

We now turn to Table 7 which gives a picture of employment in the top 10 manufacturing sectors by looking at unskilled and skilled labor situation separately. It is important to highlight that these sectors not only create high skilled jobs, but also a significant amount of medium and low-skilled jobs as well which would not only create employment opportunities, but specifically jobs with better wages.

Table 7. Employment in Top 10 value added (VA) in manufacturing sector for different labor sectors

Commodity	Sectoral VA	Rank of % GTVA	% of GT VA	Lab. Prim./ GTVA	Lab. Mid. /GTVA	Lab. Sec./ GTVA	Lab. Tert./G TVA	Lab. Prim./ VA-%	Lab. Mid. /VA-%	Lab. Sec./ VA-%	Lab. Tert. /VA-%
Food	88,002	1	2.48	0.06%	0.16%	0.37%	0.69%	2.45	6.36	14.99	27.97
Machinery	31,420	2	0.88	0.01%	0.05%	0.14%	0.44%	1.68	5.59	15.89	49.82
Other Chemical Products	27,789	3	0.78	0.00%	0.05%	0.17%	0.20%	0.16	7.40	26.82	32.71
Fabricated Metals	26,551	4	0.75	0.04%	0.13%	0.25%	0.27%	5.67	17.35	33.07	36.73
Motor Vehicle Parts	25,367	5	0.71	0.01%	0.05%	0.15%	0.50%	1.84	6.78	20.44	69.55
Basic Chemicals, Nuclear	21,963	6	0.62	0.00%	0.05%	0.17%	0.20%	0.16	7.40	26.82	32.71
Misc. Manufacturing	20,228	7	0.57	0.01%	0.02%	0.05%	0.07%	1.06	3.16	8.92	12.29
Paper	18,843	8	0.53	0.01%	0.03%	0.07%	0.20%	1.07	5.27	12.32	37.56
Plastic	12,626	9	0.36	0.01%	0.06%	0.13%	0.14%	1.82	17.14	37.86	39.93
Computer Related Activities	7,739	10	0.22	0.00%	0.00%	0.02%	0.18%	0.44	1.22	9.39	84.68

Source: Author's calculation based on 2015 South Africa SAM.

Below are some of the tables for the multipliers in the health sector and the construction sectors, both of which has received significant investments in this stimulus to improve public health infrastructure, overall infrastructure, and jobs in the economy. This was a particularly needed investment and will have long-run effects in creating high-paying jobs and improving human capabilities overall. This is also one of the scenarios where the integration of indigenous productive activities could have allowed the integration of indigenous healing, medicinal and educational practices, much of which has a lot of value in public health beyond preserving cultural practices.

These investments could have wide-reaching effects not only on the indigenous populations but have disparity-reducing effects on the greater population at hand.

Table 8. Multipliers for Workers in Health and Related Service Sectors

	Health and Social Work	Insurance and Pension	Medical Appliances
Labor w/ Primary	0.015	0.016	0.002
Labor w/ Middle	0.031	0.024	0.005
Labor w/Secondary	0.087	0.120	0.015
Labor w/ Tertiary	0.327	0.398	0.043

Source: Author's calculation based on 2015 South Africa SAM.

Table 9. Multipliers for Workers in Construction and Related Sectors from SAM-based Calculations

	Construction	Construction, related Services
Labor w/Primary	0.026	0.046
Labor w/Middle	0.047	0.068
Labor w/Secondary	0.095	0.096
Labor w/Tertiary	0.188	0.167

Source: Author's calculation based on 2015 South Africa SAM.

The multipliers for the sectors broadly related to the agriculture sector are presented below. It is important to continue investment into these sectors due to the large amount job opportunities it creates for lower skilled and lower income populations. Though the data is not present, it is important to highlight that a lot of the agricultural work and production is undertaken by black and indigenous workers. It is important for the government to not only pay attention to other productive activities undertaken by indigenous groups but also ensure that certain indigenous practices are sustained through this support. These actions are necessary to alleviate marginalized groups from poverty and reduce inequality, particularly in these times when they are more susceptible to vulnerabilities and insecurities.

