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Research Article

Improving Product Quality Under the Integrated Relationship Between Attribute Based Costing and Process Reengineering Techniques: A Review Article

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Abstract: As a result of rapid technological progress, increased competition, and the global opening of markets, local markets have been flooded with a large number of foreign products of superior quality compared to local products. This has exposed Iraqi economic units to numerous pressures for various reasons, most notably the high cost of their products and the low quality of their products. This requires these units to seek solutions that lead to the provision of a high-quality product capable of competing with foreign products in terms of price and quality, thereby achieving customer satisfaction. Therefore, the research aims to integrate the two techniques of Attribute Based Costing and process reengineering and to demonstrate their role in improving product quality. The researcher reached a set of conclusions, the most important of which are The weakness of the costing system applied at the research sample factory, its failure to accurately monitor and identify cost elements throughout the product lifecycle, and the management's lack of interest and awareness in implementing contemporary costing techniques and their role in improving the quality of its products, thus ensuring their sustainability. The integration of specifications-based costing with process reengineering technology has added substantial improvements to product specifications, aligning them with customer requirements and needs, and leading to improved product quality.

Keywords: product quality; Attribute Based Costing; process reengineering.

1. Introduction

Changes in the contemporary manufacturing environment have led to the adoption of advanced industrial technologies, resulting in dramatic changes in the quality of activities, their methods of performance, their cost structures, and their control methods (Jin et al., 2012:327). Numerous technical methods have also emerged that rely on these technologies throughout the product life cycle. The use of computers has provided great flexibility in presenting various alternatives to decision-makers (Hawas and Omar, 2019:38). They have also contributed to identifying the inputs required for each alternative, the resulting outputs, and the potential consequences. This is achieved—through computers—with extreme precision, amazing speed, and promptness. This provides the appropriate information management needs, helps optimize available resources, potentially reduces operational costs, and improves product quality. Lumley & Gergely, 2015: 7)) The transformations and changes have also led to an increase in the intensity of competition, and therefore management no longer needs only appropriate information about the internal environment of the economic unit, but rather has extended to include appropriate information about the external environment as well, and the rapid, diverse and successive variables prevailing therein, the position of competitors, and the needs and desires of customers, which helps the economic unit to achieve a better competitive position. This is no longer limited to the local environment of the economic unit, or the geographical region to which it belongs, but rather has transcended to the international level Moghaddam et. al, 2012: 1345)), as the whole world has become a single market, whose variables affect all economic units, and are

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affected by what they offer, and by the share of each economic unit in it, as one of the requirements of this environment is the necessity for the economic unit to analyze the position of competitors, and to know the extent of the efficiency of the response of customers (EL-Kelety, 2006, 139) and the success of any economic unit is measured by the extent of its ability to determine the needs and desires of customers, and the extent of success in satisfying them with efficiency and effectiveness that exceeds competitors. (Balajouz, 2011, 193) In light of this fierce competition, the desires and expectations of the beneficiary customers have become the main and influential factor that management should seek through providing goods or services and what their specifications, quality, and prices represent in terms of value from their point of view with the highest possible quality and efficiency and the orientation towards marketing, i.e. producing what can be marketed instead of marketing what can be produced (Zabin, 2020: 94), and competition is no longer intended to obtain Customers only, but also the ability to anticipate their needs and desires and the specifications of those needs and desires, as the need to satisfy their desires and needs is the primary driver behind their decision to purchase a product, and the specifications of this product represent the driver that drives them to choose this product over other similar or alternative products from competitors. (Abdul Azim, 2005: 1) This is achieved through producing goods and services with specifications that are in harmony with the needs and desires of customers through the application of modern accounting techniques, including the costing techniques based on specifications and re-engineering operations, provided that this is done in light of Competitive strategies adopted by the economic unit, in light of the requirements of the new global environment (Ibrahim and Zainab, 2017: 113).

This new environment has imposed requirements that have resulted in changes in the cost structure. Traditional accounting systems for measuring costs are no longer able to provide adequate information to meet these requirements. Doubts have also been raised about the accuracy of this information, which may be misleading to decision-makers (Al-Aamaidh, 2015: 122).

Thus, it becomes clear that the contemporary manufacturing environment is characterized by characteristics that differ from the traditional manufacturing environment in many respects. These can be presented in the form of a comparative table to identify the changes that have occurred in the industrial environment, which have rendered management accounting techniques and tools incapable of meeting all the needs of modern management.

