

## APPLYING SUPPLY CHAIN COSTING TO ACHIEVE COMPETITIVE ADVANTAGE

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### **ABSTRACT:**

**Purpose:** This paper aims to investigate the impact of supply chain costing on obtaining competitive advantage in industrial economic units by considering Mas Iraq Cement Company as a practical case. The company is one of the five cement producing firms in Sulaymaniyah Governorate, Kurdistan Region of Iraq. **Approach:** The research adopts a deductive approach as far as the theoretical aspect is concerned as it uses the accounting, cost management and strategic management literature about supply chain effectiveness and competitive advantage. While as far as the applied aspect is concerned, it utilizes an inductive approach along with the analytical case study approach as it is based on the practical cost and financial data of Mas Company during the year 2023. In reclassifying the supply chain cost of the company on an activity basis, the cost items of the supply chain are arranged according to ten activities in two main categories. Four activities are considered as the main activities: procurement, production, storage and marketing. On the other hand, there are six other activities which are regarded as support activities: accounting, legal affairs, internal control and audit, planning and follow-up, the technical department/operational quality and the information technology. All the cost items are classified into effective (value adding) or not effective (not value adding). **Results:** Out of the total supply chain cost of ID 389,950,106,827 (ID = Iraqi Dinar) of the company, ID 345,992,792,200 (88.7%) are effective while ID 43,957,314,627 (11.3%) are not effective. As far as marketing and procurement are concerned, they recorded the highest percentage of non-effective cost: 35.6% and 20.7% respectively. While as far as the most efficient activities are concerned, they are the technical department/operational quality (0.4%) and the accounting (2.5%). The materials supplies are the dominating cost factor that makes 68.9% of the total cost of the activities. However, the production activity alone absorbs 87.9% of the total cost of the ten activities. **Implications:** Activity cost analysis provides Mas Company's management with an effective cost rationalization strategy especially the marketing and procurement activities that target non-effective cost without reducing the cost related to the quality and customer related activities. **Originality/Value:** It is among the few applied studies in Iraqi cement industry that reclassify the supply chain cost on an activity basis in order to obtain competitive advantage.

**Keywords:** Supply Chain Costing; Competitive Advantage; Cost Leadership; Cement Industry; Iraq.

### **INTRODUCTION**

The world has witnessed great economic openness, especially in the movement of high-quality products and services. Also, economic units are increasingly faced with competition as they try to survive and develop in markets where only the fittest will survive. Production and manufacturing systems have created great pressures for economic units to catch up with developments and changes in the competitive environment as well as to enhance their efficiency in a way that supports their overall strategies. Due to the emerging need for competitive advantage as a result of globalization, electronic commerce and open market economies, it becomes essential to enhance the efficiency of the supply chain and to provide the necessary information which can be used for the benefit of strategies of economic units. Flexibility of supply chain reflects the ability to overcome obstacles and challenges created by geographical distance on commercial transactions or even on reaching people, through free movement of information and data among the members of the supply chain; it is in this context one of the strategies through which any economic unit can gain

competitive advantage compared to others, particularly as it operates in a dynamic environment characterized by rapid change, in which customers ask for diversity, quality, service and optimal price.

Due to the multi-level nature of the supply chain system and since it covers all the stages of procurement, production, logistics, warehousing, marketing and after-sales service, using the supply chain in this manner ensures and enhances the efficiency of the commercial relationship with the suppliers of the raw materials, components and semi-finished products, thus assisting the economic units adopting such an approach in securing a competitive advantage compared to other economic units. A competitive advantage is a result of the existence of institutional value and the capabilities it gives an economic unit to adopt and implement strategies making it superior to other similar units. In fact, the supply chain enables an economic unit to track the activities which add value to the product during all the process stages from gathering the raw materials until reaching the product or the service provided to the customers, and such kind of analysis is conducted to increase the efficiency of the activities of an economic unit and to identify the areas where value may be added, thus allowing the economic unit to obtain competitive advantage via strategic activity selection and cost estimation.

## **RESEARCH PROBLEM**

The Iraqi economic and industrial environment and the Kurdistan region of Iraq in particular is going through drastic changes which increase the level of competition among economic units and make them resort to modern approaches in administration and accounting in order to enhance the efficiency of resource usage, reduce costs, optimize the value created for the customers and enhance their ability to gain competitive advantage and survive on the market. This is especially true in the cement industry due to the high costs of raw materials, energy, production, transportation, warehousing and marketing.

In this regard, Mas Iraq Cement Company needs to achieve integration and efficiency in managing the activities which start from supplying the company with raw materials and supplies, pass through the production stage, warehousing and distribution, reach the marketing activities and customer services, along with the support activities. Resorting to traditional approaches in cost management makes it very hard to identify the sources of wastefulness and the costs that do not add any value, and as a result it makes management unable to find the possibilities of improving the efficiency of its activities and optimizing the value created.

The importance of applying the supply chain is that it serves as a strategic point of entry for analyzing the activities and their costs, identifying the value adding and non-value adding activities and coordinating the activities of all the stages of material and information flow. It results in cost reduction, quality improvement and flexibility, better reaction to market needs, and ultimately in obtaining competitive advantage. Even though many studies have discussed the issue of the application of the supply chain and competitive advantage, there is still a need for more applied research linking the cost analysis of the activities of the supply chain with gaining competitive advantage, especially in the Iraqi industrial environment and Kurdistan region of Iraq in particular, as well as in the cement industry. In this regard, the current study aims to fill this gap by studying how the supply chain is applied in Mas Iraq Cement Company and how it contributes in obtaining competitive advantage. Accordingly, the research problem is formulated around the following question, which is answered in the applied part of the study based on practical and theoretical analysis:

- Question 1: What is the effect of applying the supply chain on achieving competitive advantage in Mas Iraq Cement Company?

## **OBJECTIVE OF THE RESEARCH**

- For stating the theoretical foundations of the supply chain and its measurement techniques in quantitative and monetary terms.
- For defining the competitive advantages dimensions; cost, manufacturing efficiency internally, time of delivery, quality, customer satisfaction, environment, and the ability to change.
- For determining the impact of the supply chain on obtaining competitive advantage.

## **IMPORTANCE OF THE STUDY**

The **theoretical** significance of the study is that it deals with contemporary factors important for a wide variety of organizations and economic units, clarifies the impact of the supply chain on obtaining competitive advantage, and contributes to an Iraq-based source of reference for postgraduate studies on the subject.