Table 10. Multipliers for related agricultural sectors for labor at different education levels and lower income household groups

	Agriculture	Forestry	Fishing	Meat	Fish	Vegetable	Fruit & Nuts	Dairy Products	Grain mill Products	Starches Products	Animal Feeding Products
Labor w/ Primary	0.037	0.071	0.046	0.020	0.019	0.018	0.021	0.015	0.015	0.019	0.012
Labor w/ Middle	0.043	0.051	0.048	0.034	0.032	0.029	0.036	0.027	0.027	0.034	0.022
Labor w/ Secondary	0.069	0.074	0.136	0.068	0.062	0.055	0.074	0.058	0.058	0.075	0.047
Labor w/ Tertiary	0.157	0.159	0.170	0.136	0.124	0.109	0.152	0.120	0.122	0.156	0.099
hhd-0	0.006	0.009	0.007	0.004	0.003	0.003	0.004	0.003	0.003	0.004	0.002
hhd-1	0.009	0.013	0.011	0.006	0.005	0.005	0.006	0.004	0.004	0.006	0.004
hhd-2	0.010	0.014	0.014	0.007	0.007	0.006	0.007	0.006	0.006	0.007	0.005
hhd-3	0.013	0.017	0.018	0.009	0.009	0.008	0.010	0.007	0.008	0.010	0.006

Source: Author's calculation based on 2015 South Africa SAM.

Table 11. SAM-based multipliers for top 20 VA sectors for output, labor & 14 HH groups

	Government	Informal Sector, Households	Land Transport	Real Estate	Wholesale Trade	Financial Intermediation	Retail Trade	Mining	Business Activities	Construction	Electricity, Gas, Power	Activities to Financial Intermediation	Food	Insurance and pension funding	Sale of motor vehicles	Agriculture	Health and Social Work	Post and Telecom	Coal Mining	Other Mining
Sectoral VA	619,302	301,764	203,225	179,497	174,356	161,420	141,811	127,527	124,240	122,310	107,583	98,016	95,649	88,002	80,489	76,754	71,773	69,424	67,562	66,042
Rank %	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
%GTVA	17.43	8.49	5.72	5.05	4.91	4.54	3.99	3.59	3.50	3.44	3.03	2.76	2.69	2.48	2.27	2.16	2.02	1.95	1.90	1.86
Labor w/ Primary	0.024	0.081	0.021	0.011	0.021	0.012	0.030	0.033	0.019	0.026	0.012	0.008	0.025	0.016	0.025	0.037	0.015	0.011	0.021	0.015
Labor w/ Middle	0.047	0.102	0.046	0.018	0.044	0.017	0.064	0.049	0.041	0.047	0.019	0.014	0.045	0.024	0.059	0.043	0.031	0.026	0.034	0.035
Labor w/ Secondary	0.201	0.099	0.095	0.055	0.113	0.130	0.143	0.115	0.133	0.096	0.058	0.256	0.098	0.120	0.158	0.069	0.087	0.074	0.093	0.090
Labor w/ Tertiary	0.570	0.133	0.177	0.160	0.288	0.456	0.258	0.236	0.355	0.189	0.254	0.445	0.205	0.398	0.280	0.157	0.327	0.251	0.226	0.286
hhd-0	0.005	0.012	0.004	0.002	0.004	0.003	0.006	0.006	0.004	0.005	0.003	0.002	0.005	0.003	0.005	0.006	0.003	0.003	0.004	0.003
hhd-1	0.008	0.018	0.007	0.005	0.007	0.005	0.010	0.009	0.007	0.008	0.005	0.006	0.007	0.006	0.009	0.009	0.006	0.005	0.007	0.006
hhd-2	0.011	0.020	0.010	0.007	0.010	0.008	0.013	0.011	0.009	0.009	0.007	0.010	0.009	0.009	0.012	0.010	0.008	0.006	0.009	0.008
hhd-3	0.016	0.025	0.013	0.009	0.013	0.011	0.017	0.015	0.013	0.012	0.010	0.015	0.013	0.012	0.017	0.013	0.010	0.009	0.013	0.012
hhd-4	0.022	0.030	0.018	0.013	0.018	0.017	0.022	0.019	0.018	0.016	0.014	0.021	0.017	0.017	0.022	0.017	0.014	0.012	0.017	0.016
hhd-5	0.037	0.043	0.028	0.021	0.028	0.029	0.035	0.030	0.029	0.025	0.022	0.037	0.026	0.029	0.035	0.025	0.024	0.020	0.027	0.026
hhd-6	0.055	0.050	0.038	0.030	0.040	0.045	0.047	0.041	0.042	0.034	0.033	0.059	0.035	0.044	0.049	0.033	0.034	0.030	0.039	0.037
hhd-7	0.095	0.072	0.059	0.048	0.065	0.078	0.074	0.064	0.070	0.053	0.056	0.095	0.056	0.075	0.077	0.050	0.059	0.050	0.062	0.062
hhd-8	0.203	0.111	0.105	0.091	0.127	0.170	0.135	0.119	0.142	0.096	0.114	0.195	0.103	0.158	0.142	0.089	0.125	0.103	0.117	0.123
hhd-91	0.055	0.030	0.030	0.027	0.035	0.048	0.037	0.033	0.039	0.026	0.034	0.053	0.028	0.045	0.039	0.025	0.035	0.029	0.033	0.035
hhd-92	0.060	0.030	0.031	0.027	0.037	0.051	0.039	0.034	0.042	0.028	0.034	0.057	0.030	0.047	0.041	0.026	0.037	0.031	0.034	0.037
hhd-93	0.087	0.043	0.043	0.040	0.054	0.075	0.054	0.049	0.060	0.039	0.051	0.081	0.042	0.069	0.057	0.037	0.055	0.045	0.050	0.053
hhd-94	0.106	0.043	0.046	0.043	0.061	0.089	0.060	0.054	0.071	0.043	0.057	0.094	0.047	0.081	0.064	0.040	0.065	0.052	0.055	0.061
hhd-95	0.172	0.073	0.081	0.078	0.104	0.151	0.101	0.092	0.118	0.073	0.102	0.155	0.080	0.138	0.108	0.069	0.109	0.089	0.095	0.105