2. Literature Review

Cost Management from The Perspective of Attribute Based Costing and Business Process Reengineering

a. From Attribute Based Costing perspective

The term cost management has a broad focus. It is not limited to continuous cost reduction and cost control but rather focuses more on management's use of information for decision-making. (Lumley & Gergely, 2015: 8) And (Kumar & Nagpal, 2011: 122), believe that cost management is important for economic units because it goes beyond focusing solely on costs. Costs are not the only most important factor, but value and returns are also considered critical factors in the success of economic units. At this stage, several definitions of strategic cost management have been presented, including the philosophy of improving costs and revenues. Cost management is not only about managing costs, but also about managing revenues, so it seeks to improve productivity, maximize profits, and enhance customer satisfaction. (Horngren et al. 2015: 5) And (Lumley & Gergely ,2015: 8) defined it as a set of tools for generating information for planning, decision-making, and control in both the short and long term in order to help the management of the economic unit generate products and provide services more effectively and efficiently compared to competitors. (Henri et al. 2016: 4) defined strategic cost management (SCM) as "making deliberate decisions aimed at aligning the cost structure of an organization with its objectives." The economic unit with its strategy and improving strategic performance. (Yalcin ,2019:196) defined strategic cost management as the development of cost management information to facilitate the core management function and strategic management by using cost data to develop strategies to gain a sustainable competitive advantage in strategic cost management. (Mohsen ,2020:666) defined it as a process through

which costs are tracked throughout the lifecycle of a product in all its stages to minimize costs, taking into account the analysis of the internal and external environmental elements of the economic unit to provide products (services) with specifications and features that meet customer needs. This is achieved by using technical tools and methods to track and control costs, to create a competitive advantage for the economic unit and improve its strategic position.

The ABCI technique is an additional approach to strategic cost management and seeks to measure the cost of products based on the specifications provided by these products, which attract customers and provide added value to the customer (Roslender & Hart, 2003:257).

The management of the economic unit can utilize the ABCI technique in many areas, including: (Amin and Amin, 2020: 331)

1. Meeting the strategic cost management needs for cost information to solve some implementation problems related to the need for cost data on product characteristics and specifications.
2. Reducing costs from a strategic perspective, as knowing the specifications that add value from the customer's perspective and identifying the relatively less important specifications can reduce costs by lowering the levels of implementation of less important specifications or eliminating specifications that are not important from the customer's perspective.
3. Increasing performance efficiency by clarifying the specifications that are most important from the customer's perspective, as management works to improve its performance level, which leads to increased performance efficiency from a strategic perspective.
4. Assisting in decision-making, especially in production areas.

The main axes of strategic cost management under the specification analysis technique are as follows: (Al-Rubaie, 2015: 53; Savićet al., 2014: 1008(

1. Customer satisfaction is the primary driver of the economic unit's policies and strategies and the main pillar for ensuring survival, continuity, and competitiveness.
2. Continuous positive cost reduction, while maintaining targeted quality levels and standards, represents the most important pillars for achieving customer satisfaction on the one hand, and maximizing the overall value of the economic unit on the other hand.
3. Analyzing value-added activities throughout the product life cycle, and linking activities, specifications, and performance levels, is one of the most effective methods for reducing costs and optimizing the economic utilization of the unit's resources.
4. Controlling, measuring, and analyzing costs from a strategic perspective should be done in light of the linkage and integration between:
5. Specifications, targeted quality levels, and available internal capabilities and resources.
6. Performance and cost levels from an internal perspective and their relationship to competitors' cost structures.
7. The cost of specifications and the expected benefit of each specification from the customer's perspective.
8. The quality and cost levels targeted for specifications and the unit's competitive strategy.

b. From A Business Process Reengineering Perspective

Reengineering techniques primarily work to achieve the objectives of economic units, namely (improving quality, reducing costs, and customer satisfaction), and eliminating waste to reduce total production costs. This achieves a competitive advantage for the economic unit and ensures continuous and comprehensive improvement. This, in turn, leads to continued growth and market balance, increased productivity and market share, which in turn translates into reduced costs, maximized profits, and improved competitive position. All of this occurs through the adoption of reengineering techniques, which aim to satisfy customers and improve product quality at the lowest costs (Shahrazad, 2018: 89).

It is clear from the above that the philosophy of strategic cost management relies on information obtained from customers to be used in formulating the economic unit's plans and strategy. These plans are formulated in light of this information, which serves as an entry point for applying cost management techniques, such as the ABCI costing technique

and business process reengineering techniques. However, the data that the economic unit strategy seeks to obtain to achieve its objectives can only be obtained through cost management techniques within the market space. Through these techniques, customer needs and desires are identified, as are competitors' capabilities and market needs.

