Journal of Applied Economic Sciences
Volume XXI, Special Issue 1(91), 2026

Strategic Cost Management and Industrial Efficiency: Evidence from Target Costing in an Iraqi Manufacturing Enterprise

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Article's history:
Received 30th of November, 2026; *Revised* 19th of January, 2026; *Accepted* 21st of February, 2026; *Available online*: 15th of March, 2026. *Published* as article in the Volume XXI, Special Issue 1(91), 2026.

Suggested citation:
Khalf, A. I., Abed, E. M., Altameme, A. J., & Utaiwi, K. H. (2026). Target Costing and Value Analysis as Pillars of Financial Sustainability: An Applied Study on Iraq's Industrial Sector. *Journal of Applied Economic Sciences*, Volume XXI, Special Issue, 1(91), 365 – 386. https://doi.org/10.57017/jaes.v21.si.1(91).19

Abstract:

Improving cost efficiency and financial sustainability remains a critical challenge for manufacturing enterprises operating in transitional economies. This study examines the role of strategic cost management through the application of target costing in an Iraqi manufacturing enterprise, using the Babylon Battery Factory as an empirical case study. The research analyzes pricing structures, production capacity, and cost components in order to evaluate the alignment between internal production costs and market-based pricing mechanisms. The empirical results reveal a significant gap between the actual production cost of the A60 battery and the allowable target cost determined by competitive market prices.

The findings demonstrate that the adoption of target costing enables firms to identify inefficiencies in production processes and implement cost-reduction strategies without compromising product quality. Furthermore, the integration of value analysis contributes to improving resource allocation and operational performance.

The study highlights the importance of market-oriented cost management practices for enhancing industrial efficiency and strengthening competitiveness in manufacturing enterprises operating within transitional economic environments. This study provides empirical evidence from an Iraqi manufacturing enterprise showing how target costing can serve as an effective strategic cost-management tool for improving industrial efficiency and financial sustainability.

Keywords: strategic cost management; target costing; industrial efficiency; manufacturing enterprises; cost optimization; transitional economies.

JEL Classification: D24; L60; M41; O14.

Introduction

In transitional economies, industrial enterprises are increasingly exposed to competitive pressures generated by market liberalization, rapid technological change, and the expansion of global trade. In such an environment, firms must continuously improve efficiency in order to remain competitive. Industrial companies in Iraq, particularly state-owned enterprises, face several structural challenges, including high production costs, weak responsiveness to market signals, limited price flexibility, and reliance on traditional costing systems that often fail to provide timely and relevant information for strategic decision-making. These constraints have reduced the competitiveness of domestically produced goods relative to imported substitutes, highlighting the need for modern cost-management approaches capable of improving industrial efficiency and supporting sustainable performance.

At the same time, technological progress and evolving production conditions have increased the demand for advanced managerial and economic tools within industrial organizations. Traditional cost-plus pricing methods have become increasingly inadequate in competitive markets where prices are largely determined by customer expectations, competitor behavior, and broader market dynamics rather than internal cost structures alone. Consequently, contemporary industrial management increasingly relies on strategic cost-management systems that incorporate external market signals into production and pricing decisions without compromising product quality or operational efficiency. In this context, target costing has emerged as an important managerial technique that shifts the determination of product cost from internal accounting considerations toward externally determined market prices, allowing firms to redesign products and production processes in order to achieve cost targets while maintaining quality standards (Siwiec & Pacana, 2025).

Previous studies have emphasized the importance of integrating target costing with value analysis as a comprehensive life-cycle cost-management approach rather than limiting its application to the product design phase alone (Cooper & Slagmulder, 2004). Through this integration, firms are able to identify non-value-added activities, improve resource allocation, and enhance operational performance while maintaining customer satisfaction. Increasingly, the literature in applied economics and industrial management recognizes cost-management techniques not only as accounting instruments but also as mechanisms that influence productivity, competitiveness, and the long-term financial sustainability of industrial enterprises.

Despite the growing international literature on target costing, significant gaps remain regarding its empirical application in state-owned industrial sectors within transitional economies, particularly in the Iraqi context. Existing studies tend to focus primarily on theoretical discussions or managerial accounting perspectives, with limited attention given to the broader economic implications of target costing for industrial competitiveness, market-oriented reforms, and structural transformation. Consequently, empirical evidence linking enterprise-level cost management to macro-level industrial reform remains relatively scarce. This gap is particularly relevant in Iraq, where state-owned industries are undergoing structural adjustments aimed at improving efficiency, reducing dependence on administrative production mechanisms, and gradually transitioning toward market-based operational models.

From an economic perspective, the practical implementation of target costing can be interpreted as a micro-level mechanism supporting broader structural reform policies within state-owned enterprises. Aligning internal production costs with externally determined market prices, firms are encouraged to adopt efficiency-oriented production strategies, improve resource utilization, and enhance productivity outcomes. In this sense, the application of target costing combined with value analysis represents not merely an accounting improvement but a functional managerial framework capable of supporting industrial competitiveness and financial sustainability.

Against this background, the present study investigates the application of target costing and value analysis in improving cost efficiency within the General Company for Battery Manufacturing (Babylon Laboratories 1 and 2), one of the largest state-owned industrial enterprises in Iraq. The company operates in an increasingly competitive environment characterized by the growing presence of imported battery products. The study evaluates how the adoption of these strategic cost-management techniques can contribute to improving operational performance and aligning industrial production with market-oriented economic conditions.

Accordingly, the central research question guiding this study is: *How can the application of target costing and value analysis contribute to cost reduction and improved economic efficiency in Iraqi state-owned industrial enterprises?*

The significance of this research lies in its attempt to bridge the gap between managerial accounting practices and applied economic analysis by demonstrating how strategic cost management can serve as a practical mechanism for industrial reform. By providing empirical evidence on the economic implications of target costing in terms of cost efficiency, competitiveness, and resource optimization, the study contributes to the literature on applied economic sciences while also offering practical insights for policymakers and industrial managers in emerging economies seeking sustainable industrial development strategies.