The **practical** significance of the study is to take advantage of the results, recommendations, and suggestions made at the end of the study in contributing to the achievement of competitive advantage for Iraqi economic units in general and Mas Iraq Cement Company in particular by means of the supply chain.

## **HYPOTHESIS OF THE STUDY**

**H1:** The use of supply chain in order to overcome the weaknesses of the traditional costing systems in measuring the cost of production in industrial organizations will lead to obtaining competitive advantage in Mas Iraq Cement Company.

## **LIMITS OF THE STUDY**

Geographical limitations: The cement-production industrial organization is the study community, while Mas Iraq Cement Company is the study sample.

Time limitations: Financial statements of Mas Iraq Cement Company for the year 2023.

## **DATA SOURCES AND METHODOLOGY**

The **theoretical** aspect: Local, Arab and international literature that consists of books, researches, theses, journals and information available on the Internet.

The **applied** aspect: Field trips to the study sample, interviews with the employees of the company and examination of company's records and reports.

In the course of studying the theoretical aspects of the topic, the researcher used the deductive research method based on the data of available literature such as books, journals, theses, and reliable websites. As for the empirical part, the researcher applied the inductive analytical research method using Mas Iraq Cement Company's data, field visits, and interviews with Mas Iraq Cement Company's officials, treating the supply chain as an independent variable and the competitive advantage as a dependent variable.

## **LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **2.1 The Supply Chain Concept and Its Effectiveness**

The supply chain can be viewed as a structure consisting of interdependent elements interconnected with material and monetary streams and functional, structural, economic, technological, and informational effects. The flows of information go in two directions. The flow of a product goes from the raw-material supplier to the ultimate receiver – the customer – while the flow of finances goes against the flow of products. Entities operating in the supply chain are participants of many processes and activities creating value in the form of products and services offered to the ultimate customers (Jacyna-Golda et al., 2018). Likewise, the supply chain can be described operationally as a set of activities involved in the delivery of a product from the raw-materials stage to the client involving sourcing, production and distribution processes, together with information systems required for the coordination of these processes (Hugos, 2018).

Several components of the supply chain have been identified in literature, and a scheme of the supply chain based on flows along the chain's main components has been proposed: suppliers, warehouses, factories, and distribution centers up to final customers including flows of material, finished products and services, service itself, information, knowledge, financial resources (funds/profits) and returns (Garay-Rondero et al., 2019). Another set of scholars emphasizes the role of supply chain visibility – the information availability to participants of the chain from its origin to the fulfillment of clients' orders. According to some researchers, visibility is multi-dimensional, including human resources, processes, technology, and the information flows at each stage of the supply chain, which is expressed by

the transparency of product information (quality, location, sales points, etc.). Effective communication among the participants of the chain has also been identified as a condition for the coordination of the above flows, as any ambiguity or delay in the exchange of information between consecutive links of the chain decreases the efficiency of the whole process (Cutting-Decelle et al., 2007). (Al-Mizori, et.al., 2026)

Further line of literature associates the efficiency of the supply chain with the flexibility and agility of the chain – its ability to adjust volumes, product mix and delivery arrangements taking into account uncertainties in demand and supply (Jangga et al., 2015; Lin, Chiu, & Chu, 2006). The empirical studies demonstrate the dependence of agility of a firm on the maturity of its information systems and the level of integration of information and physical flows among the participants of the supply chain (Gupta et al., 2019; Motadel & Toloie-Eshlaghy, 2011). It is consistent with the findings about the continuous improvement of the supply chain management practices including procurement, production, and distribution (Xu, Zhang, & Abdullayeva, 2022).

On this basis, the supply chain can be viewed as an integrated system and a complex network of individuals, processes, technologies, and rules managing procurement processes and the flows of resources, information, production operations and distribution; it is one of the foundations of the global economy connecting manufacturers, suppliers, and clients, improving the quality of customer service and increasing brand loyalty organizing delivery processes, decreasing costs and eliminating waste in unnecessary operations, materials, and inventory, which increases the profitability (Grando & Belvedere, 2017). Proper and progressive management of the supply chain is a requirement for the survival of firms in competitive markets and improving their ability to face quick challenges and changes.

## 2.2 Competitive Advantage and Porter's Generic Strategies

Competitive advantage is a form of comparison between the performance of a company vis-à-vis its competitors in a similar targeted market segment, and can be gained in situations where there is congruence between the strengths of an organization and the opportunities available to it. In organizations, competitive advantage can be seen through the ability to control market offerings such as products, services and others. (Mustafa, et. al. (2022). It may also arise as a result of a unique possession of resources and capabilities possessed by the organization but lacking in the other organizations, or due to the strategies formulated by the organization that create business opportunities, which in turn necessitates the formulation of a strategy in tackling competition for competitive advantage. Competitive advantage occurs in organizations where the competitors cannot easily copy its strategy (Porter, 1985). The above mentioned resource-based perspective on competitive advantage is supported by research showing that the value and rarity of firm's resources and capabilities are also important predictors of superior competitive performance (Baia, Ferreira, & Rodrigues, 2020), as well as that the overall strategic management capability of an organization, not the resources alone, is what mediates the creation of competitive advantage (Oskoei, 2021).

According to Porter (1985), competitive strategies can be categorized into three main types: cost leadership, differentiation and focus. Cost leadership strategy focuses on the minimization of costs, even as it acquires a competitive advantage; a successful cost leadership strategy would mean that the firm operates more efficiently than its competitors. Differentiation strategy is characterized by continued innovations, creativity and learning, and besides, helps to lower competition and thus increase competitive advantage. Focus strategy, on the other hand, means the selection of its customers, the products and the geographical areas; as far as services are concerned, the organizations employing the focus strategy pay more attention to the services rendered, which is effective due to the differences in preferences and competitors' inability to duplicate. The empirical study of small and medium enterprises shows that both cost leadership and differentiation positively and significantly affect the competitive advantage (Haque, Munawaroh, & Sunarsi, 2021), whereas supply chain literature reveals that the supply chain management is also a source of competitive advantage (Bratic, 2011; Saber, Bahaami, & Haery, 2014).