The relationship between market orientation and ABCII and business process reengineering

The concept of market orientation is based on the idea of caring for customers and working to satisfy their needs and desires to a distinct degree, better than competitors. (Zabin 2020: 94) Most economic units face numerous challenges stemming from the intensification of competition and the rapid product life cycle, which requires offering products that are compatible with the ever-changing needs and desires of customers. This underscores the need for these units to change their prevailing culture and adopt a new culture and philosophy that drives the achievement of their goals by appropriately satisfying customer needs and desires. Consequently, survival in the market has become largely dependent on efficiency, effectiveness, and gaining customer satisfaction and acceptance. This underscores the importance of "market orientation" and its impact on performance (Nima and Jassim, 2017: 253). Market orientation is defined as a culture that places the customer at the center of attention and harnesses the entire management of economic units to meet the customer's needs and expectations, while working to achieve profits, adhere to the behaviors required to complete business, and respond to intelligence information, disseminating and exchanging it throughout the economic unit (Ibrahim and Zainab, 2016: 111). For example, the research and development department designs a new product in response to customer needs, communicating directly with them to identify these needs and problems. The production department manufactures this product, the purchasing department purchases the materials necessary for manufacturing, and the finance department provides the necessary funding for these activities (Elkelety, 2006: 12). It is defined as "a set of organizational behaviors specialized in the information process, meaning the generation and collection of information by the economic unit about current and future customer needs, then its distribution to the various departments of the economic unit, followed by the economic unit's response to this information" (Riliang & Christine, 2004:6). Market orientation plays a fundamental role in the development and advancement of economic units due to the rapid changes imposed on economic units, which has contributed to their management using a purposeful administrative approach based on market strategic orientations that enable them to overcome their current reality, which is burdened with many obstacles and problems, and move them to an advanced stage that enables them to achieve their goals (Kirca et al., 2005:24). Focusing on the customer and making the fulfillment of their desires and aspirations a top management priority is one of the most important elements of implementing the concept of market orientation (Hassan and Abdul Rahman, 2020:5). Without customers, the economic unit loses its ability to survive, as customers choose everything they need from a diverse group of products and focus on each of them. The quality, price and performance of these products. Customers determine for producers what they want, when they want to get it, what the specifications are and what price they are willing to pay (Elkelety, 2006: 14). The increased intensity of competition and technological progress and the results they have produced in terms of providing low-priced, high-quality products and providing innovative products with a quick response to changes in customer demands have made economic units operate in a customer-driven environment. Economic units should make customer satisfaction the first priority and focus on the basic success factors to achieve customer satisfaction through the following: (Hawas et al., 2019: 40) (Raouf & Iswadi, 2020: 116)

- **Cost:** The economic unit has been unable to transfer the burden of costs to customers. Due to intense competition and the low prices offered by competitors, the economic unit is under constant pressure to reduce the cost of its product.
- **Quality**: This refers to the conformity of the product or service to its specifications. As a result of competition, customers expect higher levels of product quality and reject lower product quality. (Axelsson et al., 2016:29).
- **Time:** Time is an important competitive variable through which economic units seek to increase customer satisfaction by quickly responding to customer requests, delivering products on time, and reducing the time spent developing and introducing new

products to the market. Economic units focus on cycle time, represented by manufacturing time, handling time, waiting time, inspection time, etc., as manufacturing time is the time that adds value to the customer. Other times do not add value, so economic units seek to eliminate or reduce them as much as possible without affecting the quality of the products offered to customers. (Das, A., 2020:33).

- **Innovation:** The success of economic units in the contemporary business environment requires the development of innovative and advanced products to meet customer needs. This requires economic units to be flexible enough to accommodate changes in customer desires through feedback on customer satisfaction with the product features offered. Any delay by an economic unit compared to competitors' offerings can impact the economic unit's profitability, position, and market share. The ABCII costing technique, as explained by Bromwich (1991, 1992), provides the type of information necessary for "market orientation." By beginning with identifying customer needs in the form of product specifications, customers can not only generate the economic unit's primary revenue but also direct the costs of the economic unit's resources. Resources must be employed for revenue generation purposes by meeting customer needs. In 1991, Bromwich sought to provide a basic framework for developing ABCII as a value proposition by integrating accounting and marketing information to provide more complete and relevant information about market orientation (Inglis, 2005: 91). Product specifications can be presented as a cost objective, and the compatibility of product specifications with customer tastes will determine market share. In this sense, the ABCII technique explains the outward orientation of the market (Cinquini & Tenucci, 2007: 22). Furthermore, the information provided byAttribute Based Costing can be more positive for the sustainability of the economic unit within the product strategy. Sustainability in this context revolves around whether the product, as a package of specifications, is offered by the economic unit at a given price and viewed more favorably by customers than competitors' products (Inglis, 2005: 84).