1. Literature Review

The available literature on strategic cost management continues to highlight the paramount value of modern costing techniques in improving operational efficiency, competitive positioning, and long-term economic sustainability of industrial firms. Both empirical and theoretical studies have explored how target costing and value-analysis methods can enhance operational efficiency and economic performance.

A preliminary empirical basis is provided by Otieno et al. (2024), who examine the adoption of target costing practices in manufacturing companies in the North Rift Economic Block, Kenya. The study positions target costing as an instrument for attaining cost-effectiveness, profitability, and long-term competitiveness through unpredictable economic environments. The findings indicate that target costing has a statistically significant positive effect on financial performance ($\beta = 0.146$, $p = 0.008$), enhancing competitiveness through cost reduction and target price determination aligned with desired profit margins. The study recommends application of target costing by manufacturing companies to navigate current economic constraints through cost management, realization of target production volume, and actualization of target profit.

Continuing on this theme, Al-Hattami et al. (2020) expand the discussion by examining target costing as a technique for reducing costs in manufacturing firms. Their study demonstrates how target costing methodology enables organizations to systematically reduce costs while maintaining product quality and market competitiveness, providing a framework for cost control in industrial settings.

Going further, Setti et al. (2021) present an integrated product development method combining Value Engineering and Design for Assembly (DfA) concepts as a strategic cost-saving tool. Their method applied to the lower structural base of refrigerators in the white goods industry achieved a 44% cost reduction (US$3.83 per product) while balancing the value attributed by consumers with actual production costs. The study establishes a cyclical integration between conceptual design and preliminary design phases, transforming subjective design information into quantitative indicators that assist decision-making throughout the entire product life cycle.

Also, regarding advanced costing methodologies, Putra et al. (2025) discuss Activity-Based Costing (ABC) through a systematic literature review and bibliometric analysis. Their findings support the view that implementation of these modern costing systems improves cost allocation accuracy, eliminates resource wastage, and strengthens managerial decision-making processes. Similarly, Cooper & Slagmulder (2004) examine interorganizational cost management and relational context, demonstrating how target costing extends beyond organizational boundaries to encompass supply chain relationships and collaborative cost reduction initiatives.

Taken together, the analysed literature reveals growing academic interest in contemporary cost-management practices and supports their effectiveness as means of cost-cutting and operational improvements. However, several limitations continue to be encountered. First, most studies take a managerial accounting approach that does not clearly connect cost-management practices with realized economic results like industrial competitiveness, productivity increase, or structural reorganization. Second, there is scant empirical investigation of target costing as a micro-level mechanism for macro-level market reforms, particularly in environments related to state-owned industrial enterprises. It is thus in this vein that the current study aims to fill this gap by examining how target costing and value analysis can be integrated not only as accounting technologies but as economic technologies that can result in financial viability and industrial strength.

2. Research Methodology

2.1. Target Costing Technique

This study employs the target costing technique combined with value analysis to evaluate cost management practices and improve cost efficiency within the production process. Target costing is widely recognized as a strategic cost management tool that integrates market requirements, customer expectations, and profitability objectives during the early stages of product design and development.

Originally developed within Japanese manufacturing industries—particularly in Toyota during the 1960s—the target costing approach has evolved into a comprehensive managerial framework aimed at reducing product life-cycle costs while maintaining product quality and customer value (Feil et al., 2004; Kim & Berry, 2011). Unlike traditional cost accounting systems that determine price based on production cost, the target costing method starts with the expected market price, from which the desired profit margin is deducted in order to determine the allowable cost of the product: Target Cost=Selling Price−Target Profit

This market-driven approach enables organizations to align product design, production processes, and resource allocation with strategic cost objectives while maintaining competitiveness.

Target costing represents a proactive cost management approach that focuses on cost control during the product planning and design stages. The method encourages collaboration among different functional units, including engineering, marketing, production, and accounting, to ensure that product design satisfies both customer expectations and profitability requirements (Horngren et al., 2016).

According to Masadeh et al. (2023), the target costing system contributes to improving managerial decision-making by enabling firms to optimize resource allocation and identify value-adding and non-value-adding activities throughout the product development process.

The primary objectives of the target costing technique include:

O1: Delivering products or services that satisfy customer expectations in terms of quality and competitive pricing.

O2: Determining target costs during the planning and design stages to ensure that the desired profit margin can be achieved.

O3: Reducing product costs before the production stage through effective cost management and design improvements.

O4: Enhancing organizational competitiveness through collaboration between departments to achieve continuous cost reduction and efficiency improvements (Gong, 2025).

2.2. Principles of the Target Costing System (Expanded with Recent References)

The target costing system is structured around several fundamental principles that guide the integration of market expectations, product design, and cost management. These principles ensure that cost control is implemented proactively during the early stages of product development rather than reactively after production has begun. According to Ansari et al. (2006), the successful application of target costing depends on six core principles. Recent studies also emphasize that these principles contribute significantly to improving cost efficiency, product quality, and competitive advantage in modern manufacturing and service environments (Alshammari et al., 2025; Dennison et al., 2024)

- Price-Led Costing

Price-led costing represents the central logic of the target costing approach. Unlike traditional cost-based pricing methods, which determine the selling price after calculating production costs, target costing begins with the expected market price. This price is determined through market research and competitive analysis. The allowable cost of the product is then calculated by subtracting the desired profit margin from the target selling price:

$$\text{Target Cost} = \text{Target Selling Price} - \text{Target Profit}$$

This principle reflects the market-driven orientation of the system, where firms must design products that can be produced within a predefined cost constraint while still meeting customer expectations. By reversing the traditional cost-plus logic, organizations can ensure that cost management decisions are aligned with competitive market conditions. Recent research highlights that price-led costing allows firms to better align their cost structures with dynamic market conditions and consumer expectations (Hou, 2024; Chenavaz, 2025).