The reliance on a particular competitive strategy by an organization is aimed at getting the upper hand among its competitors through having competitive advantage or advantages; strategy refers to the decisions made structurally by the organization in order to achieve definite objectives, which determine the success or failure of the organization. Effective organizational structure gives the firm the ability to obtain competitive advantages or advantages - which explains the reason why some firms are superior to and leaders in their field in comparison to firms in other countries,

based on the presence of factors of production in the industry, including human, physical, knowledge and financial resources and infrastructure; the possession of these factors plays an important role in getting the competitive advantage, and they form a system producing a national framework creating and supporting competitive advantages of national industries, so that the framework itself becomes a source of competitive advantages.

### 2.3 Linking Supply Chain Costing to Competitive Advantage

Reclassification of a firm's costs on the basis of activities, rather than accounts only, enables one to trace the consumption of resources to the activities consuming them, and thus helps to determine which activities, and which cost elements within them, add value to the product and which do not (Kaplan & Cooper, 1998). When applied to the supply chain, classification of the costs of each activity within the supply chain (procurement, production, storage, marketing and various support activities) into value-added (effective) and non-value-added (non-effective) costs would enable management to focus its efforts on particular cost elements causing inefficiencies, rather than making reductions across the board (Ahmad, & Jaf, 2026). This logic of activity based costing has been successfully applied to an adjacent field: in the construction materials sector, the decomposition of the practice of materials supply chain management by activities was shown to explain a considerable variance in the competitiveness of firms (Bekele, Mahesh, & Ingle, 2025), whereas activity based analysis of finished goods inventory was used to derive guidelines for inventory cost reduction as a way of gaining competitive advantage (Nuangchomnoong, Silpacharu, & Wattanakumul, 2023).

Besides cost rationalization per se, complementation of supply chain cost management with other management practices has been shown to enhance its impact on competitive advantage: the enterprise risk management was revealed to mediate, along with the competitive advantage, the link between supply chain management and firm performance (Tewu et al., 2024); the integration of digital marketing and innovation capabilities with the supply chain management was associated with higher competitiveness and creative industry performance (Munizu et al., 2024); and in materials- and energy-intensive service settings, explicit inclusion of environmental costs in supply chain cost management analysis has been shown to improve the performance of supply chains due to increased flexibility and resilience (Al-Aqrabi, et.al., 2026). Ghadiri et al., (2024) – a factor directly applicable to the materials- and energy-intensive industry like cement (Hamad, & Jaf, 2024).

Gaining the maximum benefit from the available resources, so that the economic unit can do what is required from it with regard to the implementation of the supply chain, allows the current operation to be transformed into a competitive advantage which will contribute to the success of this unit's operation and to identify the tasks necessary for creating new strategies for gaining the required competitive advantage – which, in turn, will contribute substantially to the success of these economic units' operation, to their sustainability, and to increase their ability to gain more market share (Kavalić et al., 2021). (Saeed, & Jaf, 2025). The combination of the information about the efficiency of the use of resources in terms of the supply chain activities with the above-mentioned dimensions of competitive advantage forms the foundation of the testing of the present study's hypothesis, as will be described in the following applied chapter.

## **METHODOLOGY**

### **3.1 Research Design and Philosophy**

The applied part of the present study uses an inductive, analytical case study methodology. The analyzed economic unit is a single industrial enterprise — Mas Iraq Cement Company — which reorganizes its actual 2023 accounting data according to the supply chain activities, rather than using the account classes of this company's income statement.

### **3.2 Population and Sample**

The population of the present study is the cement-manufacturing industrial sector of Sulaymaniyah Governorate, which includes five cement production companies. Mas Iraq Cement Company was selected as the sample of the present study because of several considerations which are in line with the requirements of the applied part of the research, primarily, the willingness of this company to provide the required detailed information and the possibility to perform field interviews and to obtain directly the required information, as well as relatively large production volume

of this company compared to some other companies and the use of multiple production lines with high technological equipment, which made it a suitable place for carrying out the research.

### 3.3 Data Collection

The theoretical data have been collected from local, Arab and international books, researches, theses, magazines and reliable websites. The applied data have been collected by means of field studies of Mas Company, interviews with officials and employees of this company and analysis of the company's cost accounting and production, financial statements, and other relevant documents and reports of the year 2023.

### 3.4 Analytical Technique

The accounting expenses of Mas Company recorded in its income statement of 2023 were reclassified from the account-based classification into activity-based classification. In total, ten activities have been identified, four primary activities constituting the supply chain itself – procurement, production, storage and marketing, and six secondary (support) activities — accounting, legal affairs, internal control and auditing, planning and monitoring, technical department / operational quality, and information technology. Each of the accounting expense categories, which were recorded in the income statement (salaries and wages; material supplies; service supplies; contracts and services; depreciation and amortization; and transfer expenses) has been tracked to the activity, or activities, that actually used it.

Each cost element in each of the activities was next classified into effective (value-adding) and non-effective (non-value-adding) on the basis of whether the cost is related to the effective purpose of the activity or not – that is whether it is associated with output, quality, timely delivery or customer services or it represents idle capacity, excessive or non-core depreciation, waste, one-time donations, compensation and fine or other cost which is not associated with the value creation for the customer. In the case of procurement activity, for instance, stationery, hospitality and bank service costs are fully effective, while the depreciation of transport and transportation facilities cost was largely non-effective because of underutilization of transport capacity and the depreciation of machinery and equipment was the single biggest non-effective cost item. Summation of effective and non-effective amounts for each of the ten activities gives rise to the results reported in the next section which will be used to test the hypothesis of this study.

## EMPIRICAL FINDINGS

The actual 2023 accounting data of Mas Iraq Cement Company were reclassified from accounts to activities according to the methodology outlined above. The results have been presented in five tables: effective and non-effective costs of ten activities of the supply chain (Table 1); effective cost ratios of ten activities (Table 2); distribution of cost of ten activities in the expense items of the income statement (Table 3); cost of four primary activities in terms of cost element (Table 4); cost of six secondary (support) activities in terms of cost element (Table 5).