Source: Author's calculation based on 2015 South Africa SAM.

Finally, a more expansive look at the top 20 value added sectors are presented below to highlight some more sectors which could benefit from the economic stimulus. This table also allows us to recognize the sectors that would benefit the poorest and the most vulnerable of the population, especially those who might have the least number of transferable skills. This could allow policy makers to focus on sectors like agriculture and mining which see some of the poorest populations in them, while also recognizing sectors which might bring in more jobs for lower skilled people like the informal sector (specifically in household sector), agriculture and retail trade.

We acknowledge that the Government of South Africa has credibly announced a plan with strategic programs to be implemented in immediate, short-term, and long-term span. The four major strategies the government has adopted in this regard are as follows (KPMG 2020):

- focusing on keeping small and medium-run enterprises running through debt relief programs, especially providing finances and capital to local producers of essential goods. This has also been supplemented with delayed tax programs to aid such businesses. From the analysis of SAM 2015, we can see that retail, wholesale trade and business activities account for a large proportion of the value added to the economy. It is thus useful to prioritize the resources needed to sustain these sectors during this crisis.
- the government also began programs to reduce youth unemployment numbers by providing cash transfers to employers financially affected by COVID-19, who continue to employ a certain number of employees at certain wage levels. In addition to encouraging employment, the government has also expanded its unemployment insurance programs considering this pandemic, and the resulting rise in job loss.
- creating and investing in the National Empowerment Fund to specifically make loans available to black entrepreneurs and manufacturers to help grant access to resources to the most vulnerable populations and help reduce racial inequality exacerbated by the pandemic.
- dedicate funds towards infrastructure development, particularly for renewable energy and remote learning needs to meet the immediate and long-run demands of South African development, while also creating employment opportunities.

