

Cost management in industrial operations

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Abstract

The main objective of this article is to present the relationship that exists between the strategic management of costs and its relation in the efficient control of the industrial operations, starting from the conceptual exploration in the strategic management of costs, its role in the efficient management in the SMEs, the efficiency of the processes and the fundamental role in the control of the industrial operations, likewise it presents some techniques used by the organizations and their applications. In this way the reader will be able to glimpse the possibility that companies have to follow a more effective control and be more competitive in their operations following an organized cost management.

Keywords: Cost control, operations control, strategic management, industrial operations.

I. INTRODUCTION

Looking to be more competitive in the changing environment of this century, companies need a cost system that generates useful financial reports for external entities linked to the companies, in addition to generating disaggregated financial estimates of direct and indirect internal costs and/or expenses, to achieve greater organizational efficiency at the strategic, tactical, and operational levels [1]. Therefore, cost accounting has made it possible, over the years, for organizations to make appropriate and timely decisions on issues related to the costs of producing and selling [2]. Therefore, when we investigate, we find that the literature on accounting and administration has documented that management accounting helps to reduce uncertainty, but it is still discussed whether it improves the performance of organizations [3].

If it is possible to create a method capable of estimating costs based on historical evidence, control and monitor costs periodically, it will be possible to minimize the loss of costs and adjust the program to the times and commitments with the client [4]. For this purpose, methods such as ABC are sought, a tool of Management Accounting and intricately linked to strategic cost management, which helps to accurately calculate the costs of products, by identifying and quantifying the causal relationships between activities and costs of the organization [5].

For this reason, the objective of this research is to review the guidelines drawn up by strategic cost management for efficient control of industrial operations from various methodologies in decision making. After this introduction, the structure of the work is the following: in the first one it is exposed, in a panoramic way, the approach of the strategic cost management, as well as a wide review of it; the section two shows the role that plays the strategic cost management in the SMEs; the section three presents examples of mechanisms used by companies to reach the efficiency of their operations, the session four shows the strategic cost management as a tool for the efficient control of the industrial operations.

II. THEORETICAL FOUNDATIONS

II.I. Strategic cost management

In the world, costs, like other management theories, have shown the evolution over time, starting first with cost accounting, then cost management and finally strategic cost management [6]. The latter provides useful business information to promote competitive advantage in companies, thus promoting that they can obtain a rate of return higher than their cost generating [4]. Some authors also compare it to a cost analysis but emphasize that it has a broader scope because the strategic elements are shown in a more explicit, formal, and conscious way [7]. In other words, strategic cost management is a tool for efficient cost management, which requires a comprehensive analysis external to the organization, to support any decision affecting the industrial value chain. In the table 1, shows the main characteristics of traditional cost management and strategic cost management [5].

The rapid increase in global and technological changes has led to the need for change in business management. These changes and developments have affected the cost systems of enterprises and have led to new searches for change in existing systems [9]. Some of these are largely related to general accounting, which includes cost accounting among its procedural phases, providing especially useful information for decision-making and ensuring that indicators such as raw materials, direct materials, labor and indirect production costs are foreseen [10].

Table 1. Traditional cost management and strategic cost management

Traditional cost management	Strategic cost management
1. Normal tolerance to rejection.	1. Zero defect rule.
2. Overhead deviation analysis; maximize production volume (not quality) to absorb overhead.	2. No emphasis on standard costs or gap analysis.
3. Raw material price deviation analysis; Many suppliers, but low-quality raw material.	3. Certification of suppliers that can deliver the right quantity, the right quality and on time.
4. No emphasis on non-financial performance measures.	4. Intensive use of non-financial measures.
5. No monitoring of customer acceptance	5. Systematic monitoring of customer acceptance.
6. No cost of quality analysis.	6. The cost of quality as diagnosis and management control.
CONTROL PHILOSOPHY	
1. The goal is to be at the top level of the reference group.	1. The objective is Kaizen.
2. The annual goal is to meet the standards.	2. Industry standards set the tone.
3. The standards must be met, not exceeded	3. The annual goal is to exceed last year's results.
4. Standards are tough but achievable	4. Try to exceed this year's goal (continuous improvement).
5. A standard that is regularly exceeded is not strong enough	5. Each level of achievement sets a new floor for the future

Source: Adapted from (Freedman, 2007).