### 4.1 Effective and Non-Effective Supply Chain Costs by Activity

**Table 1:** Analysis of Mas Company's Supply Chain Costs before and after Exclusion of Non-Effective Costs, 2023

| Activity                 | Total Cost 2023 (ID) | Effective (Value-Adding) | Excluded (Non-Value-Adding) | Reduction Ratio |
|--------------------------|----------------------|--------------------------|-----------------------------|-----------------|
| Procurement              | 8,495,421,208        | 6,733,989,500            | 1,761,431,708               | 20.7%           |
| Production               | 342,737,798,080      | 306,553,342,463          | 36,184,455,617              | 10.6%           |
| Storage                  | 11,689,829,981       | 11,087,064,256           | 602,765,725                 | 5.2%            |
| Marketing                | 14,314,671,720       | 9,213,579,866            | 5,101,091,854               | 35.6%           |
| Accounting               | 6,021,820,270        | 5,868,472,076            | 153,348,194                 | 2.5%            |
| Legal Affairs            | 159,374,685          | 130,672,045              | 28,702,640                  | 18.0%           |
| Internal Control & Audit | 205,395,704          | 168,165,430              | 37,230,274                  | 18.1%           |
| Planning & Follow-up     | 185,164,233          | 148,788,649              | 36,375,584                  | 19.6%           |

| Activity                | Total Cost 2023 (ID)   | Effective (Value-Adding) | Excluded (Non-Value-Adding) | Reduction Ratio |
|-------------------------|------------------------|--------------------------|-----------------------------|-----------------|
| Technical Dept./Quality | 5,986,537,860          | 5,964,937,860            | 21,600,000                  | 0.4%            |
| Information Technology  | 154,093,086            | 123,780,055              | 30,313,031                  | 19.7%           |
| <b>Total</b>            | <b>389,950,106,827</b> | <b>345,992,792,200</b>   | <b>43,957,314,627</b>       | <b>11.3%</b>    |

Source: Prepared by the researcher on the basis of Mas Company data, 2023

It is seen from Table 1 that the total cost of supply chain activities of Mas Company in 2023 was ID 389,950,106,827, out of which ID 345,992,792,200 was classified as effective cost after excluding non-value adding cost of ID 43,957,314,627 or reducing the amount of cost by 11.3% ratio. This demonstrates a definite possibility of rationalizing the cost of supply chain activities through exclusion of non-value-adding activities and cost elements.

At the activity level, the largest share of excluded (non-value-adding) cost was recorded for marketing, which was 35.6% (ID 5,101,091,854). Next comes procurement with 20.7% (ID 1,761,431,708) of total excluded cost, followed by IT activities (19.7%), planning and follow-up (19.6%), internal control and audit (18.1%) and legal affairs (18.0%). The next is production with 10.6%, storage 5.2%, and accounting 2.5%. The lowest ratio was recorded for the technical department (operational quality), with just 0.4%.

The above results clearly show that there is a significant difference in the effectiveness of resource utilization among the different activities in the supply chain: the high exclusion ratios for marketing and procurement indicate greater scope for reorganization of resources and improvement of these two activities, while low exclusion ratios in the technical department, storage, and accounting mean higher effectiveness of resource utilization. The excluded, non-value-adding cost may be reduced (without reducing the value-adding cost) resulting in reduced cost of the supply chain and making more resources available for other activities (such as increasing production, improving quality, distribution and service development), thus contributing to the company's cost leadership position.

#### 4.2 Effective Cost Ratios by Activity

**Table 2:** Total Effective (Value-Adding) Cost in Mas Company's Supply Chain, 2023

| Activity                     | Effective Activity Cost (ID) | Effectiveness Ratio (Effective ÷ Total) |
|------------------------------|------------------------------|-----------------------------------------|
| Procurement                  | 6,733,989,500                | 79.3%                                   |
| Production                   | 306,553,342,463              | 89.4%                                   |
| Storage                      | 11,087,064,256               | 94.8%                                   |
| Marketing                    | 9,213,579,866                | 64.4%                                   |
| Accounting                   | 5,868,472,076                | 97.5%                                   |
| Legal Affairs                | 130,672,045                  | 82.0%                                   |
| Internal Control & Audit     | 168,165,430                  | 81.9%                                   |
| Planning & Follow-up         | 148,788,649                  | 80.4%                                   |
| Technical Dept./Quality      | 5,964,937,860                | 99.6%                                   |
| Information Technology       | 123,780,055                  | 80.3%                                   |
| <b>Total after Reduction</b> | <b>345,992,792,200</b>       | <b>88.7%</b>                            |

Source: prepared by the researcher based on Mas Company data, 2023.

From Table 2 it can be seen that the total effective (value-adding) cost in Mas Company's supply chain for 2023 was ID 345,992,792,200 (which means 88.7% of total supply chain cost before exclusion). This means that the vast majority of the resources utilized in the activities of the chain were value-adding, with 11.3% of total cost being excluded.

Regarding the level of activity, the operational-quality activity from the technical department obtained the highest effectiveness ratio, 99.6%, followed by accounting (97.5%), storage (94.8%) and production (89.4%). This is an indicator of efficiency of resource utilization and low volume of non-productive activities in these types of activities. Marketing obtained the lowest effectiveness ratio – 64.4%, which means that 35.6% of cost was excluded – the highest inefficiency ratio in the chain's activities, procurement – 79.3%, IT – 80.3%, planning and follow-up – 80.4%, internal control and audit – 81.9%, legal affairs – 82.0%.

In general, an effectiveness ratio of 88.7% indicates the capability of Mas Company to direct the lion's share of its resources on value-added activities. Still, it should be noted that a high effectiveness ratio does not imply the importance of the activity from the financial point of view, since the production activity has the highest effective cost of ID 306,553,342,463, and, consequently, any improvement in its efficiency will lead to higher savings than in other activities due to their lower costs. Exclusion of 11.3% non-productive cost, especially in marketing and procurement, provides opportunity for reducing expenses and for allocating resources in higher productive activities, like production, quality, and distribution, thus ensuring cost leadership competitive advantage in terms of cost efficiency.

