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THE ROLE OF RESOURCE CONSUMPTION ACCOUNTING IN IMPROVING FINANCIAL PERFORMANCE: AN APPLIED STUDY ON MASS IRON AND STEEL INDUSTRY COMPANY IN SULAYMANIYAH, KURDISTAN REGION, IRAQ

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ABSTRACT

The research purpose is to focus on the role of resource consumption accounting (RCA) in improving financial performance. Also, its impact on cost reduction and transformative impact in setting and maintaining competitive prices within the modern dynamic and competitive business environment. Modern organizations have continuously been looking for new tools that would increase their operational efficiency, and in this context, resource consumption accounting (RCA) has come up as a strategic management tool kit posing a challenge to the traditional cost accounting methodologies that focused with more emphasis on the judicious use of resources. Methodology: This study would be empirically applied to the Mass Iron and Steel Industry company in Sulaymaniyah, Kurdistan region, Iraq. Finding: The result would support the hypothesis; this study was intended to estimate the positive influence of resource consumption accounting (RCA) on cost reduction and its transformative implications concerning an organization's ability to set and maintain competitive pricing and would result in improving financial performance. Originality: originality of the research indicated by introducing new ideas, theories, methods, or applications that have not been explored by previous studies.

KEYWORDS: Cost, RCA, Selling Price, Allocation, Unused Capacity, And Operating Income.

1. INTRODUCTION

Historically, there are a significant number of various methods, procedures, and tools that have been developed in the field of traditional managerial and cost accounting. All these procedures, methods, and tools are extremely probable to be designed to assist the management of the company to gain accurate information. Then, the internal business processes employ this data that is collected by these tools and methodologies in order to make better decisions and reach their objectives (Alsoboa et al., 2015). The reason for the emergence of these various methods, procedures, and tools is referred to as a number of significant factors that include customer empowerment, the force of competition, and technological advancements; all these factors have a strong impact on the business environment. Given the above-mentioned changes, it is essential for the economic units to consider reevaluating their traditional marginal and accounting systems due to the current strong competition that economic units tend to face and the criticism that traditional systems have received for their inability to provide management with the necessary information for decision-making; new tools and cost-management strategies are now required. The performance of the economic unit is determined in part by these technologies, which aim to maintain consumer satisfaction and increase output while reducing costs and preserving quality. As a result, costing and management systems have been modified and enhanced (Alsoboa et al., 2015). The business performance and management are more likely to have the aim of enhancing the profitability and offering relevant information for many purposes, such as planning, controlling, and making better decisions. Strategic management accounting has become one of the most sophisticated accounting topics during the last thirty years; it is extremely probable that it focuses on helping management accomplish organizational objectives and maximizing shareholder value. Consequently, sophisticated costing and managerial techniques have definitely enhanced cost prediction and measurement, which led to significant cost savings and decreases. Thereby, some of these strategic costing systems even have caused the change of traditional cost structures, which has an effect on decision-making (Alsoboa et al., 2015). The resource consumption accounting (RCA), for example, is a costing method that tends to increase company value through improved resource utilization and cost management, as well as increased use of financial leverage, in relation to the impact of the method on business performance. The performance of businesses is significantly impacted by RCA and how it is seen in terms of the strategic cost allocation approach, greater efficiency, and higher effectiveness. Financial performance is strongly and positively correlated with cost advantage, production process efficiency, and product planning expertise. Therefore, RCA contributed to the improvement of financial performance. Moreover, cost allocation to produced products tends to boost the ability of an analyst to calculate cash flow and increase its applicability to strategic decision-making. Utilizing the resources of an economic unit as efficiently as possible is the goal of the RCA technique. As a result, the product is less expensive, giving these companies a competitive advantage. Numerous businesses employ a range of strategic techniques and managerial instruments to help them create value for their products and services while minimizing expenses. Therefore, this study tends to investigate the role of RCA implementation in improving financial performance of economic units.

1.1. The Research Problem

The rapid developments that the economic units are witnessing in light of the modern business environment and the intense competition that resulted from it made it obvious that the economic units should think about finding modern accounting techniques that meet the new requirements and contribute effectively to reducing costs, which is the most important aspect in terms of achieving the competitive advantage through improving the financial performance of the unit, which traditional systems are no longer able to achieve. For that reason, in order to provide evidence regarding the mentioned point, this study has selected Mass Iron and Steel Industry Company as a sample of the study. The company applies traditional cost accounting systems, and this causes suffering for the company from the weakness in their financial performance, which participates in many aspects such as increasing manufacturing costs, the process of cost allocation, pricing decision-making, and losing competitive advantage in the market. Therefore, among these tools, the RCA could be a good choice that provides a better financial conclusion. Hence, the problem that can be framed in this study revolves around the following questions: ***Does the implementation of resource consumption accounting (RCA) contribute to improve the financial performance?***

1.2. The Research Objective

The study intends to present comprehensive research regarding the impact of RCA. Consequently, the study aims to provide an explanation of the purpose, nature, and significance of resource consumption accounting (RCA). Also, unveil mechanisms that are in association with the relation between the effect of RCA and determination of its role in improving financial performance through identifying unused capacity and reducing costs, and this tends to affect pricing decision.

1.3. The Research Hypothesis

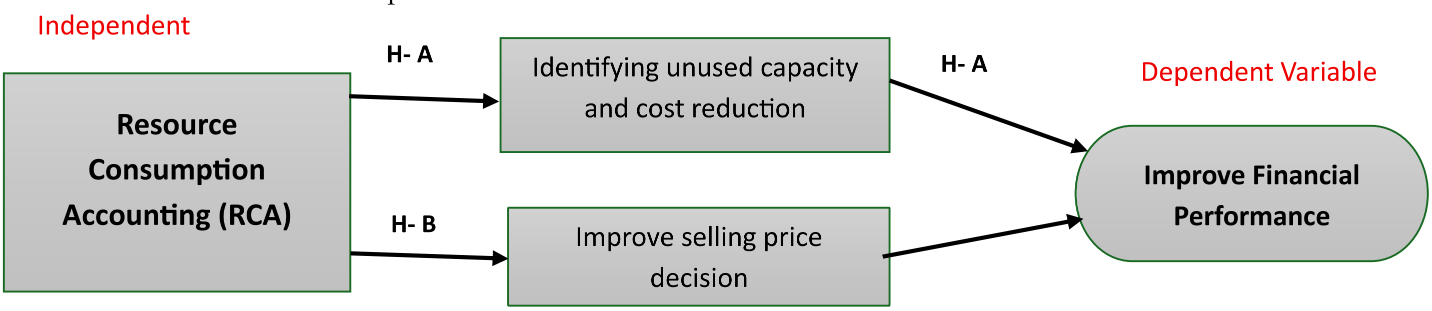
Based on the purpose and the problem of the study, the hypothesis of the research has been determined in the following dimensions:

Hypothesis: The implementation of resource consumption accounting (RCA) contributes to improve financial performance by the following drivers:

A. The implementation of resource consumption accounting (RCA) tends to improve financial performance of Mass Iron and Steel Industry Company by identifying unused capacity and cost reduction.