While specificity is required within each of the categories, the government's declared policy support measures in dealing with the economic fallout of COVID-19 certainly deserve appreciation. The support analyzed above includes working capital loan fund for manufacturing and service industries, renewable energy fund, infrastructure growth fund, working capital support for cottage, micro, small and medium enterprises, and safety net expansion. However, the upshot of our quantitative estimates based on SAM- 2015, and labor force survey indicates that while this package sufficient in the short run (based on strategic allocation of the aid for maximum countervailing impact), there needs to be a second stimulus package once the impact of the crisis and the first stimulus is assessed. It is highly likely that the poverty and inequality exacerbated by the crisis is unlikely to be fully addressed by the amount within this stimulus, as many within the middle-income deciles are susceptible to becoming poorer in the long run. Thus, an additional quantum of aid package will be needed for both social safety net protection and achieving a reasonable rate of economic growth after the first two quarters of the COVID-19 external shock. Based on earlier work done by Khan (1999) and other literature on IK, we can reasonably conclude that including trading based on IK in addition to the standard public health procedures will improve the effectiveness of the aid package by 10% to 20%.

Summary, Policy Recommendations and Conclusions

The analysis done in the paper demonstrates the crucial salience of thinking about pandemics and development intersectionally from an SEC perspective. The following conclusions and recommendations for South Africa also holds lessons for other developing nations:

- aid going towards buying PPE and other medical equipment, and for adequate testing, should be given to the presently affected areas first while a reserve fund should be maintained for future affected areas or for those areas where there will be an intensification of the infection, sickness, and mortalities. The amount and proportions should be up to the discretion of expert advisor group of public health professionals and including social scientists who have studied public health issues.
- certain areas may be more prone to experiencing most acute food shortages than others. Quick identification of the poor families in these areas and effective delivery of cash transfers and food aid will be the key required actions. While there will inevitably be some leakage, its scope should be minimized by working with reliable government officials, volunteers and local people who have a reputation for being reliable. Headcount indexes and other methods may be implemented to identify key areas to prioritize for aid in countries for strategic utilization of limited resources.

- there are advantages in combining industrial location data with data for hotspots of COVID-19 infection. Aid needs to be rushed and kept flowing in an appropriate amount with constant feedback through monitoring. It is important to be attentive to such trends and contexts in data to better administer stimuluses to areas that will not only help the most amount of people during the crisis but will also yield the shortest and long-run growth for the most labor-intensive sectors.
- the relief packages (such as food aid, cash transfers, building houses for homeless) may be reasonable steps but the amount allocated so far may not be adequate. The SAM-based multipliers derived through this exercise confirms that all these measures will have immediate and long- term impacts if implemented immediately with some degree of effectiveness. The objective should be to minimize leakage and deliver aid to the targeted groups immediately. An emphasis should be given to cash transfer programs implemented while upholding the social distancing rules, with the beneficiaries receiving their allowances in either mobile financial system accounts or in locations where social distance guidelines can be maintained. If such cash transfer systems are not present, then resources should be directed towards the creation of such programs. It is imperative for developing countries to evaluate the effectiveness of relief packages, even if it is a modeled quantitative estimate, to properly examine what sectors need attention and to what degree it will need it generate positive demand-side effects.
- the SAM-based calculations identify the direct and indirect effects of injection of funds into the top 10 value added sectors in South African economy on fourteen different household groups. These groups include households at various levels of income. The results indicate that the government and informal, household sectors are certainly important; but in addition to these sectors on which most commentators have focused on so far, there are other sectors that are important as well. Other service sectors such as retail and wholesale trade, land transport, housing and infrastructure construction and mining are also large sectors. These are quite important in generating employment and incomes, especially for impoverished households such as small farmers and day laborers. These sectors deserve support as well. As mentioned earlier, the pandemic relief plans should ultimately lead into long-run development plans and thus the focus should remain on revitalizing the largest sectors of the economy to restart growth.