Similarly, the cost models that can be adopted for business management will depend on the type of company, as is the case with some companies in the hotel sector that are based on an inorganic cost model. The factors that stand out are the failure to use tools such as contribution margins, standard costs, safety margins, operating leverage, accounting by area of responsibility, motivational aspects, and goal congruency [11]. For many institutional entrepreneurs, management accounting has been extremely helpful in identifying the need for change and obtaining support from other entities and has become an important political resource when establishing an integrated agency [12].

Strategic cost management differs in its approach from management accounting practice and has been adopted by some banks as a working principle rather than a concept, thus pointing out that it is not a complete replacement for traditional management accounting techniques, but as a complement [13] this is evident in Lithuanian companies that use the instruments of strategic cost management depending on the high level of intensity of competition or the size of the company, where some obstacles to their use arise due to an unspecified financial accounting attitude towards strategic decision making, a lack of knowledge, overheads in the production process and IT resources [14].

This supplement provides the necessary information with which the managers of companies, for example in the Electrical & Electronic sector, can analyze 3 important elements for the stability and growth of the company (the competition, the clients, and the product) that facilitate the setting of prices, client loyalty and immersion in new markets [15]. However, it should be noted that the effectiveness of the decisions made depends largely on the ability to analyze the entire strategic process from the perspective of other actors (empathy), as well

as the analysis of the three cost elements (value chain, strategic positioning, and its generators) with the aim that this practice delivers better results [6].

II.II. Strategic cost management in SMEs

Small and medium-sized enterprises (SMEs) have serious deficiencies in the implementation of cost systems, and strategic cost management aims to publicize the strategies that allow these types of businesses to apply various costing techniques to make effective decisions [16], [17]. Many of these deficiencies are due to the non-implementation of the different accounting management programs that large companies must become increasingly competitive in today's market [18]. On the other hand, it should be noted that successful industrial development depends both on the conditions evaluated in the micro or macroeconomic perspectives and on the existence of specific measures by the government and private development organizations aimed at strengthening the competitiveness of businesses. (Sánchez Sánchez et al., 2018).

Management accounting literature continues to suggest the benefits of adopting accounting management practices to improve business sustainability. These provide various tools, techniques, and valuable internal information, including budgeting, benefit planning and performance evaluation. However, some researchers argue that the use of management accounting practices in SMEs is not more relevant when the competition does not present a technological advance that makes a difference [20].

Among the financial management practices that SMEs must implement from the outset is the establishment of standards for financial activities and control mechanisms that help to monitor

planning elements through financial indicators [22]. It should be noted that a large percentage of SMEs use an external accounting staff to carry out their accounting and to support them with the interpretation of their accounts, as is the case in Africa, where 60% outsource their accounting [23]. Similarly, SME managers seem to focus on short- and medium-term issues, so financial management practices related to working capital and profitability are more relevant than those related to balance sheets and strategic financial management, and cash flow and decision-making activities are also much more relevant than those related to planning and detailed analysis [24].

II.III. Efficiency in the manufacturing processes.

The Comparative Efficiency of Integral Manufacturing is the product of the rate of Quality, Effectiveness, Availability, divided by the product of (Energy used, material used, Ratio of Emissions) [25]. Therefore, the improvement of manufacturing efficiency can be achieved by different means, for example, effective load of equipment, reduction of manufacturing time, reduction of production costs and lean manufacturing [26], considering that the assessment and monitoring of energy and resource efficiency is an essential activity for the implementation of sustainable manufacturing practices [27].

There is evidence that significant progress has been made in reducing costs and increasing production in some industrial sectors, such as the dairy industry, when the decisions taken by producers seek to generate an economic contribution to profitability and are based on the use of internal production factors (use of human capital and production of inputs) [28].

II.IV. Strategic cost management in the control of industrial operations

Productive systems must possess characteristics such as flexibility, quality, adaptability, and speed of response to be competitive in the business environment. These characteristics are the key to success for many companies [29] where the strategy in operations that one has for decision making has a great influence to achieve that success [30]. In other words, operational control becomes vital for business growth, where management accountants are becoming more active in the strategic decision-making process. However, operational managers still doubt the attitude and their ability to contribute to or improve the company's performance [31].

II.V. Costs of industrial operations.

History allows us to understand that costs, as well as other accounting areas within a company, are a determining factor for its adequate financial, productive, and commercial operation. It is always necessary to know the value of the

product or service by subtracting the cost of its realization or execution, thus obtaining the profitability that is the most important objective for the company [32]. It should be added that the cost is considered, for accounting purposes, as any economic effort made to obtain a future benefit, where it is considered that a direct or indirect cost corresponds to the way in which that cost is assigned to the product, service, process, or department.