B. The implementation of resource consumption accounting (RCA) tends to improve financial performance of Mass Iron and Steel Industry Company by reassessment and improve selling price decision.

1.4. The Model of the Research



2. LITERATURE REVIEW

2.1. Cognitive Foundations of the Resource Consumption Accounting (RCA) Costing Method

In the last 20 years, there have been dramatic changes that have occurred in the field of manufacturing environments, and this caused development in product design, manufacturing cycle time, customer request responding, and consideration of cost reduction and increasing efficiency. Consequently, professionals in the field of management and accounting greatly attempt to find a tool and method that could help a business unit in order to gain better understanding and determine the manufacturing process, activities, and cost in more detail and accurately (Merwe & Keys, 2002). The business responded to the new circumstances by implementing an innovative approach to deal with the recent changes in the business environment, including the interaction of global economies and technological advancements over the past 50 years, which resulted in globalization and the emerging new accounting methods and definitions of management in general. Regarding the accuracy of the recalculation of manufacturing overhead costs. It can be seen that better cost controls, asset utilization, and capacity managing are just a few of the ways that the application of RCA in economic units may significantly affect firm value (Al-Qady and El-Helbawy, 2016).

2.2. The Consistence of Resource Consumption Accounting (RCA)

RCA was launched as one of the cost-measurement efforts that appeared in the US and numerous European nations. The RCA system is a fundamental management accounting technique that is carefully implemented to produce data that can be utilized to maximize the organization's value. RCA was created in December 2001 by the International Association for Advanced Manufacturing (CAM-I). In its 2009 publication under the subject of "Evaluating the Costing Journey: A Costing Levels Continuum Maturity Model," the International Federation of Accountants (IFAC) includes Resource Consumption Accounting (RCA) in its Good Cost Management Practice Guide, which serves as a guidebook for best practices in cost management (Al-Rawi and Abd al-Hafiz, 2018; Abdul Azim, 2012). The contents of resource consumption accounting (RCA) consist of the integration of both Grenzplankostenrechnung (GPK) (planned marginal cost accounting) and activity-based costing (ABC). Both costing methods are presented below:

2.2.1. First Integrated Component of Resource

Consumption Accounting (RCA): Grenzplankostenrechnung (GPK) (Planned Marginal Cost Accounting)

Following the Second World War, German researchers and practitioners created a number of costing techniques and tools (Michael and Gong, 2009). The German cost input is the foundation of its ideology, which integrates the greatest concepts (Ali, 2013). For instance, Sharman (2003) offers Grenzplankostenrechnung (GPK) (Planned Marginal Cost Accounting); it basically means "flexible margin costing" when translated from German. Planned Marginal Cost Accounting, or Grenzplankostenrechnung (GPK), was first presented by Wolfgang Kilger and Hans-Georg Plaut in the late 1940s and early 1950s. While Kilger offered the scholarly foundation, Plaut concentrated on the actual execution in order to help with managerial decision-making and to eliminate errors in the costs allocated to the various goods and services. The German GPK approach is commonly known as flexible margin costing, and its purpose is to provide accurate and reliable information in order to help managers in terms of decision-making. Further, due to inefficiencies in conventional cost systems, GPK was utilized in Europe. Indeed, the German management accounting techniques, which have been available for 70 years and continue to be in use by over 3,000 businesses, contribute to forming the basis of RCA. However, GPK is not well-known outside of German-speaking nations (White, 2009). It has been suggested that the GPK German management method tends to analyze and manage capacity. It has been presented by Su (2013), who states that there are two concepts for the creation of a new cost accounting system: firstly, contribution margin per unit of produced product should be calculated by deducting the variable cost per unit of produced product from the selling price. Secondly, only direct cost would be allocated to the produced product; this would be for a twelve-month period. Thereby, the fixed cost would be presented as a period cost subtracted from revenue directly. The purpose of the GPK costing method is to monitor the efficiency of the cost center. This method is specified and useful for the companies that produce complex products and provide services when they offer extremely complicated items or services; additionally, it is effective and appropriate for the company that has a routinized and repetitive process. The vision that Plaut had was to provide useful cost information in order to assist managers in making decisions and also attempt to provide solutions to correct the inconsistency of the assignment of fixed costs (Sharman, 2003).

Cost-type accounting, cost center accounting, product cost accounting, and contribution margin accounting are the primary characteristics of GPK (Su, 2013) as presented in the following Figure 1:

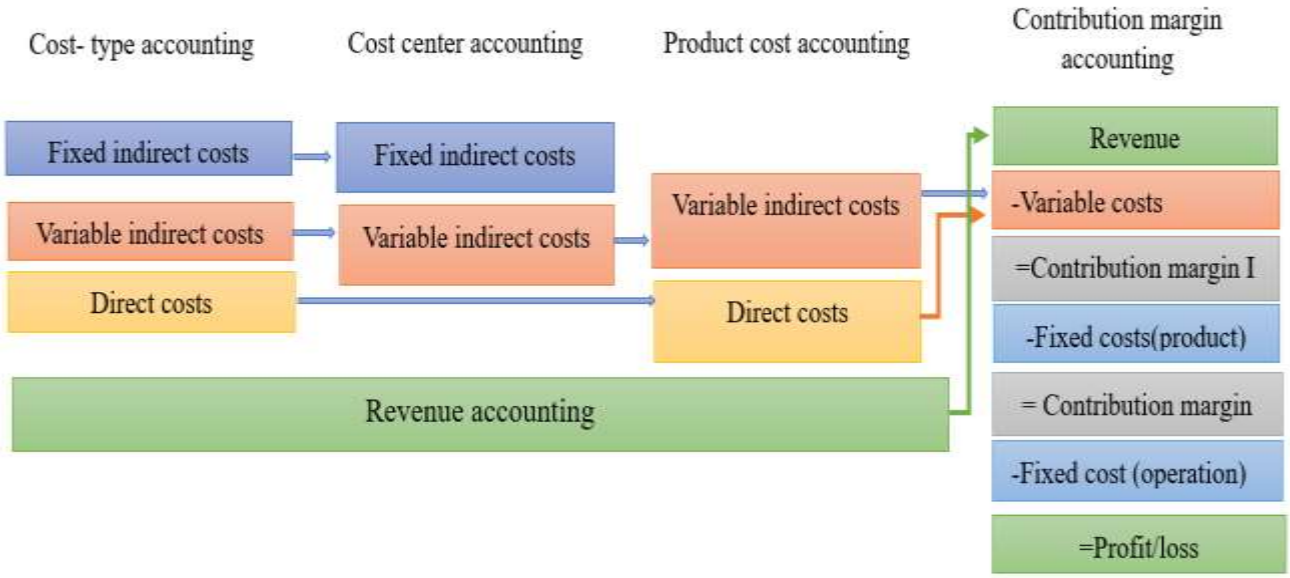


Figure 1: The Main Characteristics of Grenzplankostenrechnung (GPK).
(Source: Friedl Et Al., 2009: 40).