- Customer Orientation

Customer focus is a critical component of the target costing philosophy. The system prioritizes the needs and preferences of customers in terms of product quality, functionality, and price. Product design decisions are therefore guided by customer expectations and perceived value rather than by internal production considerations alone.

Customer orientation requires continuous feedback from the market, allowing firms to adjust product features and specifications to match consumer preferences. As a result, the target costing process integrates marketing information and customer research into cost planning, ensuring that the final product delivers value that exceeds its cost from the consumer's perspective. According to Rounaghi et al. (2021) and Ndwandwe & Khoza (2026), incorporating customer value into cost management strategies significantly enhances long-term competitive positioning.

- Design-Stage Cost Management

One of the most distinctive characteristics of target costing is its emphasis on cost control during the product design phase. Research in cost management indicates that a large proportion of product costs are determined during the design and development stages. Once production begins, opportunities for significant cost reduction become limited.

Therefore, target costing encourages firms to implement cost management techniques early in the product development process. Engineering teams analyse alternative materials, production methods, and component structures to identify cost-efficient solutions before manufacturing starts. This proactive approach reduces the likelihood of costly modifications later in the production cycle. Recent studies emphasize that integrating cost planning with product design significantly improves operational efficiency and innovation performance (Zhang, 2022, Wang et al., 2204).

- Cross-Functional Collaboration

Target costing relies heavily on interdisciplinary cooperation between different organizational units. Cross-functional teams typically include specialists from design engineering, production, marketing, purchasing, accounting, and supply chain management. These teams work collaboratively throughout the product development process to ensure that cost targets are met while maintaining product functionality and quality. Such collaboration enhances communication between departments and allows organizations to identify cost reduction opportunities that might not be visible within isolated functional units. It also facilitates the integration of technical, financial, and market perspectives in the decision-making process. According to Nawaz & Wagner (2024), interdisciplinary collaboration plays a key role in improving cost transparency and enabling strategic cost management.

- Value Chain Integration

The target costing system extends beyond the boundaries of the firm by incorporating participants from the entire value chain, including suppliers, distributors, service providers, and sometimes even customers. This extended enterprise perspective recognizes that cost efficiency and product value are influenced not only by internal operations but also by the activities of external partners. Involving suppliers early in the design and development stages, organizations can identify opportunities for cost savings in materials, logistics, and production processes. Value chain integration therefore supports the creation of customer value while minimizing total system costs. Modern supply chain research emphasizes that collaboration

with suppliers is essential for achieving sustainable cost reductions and improving overall value chain performance (Singh, 2024; Désirée & Ivens, 2025).

- Life-Cycle Cost Management

The final principle of target costing is the management of costs across the entire life cycle of the product. Instead of focusing solely on manufacturing expenses, the system evaluates all costs associated with the product from its initial development to its final disposal.

Life-cycle cost analysis includes costs related to product acquisition, operation, maintenance, repair, and distribution. By analysing these costs comprehensively, firms can identify opportunities to reduce total life-cycle expenses while maintaining product performance and customer satisfaction. Recent studies highlight that life-cycle cost management is particularly important in industries characterized by technological innovation and sustainability requirements (Balasbaneh et al., 2025; Siwiec & Pacana, 2025).

Overall, these six principles form the conceptual foundation of the target costing system. Together, they support a proactive and market-oriented approach to cost management that aligns product design, organizational processes, and value chain activities with strategic profitability objectives.

2.3. Methods of Calculating Target Cost

The methodology used to determine the target cost may vary depending on the organization's strategic objectives, production technology, and availability of cost information. Contemporary cost management literature identifies several approaches to estimating target cost, each reflecting different perspectives on cost planning and profitability management (Aman, 2020). In practice, organizations often combine these methods to achieve more accurate cost estimates and improve decision-making during the product development stage.

Addition Method

The addition method determines the target cost by estimating the cost of individual product components, activities, or production processes and then aggregating these estimates to obtain the overall product cost. This method begins with identifying the baseline cost structure of the product and analysing each component to determine potential cost reduction opportunities.

Under this approach, cost planners first estimate the cost of materials, labour, manufacturing overhead, and supporting activities associated with each component. These component-level costs are then combined to produce the total estimated product cost. Cost reduction initiatives may subsequently be applied to individual components to align the total cost with the target cost level.

Although this method is widely used in traditional cost accounting systems, it has certain limitations. In particular, it does not fully integrate market conditions or strategic profitability objectives into the cost planning process. As a result, the addition method may lead to cost estimates that are technically accurate but not necessarily aligned with market expectations or competitive pricing strategies. For this reason, it is often considered a closed-system approach to cost estimation, as it primarily relies on internal cost data without adequately incorporating external market factors.

Discount (Subtraction) Method

The discount method, also referred to as the subtraction method, represents the most widely adopted approach to target costing in modern cost management systems. In this method, the target cost is determined by subtracting the desired profit margin from the expected selling price of the product.

The basic formula for this method is expressed as follows:

Target Cost = Target Selling Price − Target Profit

The target selling price is usually determined through comprehensive market research, including competitor analysis, customer surveys, and demand forecasting. Once the acceptable market price has been identified, managers determine the desired profit margin based on strategic profitability goals and investment expectations.

The difference between the selling price and the required profit margin defines the maximum allowable cost for producing the product. Designers and engineers must therefore develop the product within this predefined cost constraint.

This method is widely used in Japanese manufacturing industries and has been adopted by more than 80 percent of Japanese companies. Its popularity stems from its ability to integrate both internal organizational factors (such as production capabilities and cost structures) and external market factors (such as customer expectations and competitor pricing). Consequently, the subtraction method is considered a market-oriented and open-system approach to cost management.

Cost Reduction Rate Method

The cost reduction rate method estimates the target cost by applying a predetermined reduction rate to the current cost of a product. This approach is commonly used when historical cost data are available for similar products or when an organization seeks to improve efficiency in an existing production process.