As Walker points out in his 1998 study, "To obtain more positive and useful information for decision-making, costing systems should rely on analyzing product specifications. Innovating new products or re-developing and improving existing products to achieve a competitive advantage requires studying and analyzing specifications and providing accurate information about the cost of the activities that contributed to their achievement" (Walker, 1998: 14). Thus, the Attribute Based Costing technique relies on activities and linking them to products based on product specifications and the performance levels of each specification (Brimson, 1998: 9). In addition to the relationship between ABCII and market orientation, we also find that the relationship between business process reengineering and market orientation has become more pressing through the emphasis on adopting strategic orientations, as they represent a modern and pioneering intellectual approach, characterized through its processes and methods by the ability to increase the capabilities of the economic unit and improve its performance (Kumar & Arora, 2000: 55). The success of implementing business process reengineering technology depends on the commitment and conviction of the senior management in the economic unit regarding the need to adopt strategic orientation and analysis programs in the economic unit, in order to improve its competitive position. This conviction can be manifested in the commitment of the senior management to adopting strategic directions appropriate to the economic unit and the environment, represented by market orientation (Hendrick, 2003:493). Product quality depends primarily on customer needs and desires and the concept of market orientation. Quality does not occur on its own, but rather requires planning. Quality must be the basis of the economic unit's policy and planning process, related to and in line with an economic and commercial outlook (Andersson & Ryfors, 2000: 17). This quality must be achieved through simple and easy-to-apply tools, using contemporary accounting techniques, including costing based on specifications and process reengineering, along with defining objectives, functions, and identifying job opportunities. These factors are translated into an applicable framework. A study by Lukas & Ferrell, which was applied to a sample of American industrial companies, concluded that improving product quality changes with market orientation (Erdil et al., 2004: 1). From the above, the researcher believes that achieving the philosophy of market orientation and customer focus under the techniques of specifications-based costing and business process reengineering requires market researchers to recognize the importance of surveying customers' opinions, preferences, and evaluation of products, to formulate a combination of specifications that satisfy those desires. This is

because the combination of specifications varies from one market to another and from one product to another. However, improving product quality depends on targeting the study and analysis of these specifications and then attempting to achieve them. Valuable characteristics and specifications are those that align with customer needs and achieve the best value for the economic unit. They also determine the activities through which value is achieved, determine the associated costs, and then link these activities and their costs to the characteristics and specifications of the product, given that activity costs are the costs that add value.

3. The Importance of Integrating Attribute Based Costing and Business Process Reengineering Techniques

Both specifications-based costing and business process reengineering have been previously discussed, and it is expected that when combined, they will provide relevant information for improving product quality. Attribute Based Costing (SBC) is used to track, aggregate, and analyze activity and process costs based on product characteristics and specifications. The need for business process reengineering (BPR) has emerged through its integration with Attribute Based Costing (SBC), an important and dominant resource management tool. The importance of the integration between the two techniques can be identified through the following: (Mohsen, 2020: 44; Arora, & Kumar, 2000: 86(

1. The ability to more accurately identify resources to implement product specifications during the design phase, the stage during which the largest proportion of product costs is determined. The various impacts of the operating process and available resources are studied using BPR, which enables the prediction of resource quantities.
2. Re-employing resources in core activities that deliver value to customers. After the specification costing technique identifies activities that meet specifications, classifies these activities, and excludes non-value-adding activities, BPR takes over the control and planning of resources, reduces waste, and thus improves activity performance and achieves the highest degree of alignment between activity costs and customer preferences
3. In the Attribute Based Costing technique, the activities performed to specifications are the focal point, consuming the identified and studied resources. Business process reengineering analyzes and sorts these activities, identifying those that add value and those that do not, thus reducing the wasteful process of identifying these activities.
4. TheAttribute Based Costing technique integrates with business process reengineering and the modern concept of marketing, which is market orientation. The key factor for the success of an economic unit is its ability to identify customer needs and desires and work to satisfy them effectively and efficiently, outperforming competitors. This is achieved through fundamental and radical improvements to the performance of strategic activities geared toward meeting customer desires and needs.
5. The integration between the two techniques contributes to improving quality and reducing costs by utilizing untapped capacities and determining the optimal combination of levels of achievement for each product specification, which achieves the greatest possible benefit for the economic unit while simultaneously meeting customer needs and desires. BAKO, Y., & BANMEKE, 2019: 98
6. The integration of ABCII and PRE technologies achieves returns and maximum benefit for the economic unit, as ABCII focuses on finding a balance between customer benefits, the price of those benefits, and the return on investment, while Business process reengineering focuses more on maximizing returns by reducing costs and improving product quality, reflecting their respective philosophy of achieving returns.