From the presented **Figure 1,** it can be seen that the cost-type accounting obviously refers to the determination and classification of costs into different types of costs, such as material cost, labor cost, maintenance cost, utilities, depreciation cost, etc., which could be determined as direct and indirect costs. Also, at the same time indirect cost would be separated again into fixed indirect cost and variable indirect cost. The essential characteristic of GPK is cost center accounting, which is created based on the responsibility accounting principles. The purpose of cost center accounting is to consider the maintaining of manufacture overhead (Su, 2013). After that, both direct and indirect costs from cost centers are allocated to products based on the quantity of variable input used, such as machine hours, labor hours, etc. (Su, 2013). Because of short-term decision-making, adoption of a marginal costing viewpoint could be supported, which does not include fixed costs; they are not considered at this stage (Su, 2013; Sharman, 2003; and Friedl et al., 2009). Lastly, the profit-and-loss statement is calculated. In GPK, it is known as contribution margin accounting. There are three levels to it. The most straightforward one takes a lump sum deduction from contribution margin I for all fixed expenditures. As it has been realized that there are two kinds of contribution margin, one is referred to after deducting variable costs from the revenue. Second, it is found after deducting fixed indirect costs from the first contribution margin. The critical point here is the authors could mention gross profit instead of saying second contribution margin because gross profit could be calculated and identified after subtracting variable and fixed costs from the revenue.

2.2.2. Second Integrated Component of Resource Consumption Accounting (RCA): Activity-Based Costing (ABC)

In the 1980s, Robin Cooper and Robert S. Kaplan developed the Activity-Based Costing (ABC) approach. They created this technique to give more precise cost data by allocating indirect and overhead expenses to certain production-related tasks. Cooper and Kaplan (1988) explained the concept of activity-based costing (ABC), and the fundamental idea of ABC is that businesses use resources and pay expenses to carry out a variety of tasks that are a part of their value chain in order to generate goods and services. Moreover, allocating resources to tasks directly or through resource drivers needs to be the foundation of cost allocation (Cooper and Kaplan, 1988). Furthermore, it has been suggested that the ABC costing method has been implemented in the US (Okutmus, 2015). In addition, the ABC of US management method tends to analyze and manage the process of production of products or the process of providing the services. The study of Okutmus (2015) points out that the ABC method, which was regarded as a revolution in management accounting because it refuted the traditional understanding of an organization as a collection of departments or cost centers and instead saw it as a diverse range of activities that are further subdivided into a variety of tasks. In this manner, the central notion was "activity," along with the concept of "cost driver," which is the metric used to allocate indirect costs across different activities (Larbi, 2021). Additionally, ABC data is the most useful for decisions related to long-term planning when the majority of costs are optional or subject to change. For instance, the choice to start or drop producing a certain product must take into account the long-term need for expensive resources from that product. Similarly, the resource-demanding nature of the product and manufacturing process design process can be used to evaluate the allowable cost of a potential product (Jassem, 2019). However, for short-term decisions when many costs are fixed and sometimes unavoidable, the output from an ABC system may be false and useless due to the long-run fluctuation of costs implied by the ABC method (Perkins and Stovall, 2011). Companies using ABC failed to detect underutilized capacity (Grasso, 2005). Despite having previously mentioned advantages, inaccurate cost information results from the ABC method's assumption that the resources are operating at maximum capacity and failure to account for idle capacity (Güneş and Gutnu, 2022). This is because RCA concentrates on resources, and the ABC costing method concentrates on operations (Mustafa et al., 2022). In addition, Al-Qudah and Al-Hroot (2017) point out that the ABC works well for complicated procedures that are difficult to solve as well. It is true that ABC had an important role in enhancing cost considerations of management practices in the past; however, in today's global economy with competitive operations, ABC is no longer an effective tool for managing (Johnson cited in Grasso, 2005, and Larbi, 2021). As a result, in the US, going a step further, Grasso (2005) mentioned that they have suggested resource consumption accounting (RCA) as an enhancement over current ABC and GPK systems.

The consistency of RCA is presented in the following Figure 2:

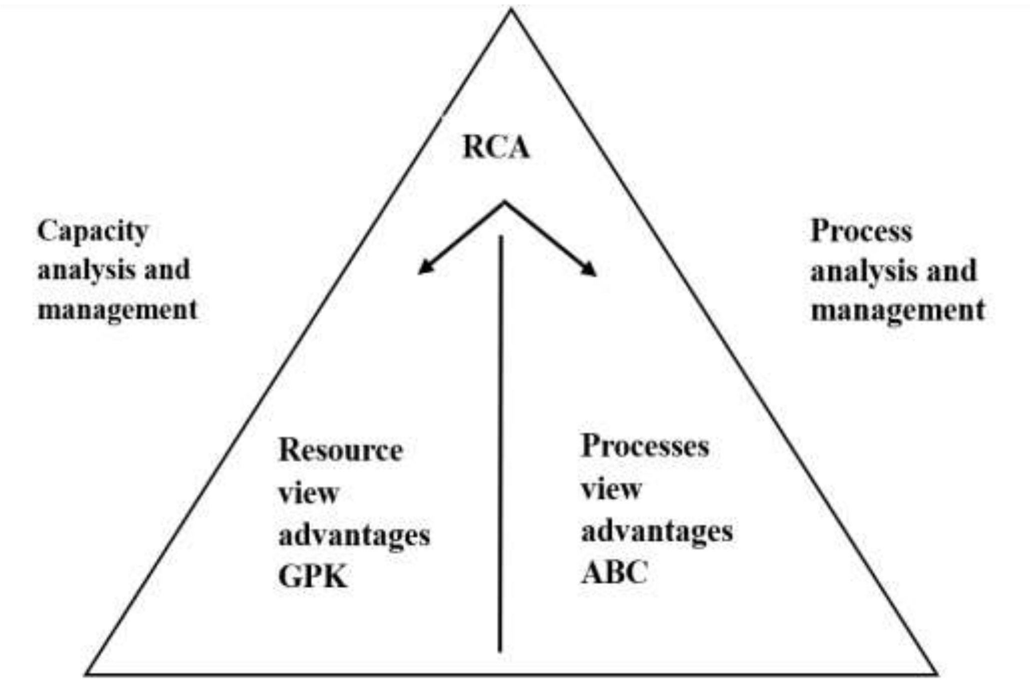


Figure 2: The Consistency of Resource Consumption Accounting (RCA).
(Source: White, 2009: 71).