The target cost can be calculated using the following formula:

Target Cost = Current Cost − (Current Cost × Reduction Rate)

In this method, managers determine a specific cost reduction percentage that reflects expected improvements in productivity, technological innovation, or operational efficiency. The reduction rate is typically based on past experience, benchmarking analysis, or strategic cost improvement objectives.

This method is particularly useful when organizations are introducing incremental improvements to existing products rather than developing entirely new products. However, the reliability of this approach depends largely on the accuracy of historical cost data and the organization's ability to realistically estimate achievable cost reduction rates.

2.4. Value Analysis

Value analysis is a systematic managerial technique used to evaluate the relationship between a product's functionality, quality, and cost in order to improve product value from the customer's perspective (Setti et al., 2021). The fundamental objective of value analysis is to maximize product value by either enhancing functional performance, reducing cost, or achieving both simultaneously.

From a strategic perspective, value analysis has become an essential tool for organizations seeking to strengthen their competitive advantage. The technique focuses on identifying product functions that create value for customers while eliminating activities or components that do not contribute to the product's overall performance or market appeal.

According to Suhaimi (2014), value analysis can be defined as a structured and systematic approach that aims to analyse the functions of a product, evaluate the cost associated with each function, and identify opportunities to perform those functions more efficiently. The process involves examining each element of a product or production process to determine whether it contributes to customer value.

A central component of value analysis is functional analysis, which seeks to identify the essential functions that a product must perform to meet customer expectations. By analysing these functions, organizations can determine which activities are necessary and which represent non-value-adding processes. Eliminating unnecessary functions or redesigning inefficient processes can significantly reduce production costs without compromising product quality.

Value analysis also provides several strategic benefits for organizations. Among the most important advantages are:

- improving the cost structure of the organization and increasing competitiveness in both domestic and international markets;
- enabling management to analyse cost components and identify the main drivers of production costs;
- identifying opportunities for restructuring operational processes and improving resource utilization;
- strengthening strategic decision-making by providing a clearer understanding of cost–benefit relationships.

Furthermore, value analysis is closely related to value chain analysis, which examines all activities involved in the creation and delivery of a product, from raw material acquisition to final delivery to the customer. By analysing each stage of the value chain, organizations can identify inefficiencies, reduce operational costs, and improve overall productivity.

In highly competitive markets, the integration of value analysis with target costing provides a powerful framework for achieving cost reduction while maintaining product quality and customer satisfaction. By systematically analysing product functions and eliminating non-value-adding activities, firms can enhance their operational performance and strengthen their long-term competitive position.

2.5. Case Study Context

This study adopts a case study approach in order to examine the practical application of the target costing technique and value analysis within a real manufacturing environment. The case study methodology allows for an in-depth analysis of cost management practices and provides valuable insights into how organizations can implement strategic cost reduction methods while maintaining product quality and competitiveness.

The empirical investigation focuses on the Babylon Battery Factory, which operates under the General Company for Automotive and Equipment Manufacturing affiliated with the Iraqi Ministry of Industry and Minerals. The factory represents one of the key industrial facilities in Iraq specializing in the production of automotive batteries and related energy storage products.

The selection of this factory as the empirical context of the study is justified by several factors. First, the factory plays a strategic role in the domestic automotive and industrial battery market, supplying products to both governmental and private sector clients. Second, the factory has undergone significant technological modernization through partnerships with international companies, allowing it to adopt advanced production technologies and modern cost management practices. Third, the manufacturing processes involved in battery production provide a suitable environment for analysing the application of target costing and value analysis techniques.

The Babylon factory complex includes multiple production units dedicated to the manufacturing of different battery types. One of the primary facilities, known as Babylon Plant 1, produces sealed maintenance-free batteries (SMF) using advanced Italian technology under license from the Italian company Sofima. These batteries are widely used in modern vehicles due to their durability and improved safety characteristics.

Another production unit manufactures conventional liquid lead-acid batteries according to international technical standards as well as Iraqi Standard Specification No. 81. This production line operates under a technological concession agreement with the British company Chloride and focuses primarily on batteries used in heavy-duty vehicles and military equipment.

In addition to these production facilities, the factory also includes a lead processing and smelting unit located at the Khan Dhari industrial site in Baghdad. This facility produces lead alloys and refined lead that serve as essential raw materials for battery manufacturing. The use of modern smelting technology ensures that the production process complies with international technical standards and quality requirements.

The factory also operates the Al-Nour Factory, located in Abu Ghraib (Baghdad), which specializes in the production of zinc-manganese dry batteries. These batteries are used in a wide range of electronic devices, including lighting equipment, portable electronics, and mobile communication devices.

The primary customers of the Babylon Battery Factory include various governmental institutions such as the Ministries of Defence, Interior, and Oil, in addition to private sector distributors, automotive service providers, and individual consumers. This diverse customer base makes the factory an important supplier within the national energy storage and automotive components market.

From a historical perspective, the factory was initially established in 1969 through a technological partnership with the British company Fluoride. Commercial production began in 1971 with an annual production capacity of approximately 100,000 batteries per year, aimed primarily at serving the domestic Iraqi market. Over time, the factory expanded its production capabilities and adopted modern manufacturing technologies in order to meet growing demand and improve product quality.

Within this study, the Babylon Battery Factory provides an appropriate context for evaluating how the target costing methodology can be applied to optimize cost structures, enhance value creation, and improve competitiveness within the manufacturing sector. The empirical analysis focuses on identifying cost drivers within the production process, evaluating opportunities for cost reduction through value analysis, and assessing how target costing principles can support more efficient resource allocation and strategic decision-making.