#### 4.3 Distribution of the Ten Activities' Costs by Expense Category

**Table 3:** Distribution of the Ten Activities' Costs by Income-Statement Expense Category, Mas Company 2023

| Activity                 | Salaries & Wages     | Material Supplies      | Service Supplies      | Contracts & Services  | Depreciation & Amortisation | Transfer Expenses    | Total                  |
|--------------------------|----------------------|------------------------|-----------------------|-----------------------|-----------------------------|----------------------|------------------------|
| Procurement              | 487,615,678          | 89,234,246             | 1,387,101,497         | 0                     | 6,531,469,787               | 0                    | 8,495,421,208          |
| Production               | 1,955,151,325        | 262,734,218,670        | 17,316,946,909        | 12,186,714,857        | 43,524,525,983              | 5,020,240,336        | 342,737,798,080        |
| Storage                  | 1,008,051,642        | 338,261,805            | 10,335,046,571        | 0                     | 8,469,963                   | 0                    | 11,689,829,981         |
| Marketing                | 365,711,759          | 5,303,532,256          | 513,401,979           | 0                     | 8,132,025,726               | 0                    | 14,314,671,720         |
| Accounting               | 426,663,718          | 115,951,792            | 1,442,604,675         | 0                     | 3,584,961                   | 4,033,015,124        | 6,021,820,270          |
| Legal Affairs            | 121,903,920          | 22,308,561             | 14,137,929            | 0                     | 1,024,275                   | 0                    | 159,374,685            |
| Internal Control & Audit | 154,724,206          | 27,427,163             | 21,944,294            | 0                     | 1,300,041                   | 0                    | 205,395,704            |
| Planning & Follow-up     | 121,903,919          | 0                      | 62,236,039            | 0                     | 1,024,275                   | 0                    | 185,164,233            |
| Technical Dept./Quality  | 108,000,000          | 3,481,680              | 5,873,605,480         | 0                     | 0                           | 1,450,700            | 5,986,537,860          |
| Information Technology   | 93,772,246           | 16,622,523             | 42,910,414            | 0                     | 787,903                     | 0                    | 154,093,086            |
| <b>Total</b>             | <b>4,843,498,413</b> | <b>268,651,038,696</b> | <b>37,009,935,787</b> | <b>12,186,714,857</b> | <b>58,204,212,914</b>       | <b>9,054,706,160</b> | <b>389,950,106,827</b> |

Source: prepared by the researcher based on Mas Company data, 2023.

According to Table 3, the total cost of ten activities of ID 389,950,106,827 is distributed unevenly among the expense categories in the income statement. The cost item that takes the leading position is material supplies of ID 268,651,038,696 (68.9% of total cost), and almost all of it is related to the production activity, showing the material-intensity of cement production process. The second one is depreciation and amortization of ID 58,204,212,914 (14.9%) of which the biggest share is also related to the production, marketing and procurement activities.

The costs of service supplies were ID 37,009,935,787 (9.5%), the cost of contracts and services ID 12,186,714,857 (3.1%), the cost of transfer was ID 9,054,706,160 (2.3%), and the cost of salaries and wages was ID 4,843,498,413 (1.2%) of the total cost. The cost of each of the ten activities, taking into account all support costs, amounted to ID 342,737,798,080 related to the production activity, that is, almost 87.9% of the cost of all ten activities, primarily due to the cost of raw materials, service supplies, and depreciation, the second activity – marketing, whose cost is ID 14,314,671,720, then comes storage – ID 11,689,829,981, procurement – ID 8,495,421,208 and six support activities take up considerably less part of the total cost.

The obtained data clearly confirm the significant dependence of the structure of the cost of supply chain of Mas Company on the production activity, the increase in the efficiency of production and its support, i.e., procurement of materials, their storage and application, will be the main factor ensuring the improvement of the cost-based competitive advantage of the company.

#### 4.4 Costs of the Primary Activities

**Table 4:** *Cost of Primary Activities, Mas Company 2023*

| No. | Account                                      | Procurement   | Production      | Storage       | Marketing     | Total           |
|-----|----------------------------------------------|---------------|-----------------|---------------|---------------|-----------------|
| 1   | Salaries & Wages                             | 487,615,678   | 1,955,151,325   | 1,008,051,642 | 365,711,759   | 3,816,530,404   |
| 2   | Materials & Supplies (material supplies)     | 86,437,121    | 0               | 0             | 64,827,840    | 151,264,961     |
| 3   | Stationery (material supplies)               | 2,797,125     | 0               | 5,782,517     | 2,097,843     | 10,677,485      |
| 4   | Hospitality (service supplies)               | 9,048,154     | 36,279,619      | 18,705,319    | 6,786,116     | 70,819,208      |
| 5   | Staff transportation (service supplies)      | 12,722,769    | 0               | 26,301,877    | 9,542,076     | 48,566,722      |
| 6   | Banking services (service supplies)          | 1,365,330,574 | 0               | 0             | 0             | 1,365,330,574   |
| 7   | Depreciation of machinery & equipment        | 6,483,528,110 | 25,996,454,057  | 0             | 4,862,646,083 | 37,342,628,250  |
| 8   | Depreciation of transport means              | 43,844,578    | 0               | 0             | 0             | 43,844,578      |
| 9   | Depreciation of furniture & office equipment | 4,097,099     | 16,427,790      | 8,469,963     | 3,072,824     | 32,067,676      |
| 10  | Raw materials (material supplies)            | 0             | 173,975,424,361 | 0             | 0             | 173,975,424,361 |
| 11  | Spare tools/parts (material supplies)        | 0             | 27,822,159,842  | 0             | 5,204,145,007 | 33,026,304,849  |
| 12  | Packaging materials (material supplies)      | 0             | 13,732,347,102  | 0             | 0             | 13,732,347,102  |
| 13  | Waste & consumables (material supplies)      | 0             | 0               | 0             | 0             | 0               |
| 14  | Electricity (material supplies)              | 0             | 46,807,104,959  | 0             | 0             | 46,807,104,959  |