2.3. Conceptual Clarification and Definition of Resource Consumption Accounting (RCA)

RCA has become a new generation of cost management methods (Tse and Gong, 2009). It is designed to assist managers in terms of analytical processes of thought, and it is founded based on the principles of management accounting concepts (White, 2009). Moreover, White (2009) has pointed out that the manager is the main party that receives information from RCA, not the external financial report. Forget about costing for external financial statements and consider the needs of managers across the board in an organization who desire to guide production or service delivery and maximize their operational support with correct economic judgments. RCA is one of the modern methods of cost management that aims to provide suitable details on how to maximize the use of available resources and employ idle energy in a way that contributes to increasing productivity and lowering costs for the good or service, increasing the business units' profits, and supporting their competitive position (White, 2009). Numerous scholars and individuals interested in their studies have addressed it, but they have not reached harmony on an exact and comprehensive description of this approach and have instead received numerous definitions. For example,

1. Furthermore, Webber and Clinton (2004) have proposed that RCA provides better information that assists in the proper estimation of costs by investigating the resource level. In other words, resource analysis (RCA) is a technique that seeks to provide superior information necessary for precise estimation of costs.
2. The International Federation of Accountants (IFAC) (2009) defined RCA as a costing technique that combines information. The tried-and-true application means that the RCA has been tested many times before generalization; it has been used and practiced by many experimenters and professionals. Also, the concept of "true" is referred to as the reliability of the result that the RCA costing method would be provided. This means that it produces the accurate and reliable information and results. Consequently, reliable decision support principles offer decision makers information for development.
3. Shahin (2010) has defined RCA as a cost-management accounting tool that offers relevant information on how to effectively utilize available resources, use idle energy, and support various administrative decision-making processes within the company.
4. It has also been defined by Al-Sammani (2016), who stated that RCA is an affordable instrument that is all-inclusive in its capacity to

offer relevant and precise information on the business's operations and to identify idle energy, thus assisting in the optimization of resource use and decision-making.

5. According to Al-Rawi and Al-Hafiz (2018), it is one of the modern management accounting methods that are used based on the combination of activity-based cost accounting and German cost accounting systems. It was developed to help management make better decisions by maximizing revenues and lowering costs while safeguarding the viability and sustainability of the economic unit in the face of competitive markets.
6. Kadhim and Abdulzahra (2020) have expressed that it is a universal and integrative cost management system that offers managers better financial unit information and is an innovative method for accounting.
7. Also, RCA has been defined by Al-Safar (2021) as a new cost management accounting portal that offers relevant data and an eye towards the future on how to maximize the economic unit's resource availability in light of both customer expectations and desires as well as the advantages of service demand in order to lower product costs, determine the competitive position of the economic unit, and raise customer value added.
8. Additionally, Hadi and Hatif (2023a and 2023b) have defined resource consumption accounting, which is an accounting technique that provides an extended consideration of resource consumption in order to satisfy customer preferences, needs, and desires in accordance with the needs of activities for resources, with an emphasis on the necessity for the best possible utilization of resources in order to achieve the effectiveness and efficiency of resource management. This technique provides relevant information on how to use idle energy to help boost efficiency and lower costs associated with products, which in turn increases profits and strengthens the company's competitive position.
9. While a variety of definitions of the concept of RCA have been suggested, **as a result, according to previous definitions, the researcher tends to define RCA** as an effective costing tool. The main purpose of this costing tool is to determine the cost of the produced product or provided service in an accurate and reliable way. Thereby, it can identify unutilized resources and utilized resources that participated in manufacturing products or provided services. Consequently, RCA is more likely to play an essential role in providing detailed information throughout the production process, which is important for many aspects that managers could rely on, such as in terms of decision-making, controlling, planning, and budgeting.

It has been suggested that RCA is frequently used in combination with enterprise resource planning (ERP) systems to present better information that is fully integrated within the company's various reporting and planning systems; it is integrated because these systems attempt to achieve the best possible combination of cost management principles implemented in an integrated fashion (Webber and Clinton, 2004 and Al-Qady and El-Helbawy, 2016). Using these systems, attempts to track and gather more specific data, RCA easily and successfully integrates with contemporary information systems that support project operations, enabling the cost system to provide data that satisfies the requirements of various management levels (Grasso, 2005). RCA is extensive, as it can include product costing as well as resource planning (Keys and Clinton, 2002). Moreover, Al-Qady and El-Helbawy (2016) indicated that resource flow is the main emphasis of RCA, after which costs can be monitored. Given that resources are the source of costs and that costs are a significant factor in management decision-making, it is essential to comprehend resource nature in order to model resources effectively. Moreover, Perkins and Stovall (2011) state that, similar to the other methods, RCA has a rich history, a solid theoretical foundation, and supporters in both academia and industry.

2.4. *The Procedures of Resource Consumption Accounting (RCA)*

It is necessary for managers to fully understand all resource connections in order to correctly develop an RCA model. Furthermore, Cooper and Kaplan (1988) proposed three guidelines that direct the process of developing an ABC system to assess the demands placed on resources by specific products. These guidelines could also be applied during the implementation of RCA technique, which helps to organize resources into resource pools. In order to create resource pools and organize resources within them, the following guidelines must be followed (Cooper and Kaplan, 1988; White, 2009; and Al-Qady and El-Helbawy, 2016).

A. **Concentrate on expensive resources***:* The most expensive resources should be managed as separate resource pools. Product costs would be greatly affected if these resource outputs and expenses were incorrectly assigned to intermediate or final cost objects (Al-Qady and El-Helbawy, 2016).

B. **Place special emphasis on resources whose usage varies greatly between items:** Products use different outputs from resource pools. Consequently, data on utilization of resources trends have to be available (Al-Qady and El-Helbawy, 2016).

C. **Emphasis on resources that consumption patterns are not associated with the volume-based measurements**: these resources cannot represent sufficient measures of resource consumption, and

D. **The similar resources should be combined into a single resource pool:** It makes sense to group different low-value resources into a single resource pool instead of creating many larger pools. It is also possible to combine components that are received from one vendor and aggregate them into a single resource pool.