The integration of target costing and value analysis in this case study allows for a comprehensive evaluation of cost management practices across different stages of the product life cycle, including product design, material selection, production processes, and distribution activities. Analysing these aspects, the study contributes to understanding how manufacturing firms c

2.6. Research Procedure and Target Costing Implementation Framework

To operationalize the target costing methodology within the Babylon Battery Factory, this study follows a structured analytical procedure consisting of five main stages. This framework integrates target costing principles with value analysis in order to identify cost reduction opportunities while maintaining product functionality and quality.

Step 1: Identification of Product Requirements and Customer Expectations

The first stage involves identifying the characteristics and functional requirements of the product from the perspective of market demand and customer expectations. At this stage, market research and customer feedback are analysed in order to determine the desired quality level, performance characteristics, and acceptable price range for the product.

Understanding customer requirements is essential because the target costing system is based on a market-driven pricing approach, where the acceptable selling price is determined by the market rather than by internal production costs. This stage therefore establishes the basis for defining the target price of the product.

Step 2: Determination of Target Selling Price

In the second stage, the expected selling price of the product is determined based on market analysis, competitor pricing strategies, and demand conditions. This price represents the maximum amount that customers are willing to pay for the product while remaining competitive within the market.

The target selling price serves as the starting point for calculating the allowable production cost. Once the target selling price is identified, the organization determines the desired profit margin based on its financial objectives and investment expectations.

Step 3: Calculation of Target Cost

The third stage involves calculating the target cost, which represents the maximum allowable cost for producing the product while achieving the desired profit margin. The target cost is calculated using the following formula:

$$\text{Target Cost} = \text{Target Selling Price} - \text{Target Profit}$$

This calculation establishes a cost constraint that guides the product design and production planning process. If the estimated production cost exceeds the target cost, additional cost reduction measures must be implemented to close the gap.

Step 4: Application of Value Engineering and Cost Analysis

Once the target cost has been determined, the fourth stage involves applying value engineering and value analysis techniques to identify opportunities for cost reduction. This stage focuses on analysing each component and production process associated with the product in order to determine whether it contributes to customer value.

Functional analysis is performed to identify activities that add value and those that do not. Non-value-adding activities are either eliminated or redesigned in order to reduce production costs without compromising product functionality or quality. This process often

involves redesigning product components, improving production efficiency, or selecting alternative materials and technologies.

Step 5: Implementation and Continuous Cost Monitoring

The final stage involves implementing the redesigned production processes and monitoring the cost performance of the product throughout its life cycle. Cost control mechanisms are introduced to ensure that the actual production cost remains within the target cost limits.

Continuous monitoring allows managers to evaluate whether the target costing objectives have been achieved and to identify additional opportunities for cost improvement. Feedback obtained from production performance and market response can also be used to refine the target costing strategy for future products.

The operational stages of the target costing methodology applied in this study are summarized in Figure 1, which illustrates the sequential process linking market analysis, target cost determination, and value engineering activities.

Figure 1. Target Costing Implementation Framework

Source: Developed by the authors.

The implementation framework described above provides the analytical basis for the empirical evaluation presented in the following section, where the application of target costing and value analysis is examined within the Babylon Battery Factory.

3. Research Results

This section presents the empirical results obtained from the application of the target costing and value analysis approaches within the Babylon Battery Factory. The analysis focuses on three main aspects: the pricing structure of the factory's battery products, the relationship between product capacity and market price, and the implications of these findings for cost management and financial sustainability.

The production structure of the Babylon Battery Factory is characterized by a diversified portfolio of battery models designed for different technical capacities and operational uses. The range of products manufactured by the factory is not fixed annually; rather, it changes depending on production costs, technological adjustments, and variations in market demand.

During the analysed period, the factory produced six primary battery models, including TFZ19-3RX6, NFIRX3, CE25-3RX6, CS13RX6, TFZ21-3RX6, and 15RX6. These batteries differ in their technical specifications, production requirements, and market positioning.

Table 1 presents the selling prices of the batteries produced by the Babylon Factory. The data reveal notable variations in prices across product categories, reflecting differences in production complexity, material requirements, and battery capacity.

Table 1: Prices of batteries produced in the Babylon factory (1 and 2)

Battery size	55A	60A	65A	70A	72A	75A	90A	135A	150A
Battery price charged without a solution	30,000	36,000	40,000	43,000	43,000	45,000	50,000	75,000	92,000
Battery price charged with solution	33,000	39,000	44,000	46,000	46,000	49,000	55,000	82,000	100,000

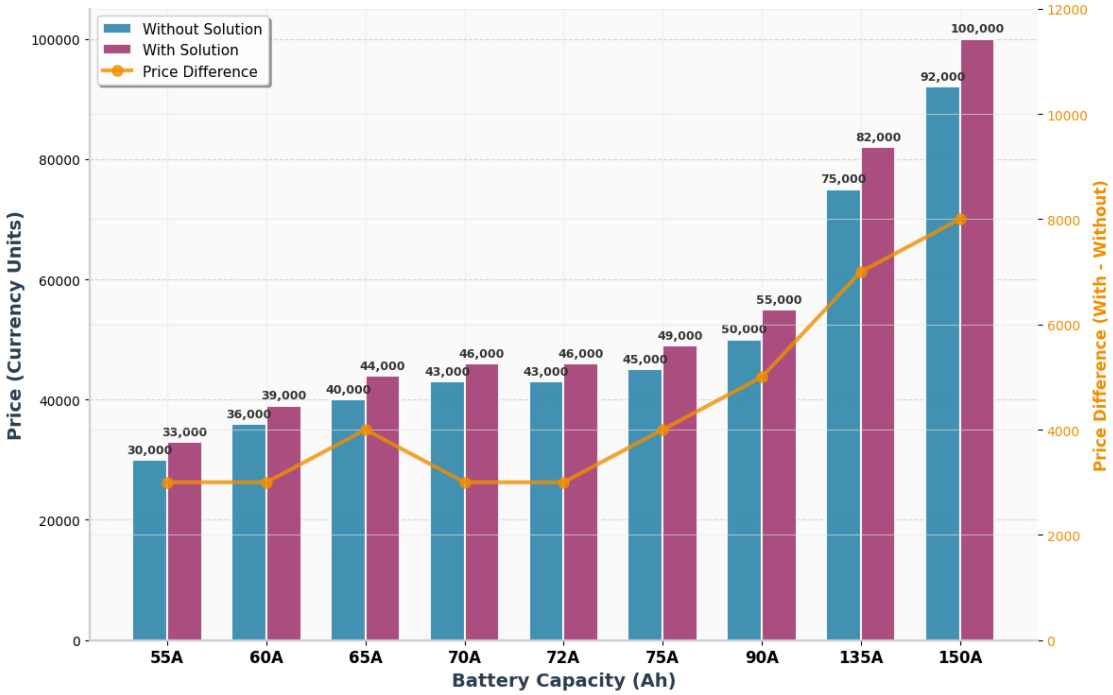
Source: Compiled by the authors.