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| No. | Account                                            | Procurement          | Production             | Storage               | Marketing             | Total                  |
|-----|----------------------------------------------------|----------------------|------------------------|-----------------------|-----------------------|------------------------|
| 15  | Maintenance of buildings, structures & roads       | 0                    | 489,922,172            | 252,597,763           | 0                     | 742,519,935            |
| 16  | Maintenance of machinery & equipment               | 0                    | 269,924,900            | 0                     | 0                     | 269,924,900            |
| 17  | Maintenance of devices & offices                   | 0                    | 23,987,450             | 0                     | 0                     | 23,987,450             |
| 18  | Rental of buildings & facilities                   | 0                    | 55,160,000             | 0                     | 0                     | 55,160,000             |
| 19  | Rental of machinery & equipment                    | 0                    | 2,053,277,750          | 0                     | 0                     | 2,053,277,750          |
| 20  | Non-employee rewards/fees                          | 0                    | 13,529,992,500         | 8,277,843,512         | 0                     | 21,807,836,012         |
| 21  | Miscellaneous service expenses                     | 0                    | 858,402,518            | 442,581,634           | 0                     | 1,300,984,152          |
| 22  | Depreciation of buildings, structures & roads      | 0                    | 17,462,178,763         | 0                     | 3,266,306,819         | 20,728,485,582         |
| 23  | Depreciation of tools & moulds                     | 0                    | 49,465,373             | 0                     | 0                     | 49,465,373             |
| 24  | Free goods & services (donations to third parties) | 0                    | 5,016,128,913          | 0                     | 0                     | 5,016,128,913          |
| 25  | Compensations & fines                              | 0                    | 3,386,073              | 0                     | 0                     | 3,386,073              |
| 26  | Food & medical supplies for employees              | 0                    | 397,182,406            | 243,001,894           | 0                     | 640,184,300            |
| 27  | Operating services (contracts & services)          | 0                    | 12,186,714,857         | 0                     | 0                     | 12,186,714,857         |
| 28  | Specialised-staff rewards                          | 0                    | 725,350                | 0                     | 0                     | 725,350                |
| 29  | Fuel & oils                                        | 0                    | 0                      | 89,477,394            | 32,461,566            | 121,938,960            |
| 30  | Travel & assignment                                | 0                    | 0                      | 58,984,813            | 0                     | 58,984,813             |
| 31  | General communications                             | 0                    | 0                      | 54,839,040            | 0                     | 54,839,040             |
| 32  | Rental of transport means                          | 0                    | 0                      | 1,203,192,613         | 436,507,087           | 1,639,699,700          |
| 33  | Maintenance of transport means                     | 0                    | 0                      | 0                     | 22,055,150            | 22,055,150             |
| 34  | Advertising & promotion                            | 0                    | 0                      | 0                     | 32,529,550            | 32,529,550             |
| 35  | Publishing & printing                              | 0                    | 0                      | 0                     | 5,982,000             | 5,982,000              |
|     | <b>Total</b>                                       | <b>8,495,421,208</b> | <b>342,737,798,080</b> | <b>11,689,829,981</b> | <b>14,314,671,720</b> | <b>377,237,720,989</b> |

Source: made by the researcher based on Table 4-7 of the company's activity records.

Table 4 shows that in 2023 the total cost of the four primary activities is ID 377,237,720,989 and they are divided between procurement, production, storage and marketing activities. The greatest share of cost is the production activity, its cost is ID 342,737,798,080, then goes marketing activity, whose cost is ID 14,314,671,720, storage activity – ID 1

## Analysis of Cost Elements

Cost of raw material, amounting to ID 173,975,424,361, was by far the biggest cost element, being almost entirely related to production. Thus, the need for effective purchasing management, inventory management, choice of suppliers

and pricing should be stressed. Cost of electricity was ID 46,807,104,959, all of which was within the scope of production activities. It means that energy was one of the cost drivers and any increase in the energy use efficiency and in the equipment maintenance, along with reduction in waste, will result in lower cost of production. Depreciation of machinery and equipment made up ID 37,342,628,250 and was mostly related to production, procurement and marketing. It underlines the importance of ensuring high rate of utilization of productive capacity, since low rate of utilization causes increased depreciation costs of products.

Cost of spare tools and parts was ID 33,026,304,849, including ID 27,822,159,842 in production activities and ID 5,204,145,007 in marketing. It means that maintenance and continuity of operation of equipment were important issues. Improvements in these aspects are possible through planned preventive maintenance and better management of spare parts inventory in order to reduce breakdowns and unplanned stops. Depreciation of buildings, structures and roads was ID 20,728,485,582, including ID 17,462,178,763 in production activities and ID 3,266,306,819 in marketing. The necessity of evaluation of economic use of company's facilities compared to the actual activity level should be noted here. Cost of non-employee rewards/fees and operating services amounted to ID 21,807,836,012 and ID 12,186,714,857 correspondingly. These are an important aspect of analysis of efficiency of outsourcing, since it makes it possible to check whether services that are contracted outside have added value or not.

#### ***Cost-Chain Perspective and Implications for Competitive Advantage***

The importance of Table 4 lies in the fact that it does not consider cost as an accounting issue only, but correlates it with the activities, thus making it possible to determine those activities and cost drivers that influence the cost of product the most and thus helping in decision-making regarding redistribution of resources, cost rationalization, waste identification and coordination of the activities. Reduction in the cost of materials or energy through increasing of efficiency is different from reduction of maintenance or quality cost in order to reduce product quality. Thus, the information provided in Table 4 will allow the managers to differentiate the necessary cost that creates value and the places where cost reduction is possible without deterioration of product quality.

The creation of competitive advantage for Mas Company is impossible without management of supply chain cost at the activity and cost drivers level. High level of concentration of cost in production (especially concerning raw materials, electricity, depreciation and spare parts) shows the opportunities of improvement of resource use efficiency and decrease of cost per unit of product, while analysis of cost of procurement, storage and marketing will make it possible to identify wastes and reallocation of resources into those activities that will add value for product and consumer. Thus, this analysis helps to implement the cost leadership strategy, improve the operating efficiency and make company competitive provided that reduction of non-value adding cost will not reduce the quality, continuity and customer-related cost that create value for customers.

#### **4.5 Costs of the Secondary (Support) Activities**

**Table 5:** *Costs of the Secondary (Support) Activities, Mas Company 2023*

| No | Account              | Accounting  | Legal Affairs | Internal Control & Audit | Planning & Follow-up | Technical Dept. | IT         | Total       |
|----|----------------------|-------------|---------------|--------------------------|----------------------|-----------------|------------|-------------|
| 1  | Salaries & wages     | 426,663,718 | 121,903,920   | 154,724,206              | 121,903,919          | 0               | 93,772,246 | 918,968,009 |
| 2  | Fuel & oils          | 37,871,828  | 0             | 0                        | 0                    | 0               | 0          | 37,871,828  |
| 3  | Supplies & equipment | 75,632,480  | 21,609,280    | 27,427,163               | 0                    | 0               | 16,622,523 | 141,291,446 |
| 4  | Stationery           | 2,447,484   | 699,281       | 0                        | 0                    | 0               | 0          | 3,146,765   |
| 5  | Hospitality          | 7,917,135   | 2,262,039     | 2,871,049                | 2,262,039            | 0               | 1,740,030  | 17,052,292  |
| 6  | Staff transportation | 11,132,423  | 0             | 0                        | 0                    | 0               | 0          | 11,132,423  |