There is a significant stage that needs to be taken in order to implement resource consumption accounting (RCA), which is presented in the study of Kbelah et al. (2019), which is as follows:

Step 1: Create resource pools from the resources and determine the cost that has been incurred by the business units during the production process.

The goal of resource pool construction is to combine the expenses of similar resources into one area of accountability. This kind of duty is known as a cost center in German cost management systems, and it may consist of a number of resource pools. A resource pool can, for instance, consist of the employees who run a certain machine and the machine itself (Webber and Clinton, 2004). One major benefit of accounting for resource consumption through control and planning at the level of resources is that it allows managers to identify all of the available resources for the economic unit, such as cash, buildings, machinery, personnel, etc. This is the fundamental and first step in implementation, given that resources are available to the unit and the economy receives the operating capacities of production (White, 2009). Following the resource allocation process, resources are arranged into homogenous groups according to cost element homogeneity, technological linkages, or skill sets. In order to turn these costs into other resource pools or the ultimate outputs, resource characteristics should be integrated to create homogenous groups (Webber and Clinton, 2004). This means that it depends on the similarities and relationships between resources, such as the human resource pool, the equipment resource pool, and others; this stage needs confirming and analyzing the relationships between resources and defining resource pools (Kbelah et al., 2019).

Step 2: Classify and determine the resource pools as fixed and proportional with related costs.

Each resource pool's costs are separated into two categories: fixed costs and proportionate costs. Moreover, proportional cost, as mentioned before, has been used to describe the variable cost under RCA. This is because the variable cost changed depending on the cost object, which may be a product or a unit. Nonetheless, proportionate cost is associated with resource pool production. Indeed, this distinction is crucial because the proportional costs are allocated based on the production amount (output) of the resource pool, while the fixed costs are allocated based on the theoretical capacity. For instance, direct labor is considered a proportionate cost, whereas training hours are considered a fixed cost component (Paksoy, 2021, and Köse and Ağdeniz cited in Kadhim and Abdulzahra, 2020).

Step 3: Identifying the resource driver for each resource pool together with determining the practical and theoretical capacity of each resource pool.

In contrast to previous technical approaches, RCA tends to specify a driver for each resource pool, such that if there is a resource pool that is specified for material cost, then material handling or material moving could be a great driver for the material resource pool; the manager should count how many times material was moved or handled. The next important stage is the determination of theoretical and practical capacity for each activity (Okutmus, 2015).

Step 4: Computing allocation rates for fixed and proportional costs for each resource pool.

The fourth stage then involves determining the activities. Through resource cost drivers, fixed and proportionate costs gathered in resource pools are allocated to activities, hence determining the costs of those activities. While variable costs are assigned based on the outputs of the budgeted resources, fixed costs are defined by the theoretical power of resources (Al-Rawi & al-Hafiz, 2018). In accordance with Horngren et al. (2018), 80% of the theoretical capacity is the practical capacity. It is possible to accurately identify unused capacity with this method, regardless of whether it is leftovers, idle, or lost. Using theoretical energy instead of practical capacity significantly helps to stabilize consumption rates and fixed costs, which are consistent over time periods due to changing conditions (Perkins &

Stovall, 2011).

Step 5: Determine the cost of the resource pool and assign it to various activities.

The quantitative measure of the magnitude of the anticipated resource outputs is used in this stage to determine the reasons for resource cost. These consist of machine hours, direct working hours, and other factors. This means that by using quantitative measurement, the output of the resource would be predicted, such as the hours that workers worked, the machines, and the kilogram of material used. In addition, it carries the number of resources that must be used in each resource pool in order to achieve a specific output size that cannot be achieved with any other strategy (Perkins & Stovall, 2011). computation of each activity's cost based on the theoretical capacity for determining a fixed rate and the practical capacity for proportional cost.

Step 6: Calculating total product cost for each produced unit.

Ultimately, the cost of the product or service is calculated by allocating the activity costs from the previous stage to goods or services in proportion to the volume of usage of the activities (Paksoy, 2021). The study of Zhang et al. (2011) set out to determine the term "resource pool," which refers to a collection of different resource elements and indicates the output capacity of business units. When resources are actually used, the costs are allocated to the cost objects in the system; nevertheless, all resource costs associated with idle capacity that are not allocated to the cost objects stay in the resource pools (Okutmus, 2015).

The steps of implementation of resource consumption accounting have been presented in the following figure 3:

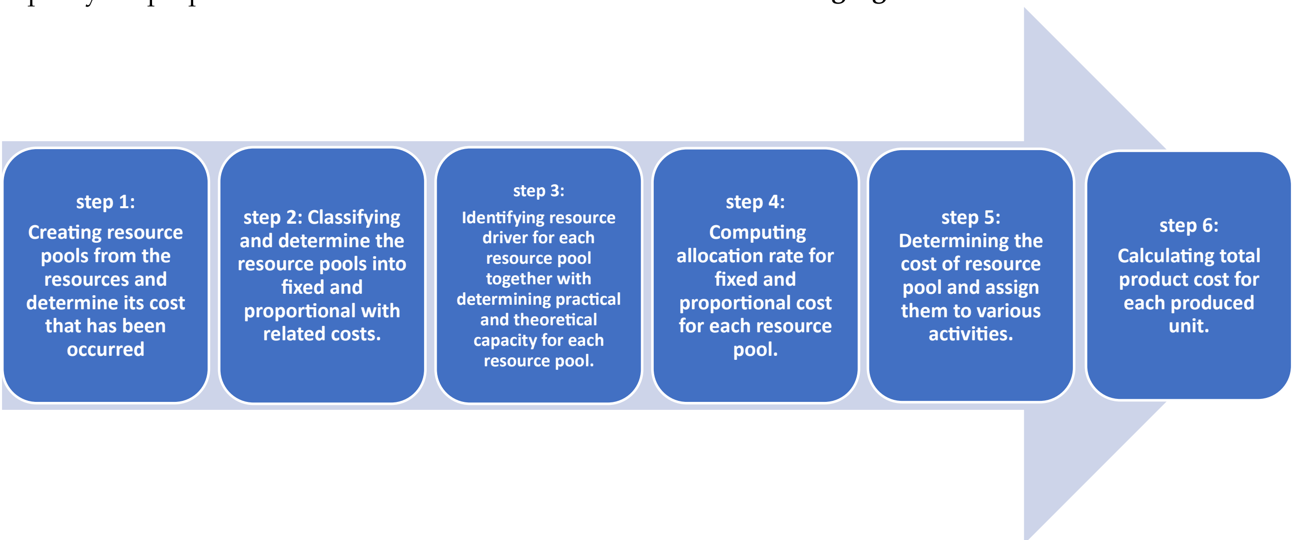


Figure 3: Procedure Of Resource Consumption Accounting (RCA).