The pricing structure provides an important foundation for the implementation of the target costing approach, as it defines the market-based reference point from which allowable production costs can be derived.

Figure 1 illustrates the relationship between battery capacity (measured in amperes) and the corresponding market price of the products. The results indicate a clear positive relationship between the technical capacity of the battery and its market value. Batteries containing electrolyte solution generally exhibit higher selling prices than batteries without solution. This price difference reflects the additional production processes, material inputs, and technological features required to produce higher-performance batteries.

The results further indicate that the price differential becomes more pronounced for batteries with higher capacities, particularly within the 90-150 ampere range. These products incorporate additional technological specifications designed to enhance durability and performance under demanding operating conditions. As a result, they command higher market prices compared to lower-capacity battery models.

Figure1: Prices of batteries produced in the Babylon factory (1 and 2)



Source: Authors' calculations based on Babylon Factory production data.

From a target costing perspective, these findings highlight the importance of identifying the cost drivers associated with higher-capacity battery production. Understanding these drivers enables management to evaluate whether the production cost structure is consistent with the allowable cost defined by the target costing framework.

Production performance in the Babylon Battery Factory can also be assessed through the analysis of available energy capacity and production planning indicators. Table 2 presents the production energy indicators associated with standard liquid batteries and distilled water production within the factory.

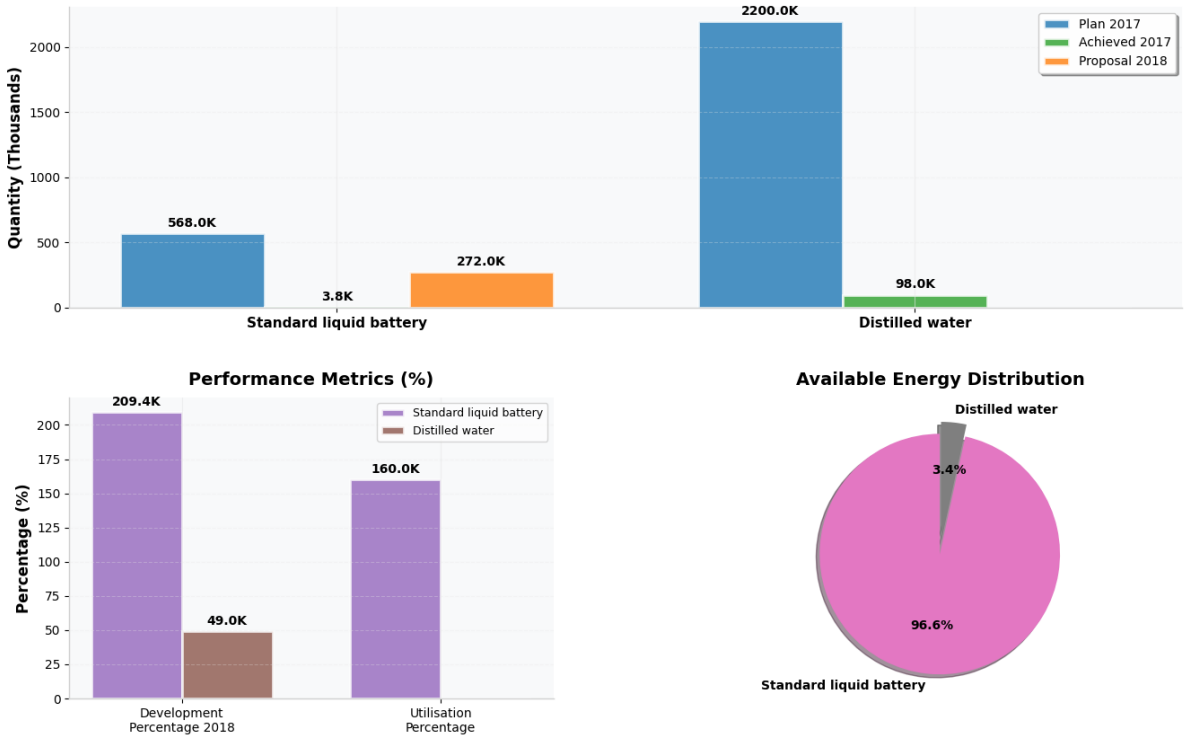
Table 2: Energy produced from batteries in the Babylon factory

Product name	Unit of measurement	Available energy		Plan for the year 2017		Proposals for the production plan for the year 2018		Percentage of utilisation of available energy		Percentage of development in the plan for the year 2018		Achieved until 30/60/2017	
Standard liquid battery	Standard	31,240	568,000	14,960	272,000	14,960	272,000	160	166	-	-	209.38	3,807
Distilled water	Litre	1,100	2,200,000	1,100	2,200,000	0	0	-	-	-	-	48.99	97,994

Source: Babylon Battery Factory production reports.