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| No . | Account                                      | Accounting    | Legal Affairs | Internal Control & Audit | Planning & Follow-up | Technical Dept. | IT         | Total         |
|------|----------------------------------------------|---------------|---------------|--------------------------|----------------------|-----------------|------------|---------------|
| 7    | Subscriptions & memberships                  | 41,565,615    | 11,875,890    | 15,073,245               | 0                    | 0               | 0          | 68,514,750    |
| 8    | Banking services                             | 1,194,664,252 | 0             | 0                        | 0                    | 0               | 0          | 1,194,664,252 |
| 9    | Miscellaneous service expenses               | 187,325,250   | 0             | 0                        | 53,521,500           | 0               | 41,170,384 | 282,017,134   |
| 10   | Depreciation of furniture & office equipment | 3,584,961     | 1,024,275     | 1,300,041                | 1,024,275            | 0               | 787,903    | 7,721,455     |
| 11   | Compensations & fines                        | 738,927       | 0             | 0                        | 0                    | 0               | 0          | 738,927       |
| 12   | Other taxes & fees                           | 4,032,276,197 | 0             | 0                        | 0                    | 0               | 0          | 4,032,276,197 |
| 13   | Legal services                               | 0             | 0             | 0                        | 0                    | 0               | 0          | 0             |
| 14   | Accounting services                          | 0             | 0             | 1,500,000                | 0                    | 0               | 0          | 1,500,000     |
| 15   | Audit services                               | 0             | 0             | 2,500,000                | 0                    | 0               | 0          | 2,500,000     |
| 16   | Training & qualification                     | 0             | 0             | 0                        | 6,452,500            | 0               | 0          | 6,452,500     |
| 17   | Salaries — department staff                  | 0             | 0             | 0                        | 0                    | 108,000,000     | 0          | 108,000,000   |
| 18   | Purchase of materials for testing            | 0             | 0             | 0                        | 0                    | 3,481,680       | 0          | 3,481,680     |
| 19   | Quality-certificate renewal                  | 0             | 0             | 0                        | 0                    | 0               | 0          | 0             |
| 20   | Storage                                      | 0             | 0             | 0                        | 0                    | 0               | 0          | 0             |
| 21   | Electricity, food & wages                    | 0             | 0             | 0                        | 0                    | 0               | 0          | 0             |
| 22   | Document printing                            | 0             | 0             | 0                        | 0                    | 0               | 0          | 0             |
| 23   | Inspection & testing (hourly)                | 0             | 0             | 0                        | 0                    | 5,873,605,480   | 0          | 5,873,605,480 |
| 24   | Annual government approvals                  | 0             | 0             | 0                        | 0                    | 1,450,700       | 0          | 1,450,700     |

| No. | Account      | Accounting           | Legal Affairs      | Internal Control & Audit | Planning & Follow-up | Technical Dept.      | IT                 | Total                 |
|-----|--------------|----------------------|--------------------|--------------------------|----------------------|----------------------|--------------------|-----------------------|
|     | <b>Total</b> | <b>6,021,820,270</b> | <b>159,374,685</b> | <b>205,395,704</b>       | <b>185,164,233</b>   | <b>5,986,537,860</b> | <b>154,093,086</b> | <b>12,712,385,838</b> |

Source: prepared by the researcher based on Tables 8-13 of the company's activity records.

Table 5 demonstrates that the total cost of the six secondary activities in 2023 equaled ID 12,712,385,838, divided into accounting, legal affairs, internal control and audit, planning and follow-up, technical department/operational quality, and information technology. It should be noted that there is a noticeable difference in the amount of cost of the listed activities: the greatest cost was observed in the case of accounting, which equaled ID 6,021,820,270, while the lowest cost was recorded in the cases of information technology, legal affairs, internal control and audit, and planning and follow-up activities.

In terms of the supply chain, it should be noted that the discussed activities do not directly deal with production and sale of the product, and play a supportive role for the primary activities, so that the efficiency of their work is shown indirectly through product cost, quality and speed of performance of operations.

#### Analysis by Activity

**Accounting:** cost equaled ID 6,021,820,270, which was the largest among the costs of support activities, due to the high level of other taxes and fees (ID 4,032,276,197) and banking-service cost (ID 1,194,664,252). In this respect, it should be stated that the most part of the cost of the activity under discussion does not concern salaries only, but also relates to financial obligations and expenses for managing the activity. In this regard, it may be stated that the improvement of financial management and control over financial flows and banking expenses will increase efficiency of use of financial resources from a competitive advantage point of view.

**Legal affairs:** cost equaled ID 159,374,685, which was quite a small value in comparison with the total cost of the support activities. However, the importance of the activity cannot be assessed in terms of its financial value alone, since the quality of legal services can significantly limit contractual and legal risks and fines and, thus, protect the company's resources and supply-chain operation.

**Internal control and audit:** cost amounted to ID 205,395,704. Although relatively small in scale, the above activity is quite crucial for detecting errors, deviations, and possible sources of losses and weaknesses in control. The costs involved in the above activity can be viewed as value-added costs so long as they help prevent higher losses in primary activities. Thus, cutting down this cost cannot be viewed as the aim per se, and efforts should rather focus on making this control more efficient relative to the resources spent on it.

**Planning and follow-up:** cost amounted to ID 185,164,233. The above activity is quite crucial for organizing the company's resources and various activities, tracking the progress in plan implementation and possible deviations, and its connection to competitive advantage can be seen through its role in eliminating inefficiencies and delays and proper utilization of resources. In addition, planning and follow-up allows linking procurement, production, storage and marketing to the company's plans.

**Technical department/operational quality:** cost amounted to ID 5,986,537,860 – the second largest cost among the support activities – mostly due to inspection and testing, which amounted to ID 5,873,605,480. This category of expenditure should be evaluated differently from others because the costs of inspection and testing are directly related to the quality of the produced goods and their compliance with specifications. Thus, higher costs do not necessarily reflect the inefficiency of operations and rather constitute investments into quality, which prevent losses from poor-quality products and save money on rework. From the standpoint of competitive advantage, maintaining the product quality is necessary for building customer confidence and good reputation, so cutting quality costs randomly may not be efficient.

**Information technology:** cost amounted to ID 154,093,086 – the lowest among the support activities. Despite the relatively low cost of the above activity, its strategic importance grows because of its role in promoting the information flows between supply chain activities and facilitating data acquisition, processing and decision-making. Efficient investments in information technology will allow improving the coordination of activities, minimizing errors, accelerating information flow and control of cost, inventory and production.