(Source: Prepared by Researcher Based on the Study of Kbelah Et Al., 2019).

3. METHODOLOGY

3.1. Research Design

This is an applied study in order to identify the role of implementing RCA in improving the financial performance; the researcher has selected Mass Iron and Steel Industry Company as the implementation area of the study. In addition, this study has first carried out the descriptive analysis in order to describe the nature of the traditional costing method that is currently used by the Mass Iron and Steel Industry Company. After that, an exploratory analysis is carried out in order to find the role of RCA implementation on different aspects such as cost reduction, capacity management, and determination of competitive prices, which play an important role in improving the financial performance of the selected company. Finally, comparative analysis has been carried out in order to identify the different outcomes between traditional costing method and RCA costing method.

3.2. Data Collection

This study could be quantitative research because, in order to implement RCA, secondary data should be obtained, such as cost information, selling price, number of units produced, and number of units sold. This type of information could be obtained from cost reports and financial reports of Mass Iron and Steel Industry Company for the year 2023. Also, the primary data are required, especially in terms of determination of cost drivers and cost allocation base, which mostly are operational data; this type of information could be obtained by performing interviews with the production manager, production engineer, and accountant. In some cases, they are needed. Therefore, primary and secondary cost information has been used to calculate production costs and gross profits under traditional costing method and RCA costing method in order to provide a clear view regarding the consequences of RCA.

3.3. General Information About the Mass Iron and Steel Industry Company

Mass Iron and Steel Industry Company was established in 2011 by Mass Group Holding Ltd. It is located in the Bazyan region, 38 km west of Sulaymaniyah, Iraq. It is a part of the strategic project of the Mass Group Holding Ltd. Also, the plant is unique and significant in the area. In order to address the significant need for iron supplies for rebuilding Iraqi cities, manufacturing began in 2015. A variety of iron products were manufactured, including reinforcing rebar steel with different sizes such as 10 mm, 12 mm, 16 mm, 18 mm, 20 mm, 25 mm, and 28 mm. Each kind is produced in accordance with international standards (BS, ASTM, and ISO). Since 2016, the plant has held an ISO 9001:2015 quality approval, which has given the largest firms investing in Iraq (oil companies, power companies, residential complexes, etc.) the confidence to work with the mass plant to guarantee quality. The plant is regarded as one of the most important strategic projects in Iraq because it uses the newest and most cutting-edge European machinery and equipment, while the main lines and equipment are provided by Danieli, an Italian company that is well-known for its technology for producing iron and steel production lines. The Mass plant is regarded as one of the best plants in the Middle East.

3.4. Procedure And Implementation

3.4.1. Descriptive Of Cost Information

This research tends to explore, describe, and compare the results after implementing costing methods based on collected data, which is presented in **Table 1.** Moreover, the **Table 1** shows the direct cost and indirect cost of Mass industry company for the year 2023. While the total direct manufacture cost in 2023 was $79,386,928.67. On the other hand, total indirect manufacturing overhead in 2023 was $88,214,592.17. Furthermore, the direct costs tend to constitute about 47% of total production costs; also, it consists of two categories, which are direct material costs and direct manufacture labor costs. However, the indirect cost constitutes around 53% of total production costs, and it consists of twenty-five categories**.**

The detail of cost is presented in the following points:

1. **Total direct material (scrap) costs:** the cost of scrap material, which is a core raw material, was $78,461,982 in 2023, as presented in **Table 1**. ***The researcher has assumed that there is a zero beginning and ending balance of scrap material inventory. This means that the number of tons purchased is equal to the number of tons of scrap material used in manufacture iron.***
2. **Total direct labor costs:** It has been presented in **Table 1;** the total direct manufacture labor cost in 2023 was $924,947. It consists of the total wages of three categories, which are the wages of labor in scrap preparation activity, melting activity, and rolling mills activity.
3. **Total indirect material costs: The** indirect material cost was $41,334,667, as presented in **Table 1. The** total indirect material cost consists of the total cost of a group of components that have been utilized during the manufacturing of iron, especially when the scrap materials were melted. These indirect materials tend to be used for many purposes, such as removing pollutants like sulfur, phosphorus, and silica; modifying the carbon percentage of steel; and preventing overheating, wear, and friction.
4. **Total indirect manufacturing labor cost: It** consists of the total cost of labor that works indirectly in the factory in different sections as presented in the **Table 1.** The total indirect manufacturing cost was $416,579. Also, it consists of the total wages of five categories, such as the total wages of labor in laboratory & quality control activity and in services & industrial activity, and the total wages of labor as a production supervisor who monitors workflow and productivity, production engineering, and IT engineering (IT technician).
5. **Electric Energy Costs:** As it can be seen in the **Table 1**, the total cost of electric energy in 2023 was $21,462,102, which contains 24.33% of indirect manufacturing overhead. Mass industry company: During the manufacturing of steel and iron, it requires a number of energy-intensive procedures.

There are three main parts that use a lot of electricity:

A. Electric Arc Furnace (EAF): In this stage, it uses high-voltage electric arcs to melt scrap steel or direct reduction iron (DRI). In this process, 300 – 500 kilowatts per ton will be consumed.

Actually, it depends on the quality or the components of the scrap material. In order to produce melted steel, the heated temperature should reach over 3,000°C.

B. Ladle Furnace (LF): After EAF, molten steel is refined by modifying its temperature and chemical structure. maintains or increases the temperature with electric heating. Also, it usually uses between 30 and 60 kWh for every ton of steel.

C. Hot Rolling Mill (HRM): In this process, melted steel bars and sheets or other forms of steel can be produced. In addition, it needs motors powered by electricity to power auxiliary systems and rollers. The kind of product and machine design have a significant impact on energy usage.

6. **LPG (Liquefied Petroleum Gas) Cost:** Before rolling or bending billets, they should be heated by using LPG. Its steady flame guarantees even heating, enhancing the quality of the final product. As presented in **Table 1**, the cost of LPG is $13,275,204.
7. **Maintenance and Repair Costs:** These include maintaining and repairing infrastructure, machinery, and equipment. includes labor, emergency repairs, spare parts, and regular maintenance. Avoids unscheduled downtime, which may be very expensive in continuous processes like the manufacturing of steel. In 2023, this cost can be seen to be equal to $1,207,453; it is presented in the **Table 1**.
8. **Protection and Security Costs:** These guarantee the protection of intellectual property, assets, and employees. involve insurance, fire safety systems, digital safety, and physical safety (guards, camera system security). Security is crucial at steel mills because they are high-risk locations with expensive assets and dangerous chemicals. In 2023, Mass Steel and Iron Industry Company has a contract with a security company annually for $16,667, as presented in **Table 1.**
9. **Utilities Costs:** These are costs associated with water, energy, and other necessities. It was $582,450 in 2023 as presented in **Table 1**.