Figure 2 provides a comprehensive production planning study in the energy industry and compares the planned outputs of the 2017 year against the proposed output in 2018 and the actual performance in the same year. It shows that the projected output of the year 2017 was significantly higher than the heights that were finally reached, especially on the part of distilled water, hence showing a big gap in implementation. The 2018 proposal reflects a strategic realignment, with lower standards of liquid batteries of the standard and distilled water than who would be in the previous plan.

Figure 2. Energy Produced from Batteries in the Babylon Factory



Source: Based on production planning and operational data of Babylon Battery Factory (2017–2018).

The percentage of development and use of the performance metrics show ratios of high performance in standard liquid batteries than in distilled water which implies the high efficiency of the operations in the segment. Additionally, the energy distribution pie chart demonstrates that the main share of the offered energy (96.6) is provided by the standard liquid batteries, which explains its critical importance in the composition of the output of the sector.

Table 3 provides a comparative overview of energy production and planning performance for standard liquid batteries and distilled water.

Table 3. Energy Production from Batteries at the Babylon Factory

Indicator	Standard Liquid Battery	Distilled Water
Unit of Measurement	Unit	Litre
Available Energy (Quantity)	568,000	2,200,000
Available Energy (Value)	31,240	1,100
Plan for 2017 (Quantity)	272,000	2,200,000
Plan for 2017 (Value)	14,960	1,100
Proposed Plan 2018 (Quantity)	272,000	0

Indicator	Standard Liquid Battery	Distilled Water
Proposed Plan 2018 (Value)	14,960	0
Utilisation of Available Energy (%)	160%	—
Development in 2018 Plan (%)	209.38%	48.99%
Achieved until 30/06/2017	3,807	97,994

Source: Authors' calculations based on Babylon Factory operational data.

The results indicate that the available production capacity for standard liquid batteries (568,000 units) significantly exceeds the production plan established for 2017 (272,000 units), resulting in a utilization rate of approximately 160%. Furthermore, the projected development rate for battery production in the 2018 plan reached 209.38%, indicating an ambitious expansion strategy aimed at increasing output levels and improving industrial productivity.

In contrast, distilled water production exhibits a stable production capacity but shows no projected production in the 2018 plan, suggesting a strategic shift away from this product segment. These results demonstrate that the battery production segment represents the core industrial activity of the factory.

Table 4 presents the sales performance of different battery models over a 3-year period.

Table 4. Sales Values Over Three Years by Product

Product	First Year Sales	Second Year Sales	Third Year Sales
A55	—	5,763,000	16,464,500
A60	67,233,600	61,819,000	35,692,000
A65	—	812,000	3,202,000
A70	230,000	749,000	1,064,000
A72	—	9,633,000	6,660,000
A75	3,288,000	34,826,000	43,385,000
A90	4,385,000	32,857,500	31,949,000
A135	35,512,500	314,283,821	9,510,800
A150	185,934,400	83,114,500	77,321,000

Source: Babylon Battery Factory financial reports.

The sales data reveal significant variations in demand across different battery models. In particular, the A150 battery shows the highest sales value in the first year, while the A75 and A90 batteries demonstrate strong growth in the second and third years. The fluctuations in sales performance highlight the importance of aligning production planning with market demand in order to maintain financial sustainability and operational efficiency.

To illustrate the practical application of the target costing methodology, the A60 battery model was selected as a representative product of the Babylon Battery Factory. This product occupies a significant position in the factory's production structure and faces strong competition from imported batteries with similar technical specifications.

The first stage of the analysis involved determining the target selling price based on market conditions. A benchmarking analysis was conducted using six competing battery brands available in the Iraqi market, including Tyker, Indeco, Rocket, Cuban, Solite, and Indeco (Chinese brand). The average market price of these competing products amounted to 51,666.66 Iraqi dinars per unit, which was considered the reference target selling price for the A60 battery.

Following the target costing framework, the desired target profit margin was established at 20% of the selling price, consistent with the company's profitability objectives. Accordingly, the expected profit per unit was calculated at 10,333 dinars.

The next step consisted of determining the actual production cost of the A60 battery. The total cost was obtained by aggregating the manufacturing cost and the associated administrative and marketing expenses. Based on the available accounting records, the manufacturing cost amounted to 47,113 dinars, while administrative and marketing expenses were estimated at 6,637 dinars, resulting in a total actual cost of 53,750 dinars per unit.

Using the target costing formula, the allowable production cost (target cost) was determined by subtracting the target profit from the target selling price. The resulting target cost amounted to 41,334 dinars per unit.

A comparison between the actual cost and the allowable target cost reveals a cost gap of 12,416 dinars per unit, indicating that the current production process exceeds the cost level compatible with market-based pricing. This gap highlights the necessity of implementing cost-reduction strategies through value engineering, process optimisation, and improved resource management.

From a managerial perspective, the results demonstrate the importance of aligning internal production costs with external market conditions. By adopting a target costing approach, the factory can shift from a traditional cost-plus pricing model toward a market-oriented cost management system, thereby improving its competitive position and long-term financial sustainability.

Following the identification of the cost gap between the actual production cost and the allowable target cost of the A60 battery, a value analysis procedure was conducted in order to identify potential opportunities for cost reduction while preserving product quality and functionality.

Value analysis focuses on examining the relationship between product functions, production costs, and customer requirements in order to eliminate non-value-adding activities within the production process. In the present case study, the analysis combined two complementary sources of information: consumer preference evaluation and internal technical assessment conducted by engineers and production specialists at the Babylon Battery Factory. The first stage of the value analysis examined consumer requirements for battery products. A small survey was conducted among 20 consumers, using a three-point Likert scale to assess the relative importance of three key product attributes: quality, price, and battery lifespan. The results are presented in Table 5.

Table 5. The relative importance of each requirement

Rank	Requirement	Relative Importance	Total Responses	3	2	1	T × Likert
1	Quality	35.80%	58	18	2	0	54
2	Price	32.72%	53	15	3	2	45
3	Age	31.48%	51	14	3	3	42
Total	—	100%	162	—	—	—	—

Source: Authors' calculations based on consumer survey responses.