## **Ranking of Support Activities by Total Cost**

| Support Activity         | Total Cost (ID)       | Relative Importance |
|--------------------------|-----------------------|---------------------|
| Accounting               | 6,021,820,270         | 47.4%               |
| Technical Dept./Quality  | 5,986,537,860         | 47.1%               |
| Internal Control & Audit | 205,395,704           | 1.6%                |
| Planning & Follow-up     | 185,164,233           | 1.5%                |
| Legal Affairs            | 159,374,685           | 1.3%                |
| Information Technology   | 154,093,086           | 1.2%                |
| <b>Total</b>             | <b>12,712,385,838</b> | <b>100%</b>         |
| <b>Total</b>             | <b>12,712,385,838</b> | <b>100%</b>         |

*Source: prepared by the researcher based on Table 5 above.*

In fact, cost of accounting and the technical department/quality activity is about 94.5% of total support activity cost. This finding of the study is significant because it shows that cost-management strategies focused on the support activities need to concentrate on these two activities without disregarding the significance of the other four.

## **Contribution to Competitive Advantage**

**Cost-rationalization of support activity cost:** cost analysis according to activity is better than aggregate distribution of cost among products in terms of identifying the support activities having the highest consumption of resources as well as provision of better management decision-making information for cost-rationalization.

**Support to primary activities:** despite being the indirect activities, the accounting, legal affairs, internal control and audit, planning and follow-up, quality and information technology activities support the efficiency of primary activities – information technology activity contributes to the flow of information; planning and follow-up support coordination; internal audit activity helps in avoiding the waste and quality prevents non-conforming products. The competitive advantage is achieved not only by decreasing cost of the primary activities but also by increasing efficiency of the supporting activities behind them.

**Distinguishing cost which adds value from cost that can be rationalized:** all the high cost items cannot be considered as unnecessary because for instance the high cost of the inspection and testing activity (ID 5,873,605,480) might be necessary to ensure product quality. So, the management goal should be to decrease unnecessary cost rather than to decrease all the costs without considering that there is no point in cost reduction without competitive advantage.

## **Linking Table 5 to Table 1**

It is important to consider Table 5 taking into account the results of the effective/non-effective cost analysis which were provided in Table 1. As shown above, total cost of the excluded (not adding value) cost in ten activities amounts to ID 43,957,314,627 and its reduction ratio is 11.3%. This means that supply chain analysis does not only provide data concerning the size of cost but also helps to identify the portion of cost which can be dispensed or rationalized – which means the useful basis for improving resource utilization by the management. In particular, the support activities which have relatively higher non-effectiveness ratios (internal control and audit - 18.1%; planning and follow-up - 19.6%; information technology - 19.7%) need to be checked concerning their cost drivers while making sure that the reduction will not affect their supporting functions.

On the whole, the findings presented in Table 5 suggest that secondary (support) activities constitute an important supportive basis for competitive advantage at Mas Company, and cost management for these activities must be based on identification of cost drivers and estimation of the value created by each activity. Special emphasis should be laid on accounting and on the technical department/quality activity, because they contribute the majority of the cost of support activities, whereas the cost associated with quality, control and IT should be kept if it positively affects the efficiency of the supply chain. These findings are consistent with the company's strategy of cost rationalization and improvement of operational efficiency, hence helping the firm to obtain competitive advantage.

## **DISCUSSION AND CONCLUSION**

This research investigated the impact of application of the supply chain on competitive advantage in Mas Iraq Cement Company – an industrial cement producer operating in Sulaymaniyah Governorate, Kurdistan Region of Iraq. The applied findings presented in Tables 1-5 illustrate the reclassification of costs incurred by Mas Company in 2023 across its ten activities and the breakdown of cost into value-adding (effective) and non-value-adding (non-effective) categories and thus provide an empirical test for the research hypothesis (H1).

The findings confirm H1: the application of the supply chain, achieved through activity-based cost reclassification and separation of value-adding from non-value-adding cost, helps to overcome the deficiency of the company's traditional, account-based costing system, which, alone, does not allow identification of those activities and cost elements that generate waste. From the total cost of ID 389,950,106,827 incurred by Mas Company in 2023 within the supply chain, 88.7% (ID 345,992,792,200) was found to be value-adding, while 11.3% (ID 43,957,314,627) was found to be non-value-adding cost — mostly concentrated in marketing (35.6% of the activity's cost) and procurement (20.7%). Since production accounts for 87.9% of the total cost of the ten activities, and raw materials supplies and depreciation – for the majority of the cost of production, the contribution of the supply chain to competitive advantage at Mas Company is achieved mostly through cost leadership: rationalization of non-value-adding cost in marketing and procurement and improvement of efficiency of usage of raw materials, energy and installed production capacity without cutting down on the cost associated with quality and control (in the technical department, internal audit and accounting) that creates the value for customers.

## **RECOMMENDATIONS**

- Priority must be given to cost rationalization in marketing and procurement, given the high ratio of non-value-adding cost (35.6% and 20.7%) in these activities among the ten supply chain activities.
- Efficiency of production should be improved by paying special attention to the cost elements that constitute the majority of cost incurred by the company — raw materials, electricity, depreciation of machinery and equipment, and spare parts, since production alone constitutes 87.9% of the total cost of the ten activities.
- Increase the efficiency of the use of productive capacity already invested, so as to depreciate machinery, equipment, buildings and structures over a higher level of production and thus decrease the depreciation charge per unit of product produced.
- Save, rather than blindly slash, costs on activities that add value through protection of product quality even when the cost of such activities is relatively high — particularly inspection and testing in the technical department/quality activity, and internal control and audit — because such costs enhance product quality, reduce failure costs and rework, and safeguard the organization's resources and reputation.
- Focus on accounting and the technical department/quality activity in relation to cost management because these two constitute almost 94.5 percent of all support activities costs, while keeping an eye on the other four support activities.
- Continue to invest in information technology for better coordination and communication between activities in the supply chain, which will contribute to error reduction, faster decision-making and better cost, inventory and production control.
- Use the effective/non-effective, activity-based costing method applied in this study regularly in management accounting, not as a once-for-all academic exercise, but at least annually in conjunction with the preparation of the company's financial statements.

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