After the above considerations, it is important to note that currently we are seeking to control in a more efficient manner the costs of change and retention of suppliers, which have a great impact on some companies, where the new supplier must assume the costs, having a great advantage over the old supplier because the cost of retention has often been higher [34]. Companies are constantly in search of business excellence through information tools that assist in decision making and contribute to a more efficient management, this being a case that does not concern those that enjoy the functions of their accounting information system [36].

Likewise, from cost accounting we can obtain measures such as the Cost of Goods Sold, where the result allows us to establish resource management analysis such as: the use of the installed capacity, the destination of the cash and the control of the inventory [37]. In the same way, cost accounting helps us to control the maintenance of the security inventory and the shortages that occur when consumer demand exceeds stocks, as shown in Table 2.

Table 2. Variability of the demand related to the increase or decrease of the costs for security inventories

Author	Contribution
Chopra et al.	Minimize variability and lead time to lower inventory levels while maintaining service standards.
Fiom	Variations in supplier lead time and customer demand are benefits of protecting against safety inventory uncertainty.
Kanet et al.	A larger security inventory must be managed each time the uncertainty of supply and demand of an item increases
King	the variability of the demand of the time of delivery is the variable of greater influence now of managing an inventory that allows to give a good service to a minimum cost.
Wang y Hill	The safety inventory increases every time the variability of the delivery time decreases.
Hayya et al.	If the variability of the delivery time decreases, the cost of the inventory decreases.
Fang et al.	For the cost of inventory is not clear enough the effect of reducing the variance or the average delivery time.

Source: Adapted from (Izar Landeta et al., 2016).

II.VI. Techniques for cost control in industrial operations.

The Theory of Constraints (TOC) has emerged as an effective management philosophy that suggests practical solutions to several complex problems, including the problem of product mix [39]. It also supports management accounting techniques to control costs and maximize profits, provides management accounting information important for ensuring a company's competitive advantage by allowing the resolution of long-term resource allocation problems, short-term capacity expansion in terms of work hours, and environmental costs such as carbon taxation, The ABC costing system provides relevant and useful information for the decision-making process in various areas, such as the definition of the cost and sales prices of products, the identification of processes in which a greater effort is needed to improve them or adapt them to new realities and needs, and the restructuring of some areas of the industrial unit [41]. It also [42] contemplates the two-pronged model: cost allocation and procedural view.

When manufacturing companies decide which products to produce, it is of utmost importance that they correctly allocate costs to the products. It is common practice for manufacturers to use a single model for cost allocation and management accounting and to apply it to all products and production resources using Throughput accounting to do so [43]. In the same sense, some authors show that Throughput accounting still outperforms any other approach in this scenario, if one considers the overall capacity availability of a constraint resource and the total weekly throughput provided (instead of using only the weekly throughput) [44].

Based on the above considerations, some companies seek to combine accounting techniques such as Lean and Throughput, finding that these will depend on the conditions presented by the company where some have a stable and adequate flow in production, while others have dominant bottlenecks suitable for performance, but with variable flow [45]. After the above, when integrated into the Lean Accounting and Throughput Accounting method of management accounting, it allows to increase the capacity of the company and to increase the financial balance on the one hand, and to reduce unnecessary actions and the costs associated with it, reorienting the companies and their management towards the satisfaction of the needs of the consumers and the growth (extension) of the business [46].

A clear example of the use of OCTs can be seen in public health systems, due to their ability to manage conflicting systemic situations without using advanced analytical techniques or probabilistic solutions. Because other approaches, such as LEAN, require software packages, bibliographic background,

and advanced expert support, they are rarely available in public health service systems [47]. Similarly, the brewing industry is a clear example of using TOC to improve supply chain management (SCM) and achieve a high level of customer service with reasonable operating costs and investments [48].

II.VII. Use of technology for cost control of industrial operations

The use of technology for the control of costs can influence the entire system of value creation through the butterfly effect, so the cost of risk is also unusually high. This intelligent system of cost control that integrates the physical information system can analyze and generate the strategy through the information base of real-time resources and large data. In addition, early warning of risks of the cost control strategy can be carried out through simulation technology [49].

One of the most cost-effective ways to make the system control (automation) is through the use of hardware and open source software, in order to be cost-oriented, in addition to the price, the systems must be implemented within a reasonable time and must also be reliable and secure, the most widespread control of industrial processes is through the use of industry standard programmable logic controllers, which have proven their reliability and longevity in industrial applications [50].