10. **Depreciation:** in 2023, it was $9,919,470. This cost illustrates how assets gradually lose value over time as presented in **Table 1**.

Table 1: Cost Of Goods Manufactured Statement of Mass Iron and Steel Industry Company at the End of the Year 2023 (In Dollars).

Cost of Goods Manufactured Statement Mass Iron and Steel Industry Company at the end of the year 2023 and 2024.		
Description	**2023**	
Total direct material (scrap) costs		**78,461,982**
Total direct manufacture labor cost:		
Total cost of labor in scrap preparation activity	42,364	
Total cost of labor in melting activity	529,550	
Total cost of labor in rolling mills activity	353,033	
Total direct manufacture labor cost		**924,947**
Total direct manufacturing costs		**79,386,929**
Indirect manufacturing overhead costs:		
Indirect material costs:		
Lime charged (100% variable)	918,846	
Dolomite charged (100% variable)	377,822	
Carbon charged (100% variable)	364,409	
Carbon injected (100% variable)	453,834	
Carbon Powder (100% variable)	167,673	
FLUORSPAR (100% variable)	169,908	
FeSi (100% variable)	2,367,538	
FeSiMn(100% variable)	1,971,831	
FeMnHC (100% variable)	2,032,193	
CaSi Wire [Ø 13 mm] (100% variable)	15,649	
Refractory (Lump Sum) (100% fixed)	16,320,140	
Spare part (60% fixed)	10,731,051	
Liquid Oxygen (100% variable)	961,323	
Liquid Nitrogen (100% variable)	55,891	
Liquid Argon (100% variable)	178,851	
Oil, Hydraulic & Grease (20% fixed)	4,247,708	

Total indirect material costs	**41,334,667**	
Indirect manufacture labor costs (65% fixed):		
Total cost of labor in the laboratory & quality Control activity	70,606	
Total cost of labor in services & industrial activity	317,730	
Total cost of labor as a production supervisor (Monitor workflow and productivity)	10,591	
Total cost of production engineering	10,591	
Total cost of IT engineering (IT technician)	7,061	
Total indirect manufacture labor costs (65% fixed):	**416,579**	
Electric energy (Electric Arc Furnaces, Ladle Furnace LF, and HRM Hot Rolling Mill) (100% fixed)	21,462,102	
LPG (Liquefied Petroleum Gas) (100% variable)	13,275,204	
Maintenance and repair costs (50% fixed)	1,207,453	
Protection and security cost (100% fixed)	16,667	
Utilities cost (30% fixed)	582,450	
Depreciation (100% fixed):		
Building	1,997,057	
Machinery & equipment	6,675,937	
computer	6,017	
Electricity network	-	
Tools & modules	895,626	
Vehicles	241,604	
Cameras & fighting system	1,865	
Furniture & fixtures	101,364	
Total depreciation cost	**9,919,470**	
Total manufacturing overhead costs		**88,214,592**
Total manufacturing cost during the year		**167,601,521**

(Source: Prepared by the Researcher Based on the Data Received from Mass Iron and Steel Industry Company.)

3.4.2. Descriptive Of Manufacturing Activities and Cost Allocation Bases

From the manufacture company, there are a number of activities that have been operated in order to be able to produce steel and iron products from the manufacture company. In addition, for implementing RCA costing method, the researcher should identify the main activities that they are participating in in the manufacturing of steel and iron products.

For that reason, according to the environment of the steel and iron manufacture company and during the visiting and investigating of Mass industry company, the researcher has determined these following activities, which are the main activities in the industries:

1. **Scrap Preparation:** In this activity the scrap material needs to be prepared for melting by separating different kinds of scrap (materials that are not ferrous versus ferrous). Cleaning is needed to get rid of impurities such as paint, rust, or oil. reducing or cutting big items into smaller chunks. In order to guarantee a suitable mixture of materials for the furnace in terms of weight and batch.
2. **Melting:** The scrap material would be melted when one loads scrap into the boiler. Then, metal melts at temperatures that reach as much as 1,800°C. Also, impurities, or slag, are eliminated from the surface until the desired characteristics can be obtained by adding alloying elements.
3. **Rolling Mills:** Through mechanical forces, metal may be shaped and its thickness decreased.
4. **Laboratory and Quality Control:** This activity is operated in order to examine and confirm the metal in terms of mechanical, chemical, and physical characteristics. Also, there is measurement activity to determine the chemical makeup and testing for mechanical strength using tension and hardness. Moreover, microscopic examination would be operated to identify imperfections and grain structure. There is no doubt that audits of processes run in a continuous way guarantee conformity and consistency of producing processes.
5. **Services and industrial activity**: these are the extra services that maintain the plant's efficiency, which involve the maintenance of furnaces and machines. Furthermore, utilities such as electricity supply, air compressors, and the treatment of water. Also, transportation for shipping products and processing raw

materials and material handling. Finally, environmental services for recycling, waste management, and emissions control.

To apply RCA costing method, the researcher has to determine the cost allocation base.

There are some cost allocation bases that have been identified based on different cost categories, and they are reasonable and meaningful to a steel and iron manufacture company environment, which are presented in the following Table 2:

Table 2: Cost Allocation Base Information For 2023.

Cost allocation bases	Scrap Preparation	Melting	Rolling Mills	Laboratory and Quality Control	Services and industrial activity	Total
Number of labor hours per day	8	12	12	8	8	**48**
Number of labors	12	150	100	20	90	**372**
Number of labor hours per year	34,560	648,000	432,000	57,600	259,200	**1,431,360**
Total number of kilowatts that were consumed	360,000	4,500,000	2,250,000	180,000	810,000	**8,100,000**
Square footage requirements for each activity	40,000	50,000	75,000	5,000	25,000	**195,000**
Number of working machine hours in a year	25,000	56,250	75,000	8,750	37,500	**202,500**
Material handling per year	34,650	24,750	57,750	8,250	16,500	**141,900**
Number of tests and samples taken during the year	21,500	53,500	48,250	69,750	20,500	**213,500**

(Source: Prepared by the Researcher Based on the Data Received from Mass Iron and Steel Industry Company.)