4. The Role of Integration Between ABCI and PRE in Improving Product Quality

Integration between both specifications-based costing and business process reengineering techniques is expected to achieve numerous advantages in various aspects. It allows for a more accurate determination of the resources consumed and, consequently, the expected costs of implementing product specifications at the design stage (Lorenz A. 2018: 99). It also helps repurpose the economic unit's resources into core activities that deliver value to customers. After identifying the activities that meet specifications using the specifications-based costing technique, classifying these activities, and excluding those that do not add value, business process reengineering determines the customer's requirements for the economic unit's product, as well as their needs and desires. Meeting these requirements improves product quality from the perspective of both the customer and the economic unit. This integration also helps achieve optimal utilization of the economic unit's resources by defining engineering specifications based on customer requirements. These specifications translate into engineering or technical specifications expressed in the engineer's own words, such as: "What does the customer want?" "What are their needs and requirements?" "What are the technical means to achieve their requirements?" This integration also helps economic units improve the quality of their products by restructuring, reorganizing, and arranging them. It is recommended that competitors' products be evaluated to identify opportunities for developing processes that match the product's engineering characteristics, leading to cost reductions and increased quality. Furthermore, the integration will achieve the following benefits: (Duran et al., 2009: 54)

1. Focusing on products and developing them in accordance with customer desires and expectations by eliminating activities that do not add value and focusing on activities that do. Thus, improving product quality creates value for the economic unit, enhancing its reputation, and increasing its market share, which in turn leads to increased revenues and profits.
2. Excellence in three elements: cost excellence through reducing costs while maintaining the quality level required by customers; quality excellence through focusing on product characteristics and specifications in light of customer desires; and innovation excellence through continuous modification of product characteristics and specifications, which helps the economic unit retain customers and attract new ones by meeting their specifications.
3. A good understanding of the cost structure of the economic unit helps management make sound customer-related decisions. Attribute Based Costing technology contributes to supporting the competitiveness of businesses by reducing costs across the product lifecycle while meeting customer requirements in terms of quality specifications. The technology also handles Business process reengineering improves processes and their requirements, achieves regular coordination between production flows, costs, and information systems, and reduces waste and waste of time and resources.

5. Conclusions

a. The optimal criterion for the success of an economic unit, maintaining its position and continuity in a highly competitive market, is to meet customer demands for products with the specifications they desire, with high quality and at the lowest possible cost.
b. The Attribute Based Costing (ABC II) technique has emerged, emphasizing specifications as one of the most important cost estimation methods. It is an evolutionary extension of activity-based costing (ABC), which relies on detailed cost and benefit analyses based on information related to customer requirements.
c. Specification-based costing is an effective technique that focuses on the quality of the characteristics and features of a product or service to meet customer requirements and expectations, ensuring the greatest possible cost reduction. The relationship between the costs and benefits of each product unit is analyzed independently while preserving the characteristics of the product or service.
d. Traditional systems have not been accurate or fair in measuring product costs in light of the prevailing economic environment changes, as they do not take into account customer needs for products with specific characteristics or specifications,

even though these characteristics and specifications may be the cause of costs. This requires cost analysis based on these characteristics and specifications.

e. There is a difference in the way cost information is presented between the traditional system and the ABCI technique. The traditional system presents cost information in aggregate form for each cost element, while the ABCI technique presents the total cost of each product specification, and then

f. This figure is divided into a set of detailed figures that represent the costs of the components of each specification and the amounts of its cost elements.

g. Strategic cost management techniques are distinguished by their ability to integrate each other to achieve the desired goal with greater efficiency and effectiveness. The researcher found that the complementary relationship between ABCI and process reengineering techniques leads to improved product quality by identifying the optimal combination of levels of achievement for each product specification, achieving the greatest possible benefit for the economic unit while simultaneously meeting customer needs and desires.

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