The results indicate that product quality represents the most important criterion for consumers (35.80%), followed by price (32.72%) and battery lifespan (31.48%). Although the differences between these factors are relatively small, the ranking highlights the dominant role of perceived product quality in purchasing decisions.

These findings have important implications for cost management. In particular, they suggest that cost reduction initiatives should primarily target inefficiencies in the production process rather than reductions in product quality, since quality remains the most valued attribute from the consumer's perspective. In the second stage of the value analysis, engineers, technicians, and production workers at the factory evaluated possible strategies for improving cost efficiency. Several operational improvements were identified.

First, reducing raw material waste was considered a major opportunity for cost savings. This can be achieved by improving process monitoring, preventing mechanical failures during production, and strengthening coordination between production teams.

Second, modernization of production equipment was identified as an important factor in reducing indirect manufacturing costs. Replacing outdated machinery with more advanced technologies could significantly improve energy efficiency and production stability, potentially reducing indirect industrial costs by more than 30%.

Third, optimization of administrative and marketing expenditures was considered necessary. These expenses currently represent approximately 13% of the total battery cost, and more efficient resource allocation could contribute to additional cost reductions without affecting product performance.

Overall, the value analysis demonstrates that significant cost reduction opportunities exist within the production system without compromising product quality. When combined with the target costing framework, value analysis becomes an effective managerial tool for aligning internal production costs with market-determined price levels.

From a strategic perspective, the integration of target costing and value analysis enables industrial firms to transition from traditional cost-plus pricing systems toward market-oriented cost management practices. This shift is particularly relevant for state-owned manufacturing enterprises operating in transitional economies, where historical production systems often lack strong alignment with market conditions.

The findings of the Babylon Battery Factory case study therefore suggest that the adoption of modern cost management techniques can contribute to improved operational efficiency, enhanced competitiveness, and greater financial sustainability within industrial organizations.

The empirical results obtained from the Babylon Battery Factory case study demonstrate that the combined application of target costing and value analysis can significantly improve cost efficiency and operational performance. The target costing exercise performed for the A60 battery revealed a substantial gap between the current production cost and the allowable market-based cost, highlighting the need for systematic cost optimization measures. In this context, the integration of value analysis provides a structured framework for identifying inefficiencies in the production process and eliminating non–value-adding activities without compromising product quality.

From a managerial perspective, the findings emphasize the importance of aligning internal cost structures with external market conditions. By adopting a market-oriented cost management approach, firms can move away from traditional cost-plus pricing systems toward pricing strategies driven by competitive market dynamics. This transition strengthens operational efficiency and improves long-term financial sustainability.

More broadly, the results suggest that the adoption of modern strategic cost-management tools can play an important role in improving productivity and competitiveness in state-owned industrial enterprises. In transitional economies such as Iraq, where industrial production systems often remain influenced by administrative planning structures, target costing may serve as an effective microeconomic reform mechanism supporting industrial restructuring and more efficient resource allocation.

Conclusion

This study examined the role of target costing and value analysis as strategic tools for improving financial sustainability and operational efficiency in industrial enterprises. Using a case study of the Babylon Battery Factory, the research analysed pricing structures, production capacity, and cost components in order to evaluate the practical application of modern cost-management techniques within a state-owned manufacturing organization.

The empirical results demonstrate that the current production cost of the analysed battery model exceeds the allowable market-based target cost, revealing a significant cost gap that limits the firm's competitiveness. The application of the target costing framework provides a structured approach for aligning internal production costs with external market conditions by defining allowable cost levels based on market prices and desired profit margins.

Furthermore, the value analysis conducted in the study identified several opportunities for cost reduction without compromising product quality. Improvements in raw-material utilization, modernization of production equipment, and optimization of administrative and marketing expenses represent important mechanisms through which industrial firms can enhance operational efficiency and reduce production costs.

From a managerial perspective, the integration of target costing and value analysis supports a transition from traditional cost-plus pricing systems toward market-oriented cost management practices. Such a transition improves decision-making accuracy, strengthens competitiveness, and contributes to long-term financial sustainability.

At a broader economic level, the findings suggest that the adoption of modern strategic cost-management techniques can support industrial modernization and resource-allocation efficiency in transitional economies. In particular, state-owned enterprises can benefit from these tools by improving productivity, reducing structural inefficiencies, and strengthening their capacity to compete with imported products in domestic markets.

Limitations and Future Research

Despite its contributions, this study has several limitations. First, the empirical analysis is based on a single industrial case study, which may limit the generalizability of the findings to other sectors or industrial environments. Second, the research relies primarily on internal production and financial data, which restricts the possibility of conducting broader cross-industry comparisons.

Future research could extend the analysis by examining multiple industrial enterprises across different sectors in order to better evaluate the economic impact of target costing and value analysis on productivity and competitiveness. Additionally, the incorporation of quantitative efficiency indicators and econometric modelling could provide further insights into the long-term effects of strategic cost-management practices on industrial performance.

Credit Authorship Contribution Statement

The author was solely responsible for the conceptualization of the study, research design, data collection, analysis and interpretation of results, as well as the preparation and revision of the manuscript.

Acknowledgments

The author expresses sincere appreciation to the administration of the Department of Accounting Techniques, Technical College in Baqubah, and to the College Deanship for their valuable institutional support and constructive cooperation, which contributed to the successful completion of this research.

Conflict of Interest Statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability Statement

The data supporting the findings of this study were obtained from internal production and operational reports of the Babylon Battery Factory. Due to institutional confidentiality restrictions, these data are not publicly available but may be provided by the author upon reasonable request.

Ethical Approval Statement

This research was conducted in accordance with standard ethical principles for academic research. Participation in the consumer preference survey was voluntary and anonymous, and respondents were informed about the purpose of the study. No personal or sensitive information was collected.

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