The SAM-based calculations also identified the direct and indirect effects of injection of funds into the top 10 value added sectors in the South African economy on overall employment, and on employment of skilled and unskilled workers differentiated by education level. Additional information from Labor Force Survey is used to supplement the SAM-based data. Here are a few interesting insights based on analyzing that combined data set:

- the public sector continues to be the largest in terms of sectoral value added, followed by the informal sector (specifically in household sector), land transport, real estate, wholesale, and retail trade. However, when the multipliers are examined in terms of household income, it can specifically be seen that the that households with lower incomes are most likely to benefit from money going into the informal sector (specifically in household sector), retail trade, mining, and construction. It is also important to note that more people are likely to be pushed into the informal sector because of this pandemic.
- in terms of job growth, upon an injection of funds, the most growth in opportunities can be seen the informal sector (specifically in household sector), land transport and business activities sector when wages are considered. It should also be noted that job growth is relatively similar for people of all education levels except tertiary level education, where less opportunities are created as expected due to the higher need for qualifications.
- the largest value-added sectors in the manufacturing industries are food, machinery, chemical product, and fabricated metals production. Labor with tertiary and secondary education are more likely to see higher yield when these sectors are invested in compared to labor with lower academic qualifications.

In this paper, we have emphasized the importance of integrating indigenous knowledge during crises like the current COVID-19 debacle to build inclusive, sustainable, and socially aware development plans. For too long, vital traditional knowledge has been ignored especially when it comes to finding and employing solutions for indigenous lands. The merits of modern science and technology cannot be denied, but at the same time it is important to acknowledge that it is only through the unity and integration of both types of knowledge that we can form sustainable solutions in all spheres of policymaking, be it health, education or economic growth.[v] In the methodology section, we specifically highlighted how current models in multisectorial analysis and public health evaluations could benefit from the integration of indigenous sectors, notably with concepts like the IKI-SAM and the SLZSD. It is through such integrations that little by little, indigenous knowledge can become commonplace in academia and policymaking forums.

This study highlights the Socially Embedded Capabilities perspective and that such economic crises with wide-ranging global impact cannot be solved with short-term small fiscal stimuluses' and that developing countries need to approach pandemic relief by both offsetting immediate instabilities and by stimulating long-run growth to ensure that the limited resources are being strategically used to fulfill overall development goals. It also notes how important it is to gear resources towards building healthcare infrastructure and investing in public health resources –not just in a temporary manner during crisis period - but also as a part of a long-term investment towards the country's human capital and to create a reliable healthcare force capable of tackling future crises. With resources being so scarce, it is imperative for governing bodies in these nations to strategically employ such relief packages, even during a pandemic, to ensure optimal outcomes in the reduction of spread of diseases, poverty, hunger, and ultimately the creation of growth and income again.

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[i] For further information of Socially Embedded Intersectional Capabilities Approach, see also Khan, Haider A., and Joshua Villanueva (2020). Women's Socially Embedded Intersectional Capabilities and Development: A Theory of Inclusive Development Applied to the Philippines, Working paper, JKSIS, University of Denver. Khan, Haider A and Shamayeta Rahman (2020a). Women's Socially Embedded Intersectional Capabilities and Development: A Theory-based Empirical Investigation in the ASEAN economies, Working Paper, JKSIS, University of Denver. Khan, Haider A and Shamayeta Rahman 2020b. Covid-19 and Development: An Economy Wide Model and Data-based Approach to Impact and Resolutions, Working Paper, JKSIS, University of Denver. M. Mahapatro and K. Morshed (2020). COVID-19 and Gender Justice: How are women faring? Evidence from a statistical analysis of the BRAC Rapid Perception Survey for Bangladesh, Working Paper, JKSIS, University of Denver

[ii] In Walrasian general equilibrium models the flexible price vector determines the equilibrium. In a Keynesian (dis)equilibrium model in the short run the quantities vary while the price vector remains fixed.

[iii] See Khan and Thorbecke (1988: Ch. 2) for more theoretical details and empirical examples. The presentations here follow the cited work closely.

[iv] See Khan and Thorbecke (1988, Khan 1999: 2004a, b; 2006; 2010) for some examples. See also Pyatt and Round (1979: 861).

[v] In reference to personal communication to author by Dr. Mammo Muchie. December 7, 2020.