It is clear then that, with the evolution of technology and with the help of additive manufacturing and intelligent production centers, production costs decrease. However, the needs for change and evolution are driving society towards more complex solutions, and in some industries such as oil, the use of robots helps to control costs more effectively [51]. To solve the problems found in the literature: poor management and monitoring of costs, there is little evidence about measuring the costs of a project for managers and lack of cost estimation in agile methods based on repeatable processes, we can bear in the cost control exposed by [52]

ERP systems improve performance measures and management accounting techniques that can improve the information used for decision making, considering that while the information provided by management accountants improves decision making, there will be a greater demand for management accounting analysis and more demand on the knowledge of ERP uses of a new graduate at the time of recruitment [53]. Similarly, the characteristics of the CFO have a high impact on the adoption of the ERP system. Based on the Austrian research of medium and large Austrian companies that states the above, and as companies seek for this position external profiles that bring new knowledge in the adoption of systems [54].

Characterizing the impact of ERP systems on organizations is a difficult and complex task, since it sometimes resembles a continuous and uninterrupted path of disorder due to the fact that ERP systems have their own logic inscribed in the system - a technological logic that shifts the old boundaries of the

organization through configuration and customization, leaving as one of the possible solutions to this drawback the SAP system they offer in the configuration and customization phase, demonstrating that the design of their accounting modules is based on the accounting logic called Germanic accounting logic [55].

It is in this way that information technology (IT) is increasingly playing a crucial role in the management of business processes in all sectors and organizations; in this case SAP, which is presented as an integrated solution that incorporates the key functions and business processes of an organization [56]. Provide an opportunity to redesign your supply chain processes from SAP-enabled supply chain reengineering by demonstrating that effective implementation requires the establishment of the following five core competencies as shown in Figure 1.

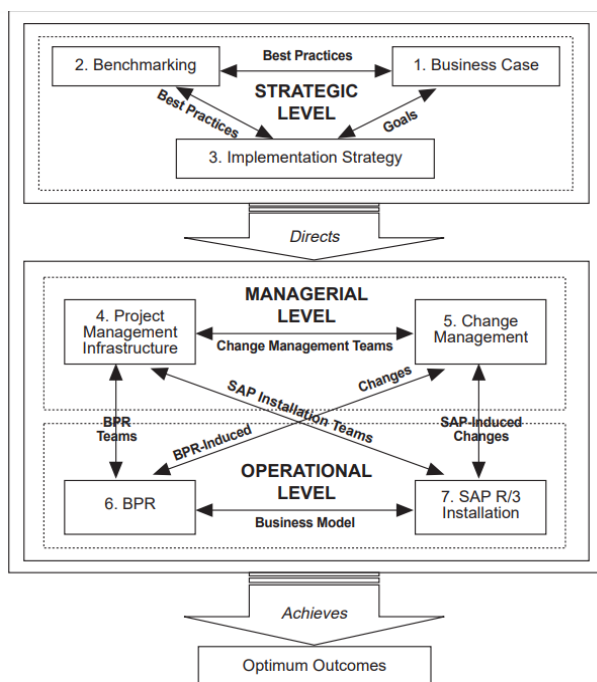


Fig. 1. ADAPTATION FOR SAP R/3 SYSTEM INTEGRATION, adapted from [57]. (1) development and deployment of change strategies; (2) project management across the enterprise; (3) change management techniques and tools; (4) integration of BPR with IT; and (5) strategic, architectural, and technical aspects of the SAP installation.

III. CONCLUSION

The strategic management of costs is a factor that provides the possibility for companies to have a more effective control of their processes, promoting competitive advantage and that they

will be able to obtain a rate of return higher than their cost, thus generating value for shareholders [7].

The contribution of strategic cost management to SMEs allows them to achieve more competitiveness. However, this will depend on the emerging market in which the company is developing, whether it is supported by institutional policy or using strategic cost management by other SMEs, which is supported by analyses carried out in Latin American and African countries [23].

The strategic management of costs in the efficient control of operations allows different techniques to be used by companies for cost control in which the ABC of Costs and Throughput Accounting in the Theory of Constraints stand out. Finding gaps in each of the techniques but that when working together there are improvements in the delivery of expected results [48].

Managers and business analysts seem to underestimate the impact of the usability of IT solutions on the processes for cost control. However, with the increased use of technology and competitiveness, they are coming to implement these types of tools, such as SAP, which is presented as an integrated solution that incorporates the key functions and business processes of an organization [56].

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