The presented cost allocation bases have been prepared based on full capacity. However, according to Mass industry company's notification, the laborers have worked 6 days in a week and 313 days in 2023. The researcher assumed that the cost allocation base information would be the same for 2023.

3.4.3. The Implementation of Traditional Costing Method

Mass industry company tends to distribute direct costs such as direct material and direct manufacturing labor costs directly to the produced reinforcing rebar steel products. This is because the nature of direct cost has long been identified as what is known as a traceable cost, which could be identified easily with products. Whereas the nature of indirect costs has been defined as a untraceable cost, therefore, it could not be easy to identify the indirect cost directly to produce reinforcing rebar steel products; perhaps it needs an allocation process. For that reason, Mass industry company tends to allocate indirect manufacturing overhead costs based on machine hours. This is due to the fact that, in the iron and steel industry, machinery and equipment play a more significant role in production than human labor. The researcher determines the cost per ton for each type of reinforcing rebar steel product for Mass industry company under traditional costing method. After that, the RCA costing method would be implemented, whereby the researcher could investigate and analyze the consequences of RCA costing method. ***Another important point to be mentioned is related to the number of tons produced and sold; actually, the researcher has used the actual number of tons produced by the Mass industry company, but the researcher assumed that the number of tons produced and sold was equal. This is because having the ending balance of inventories tends to affect the result of this research because the cost of the ending balance of each inventory would be different between two time periods, such as the cost of the beginning inventory, which is related to the previous period, is different from the cost of the ending balance of the current year.*** The following **Table 3** demonstrates the number of tons produced and sold and consumed machine hours for each type of reinforcing rebar steel product for 2023 is calculated, such as the consumed machine hours for the 10 mm product in 2023 is 21,217 hours (23,424*202,500/223,564); then this calculation tends to be repeated for all other product types in 2023.

Table 4-3: Number Of Tons Produced and Sold with Consumed Machine Hours for Each Type of Reinforcing Rebar Steel.

Type of reinforcing rebar steel products	Number of tons produced and sold (Tons)	Machine hours
	2023	2023
10 mm	23,424	21,217
12 mm	133,222	120,670
16 mm	49,101	44,475
18 mm	829	750.5
20 mm	8,207	7,434
25 mm	8,776	7,949
28 mm	5	4.5
Total	**223,564**	**202,500**

(Source: Prepared by The Researcher Based on the Data Received from Mass Iron and Steel Industry Company, The Number of Working Machine Hours Can Be Found in Table 2).

There are some steps that should be implemented in order to be able to identify the cost per ton for each type of reinforcing rebar steel product under traditional costing method:

First step: the total indirect manufacturing overhead cost was $88,214,592 (from **Table 1)**, and total machine hours for 2023 were 202,500 hours (from **Table 3).** As a result, researcher should find the actual indirect manufacturing overhead cost rate, and then the indirect manufacturing cost could be found based on the actual quantity of the cost allocation base for each type of reinforcing rebar steel product.

The calculation is presented in the following Table 4:

Table 4: The Calculation of Indirect Manufacturing Overhead Cost Rate.

	2023
Total manufacturing overhead cost	$88,214,592 ÷
Total machine hours	202,500
Indirect manufacturing overhead cost rate	**= $435.62761**

(Source: Prepared by the Researcher Based on Table 1 And Table 3).

Second step: After finding the indirect manufacturing overhead cost rate, the next step would be the calculation of indirect manufacturing overhead cost for each type of reinforcing rebar steel product by multiplying the indirect manufacturing overhead cost rate by the actual quantity of the cost allocation base, which is the consumed machine hour for each type of reinforcing rebar steel product, such as the indirect manufacturing overhead cost for 10 mm products in 2023, which is $9,242,711 ($435.62761 indirect manufacturing overhead cost rate * 21,217 hours were spent for 10 mm products).

This calculation would be repeated for other reinforcing rebar steel products for 2023. as presented in the following Table 5:

Table 5: The Calculation of Indirect Manufacturing Overhead Cost for Each Type of Reinforcing Rebar Steel Product Under Traditional Costing Method For 2023.

Type of reinforcing rebar steel products	Machine hours	Indirect manufacturing overhead cost
	2023	2023
10 mm	21,217	$9,242,711
12 mm	120,670	$52,567,184
16 mm	44,475	$19,374,538
18 mm	750.5	$326,939
20 mm	7,434	$3,238,456
25 mm	7,949	$3,462,804
28 mm	4.5	$1,960
Total	**202,500**	**$88,214,592**

(Source: Prepared by the Researcher Based on Table 4 And Table 3).

Third step: it is the final step of traditional costing method implementation, which is the calculation of the total manufacturing costs of reinforcing rebar steel products for 2023, as presented in the **Table 6** below. Also, the manufacturing cost per ton can be computed by dividing the total manufacturing cost of $167,601,521 in 2023 by the total number of tons produced in 2023, which was 223,564 tons that the company has produced. This means that the manufacturing cost per ton for 2023 would be $750 ($167,601,521 ÷ 223,564). ***It has been realized that the cost per ton of each type of product for 2023 is fixed; it does not change between different types of products. If it is 10 mm or 28 mm, the cost per ton is constant, and it is $750.***

As presented in the Table 6 below:

Table 6: Calculation Of the Total Manufacturing Cost of Reinforcing Rebar Steel Products Under Traditional

Costing Method In 2023.

Type of reinforcing rebar steel products	Manufacturing costs					
	Direct material costs (dollar) (1)	Direct manufacturing labor costs (dollar) (2)	Total direct costs (dollar) (1) +(2) = (3)	Indirect manufacturing overhead cost (dollar) (4)	Total manufacturing cost (dollar) (3) + (4) = (5)	Cost per ton (dollar)
10 mm	8,220,883	96,912	**8,317,795**	9,242,711	**17,560,506**	**750**
12 mm	46,755,570	551,176	**47,306,746**	52,567,184	**99,873,930**	**750**
16 mm	17,232,478	203,145	**17,435,623**	19,374,538	**36,810,161**	**750**
18 mm	290,946	3,430	**294,376**	326,939	**621,315**	**750**
20 mm	2,880,327	33,955	**2,914,282**	3,238,456	**6,152,738**	**750**
25 mm	3,080,023	36,308	**3,116,331**	3,462,804	**6,579,135**	**750**
28 mm	1,755	21	**1,776**	1,960	**3,736**	**750**
Total costs	**78,461,982**	**924,947**	**79,386,929**	**88,214,592**	**167,601,521**	**750**

(Source: Prepared by the Researcher Based on Table 5).

Finally, after determination of total manufacturing costs, computing of gross profit is necessary to show the impact of each kind of costing method on a calculation of gross profit. Consequently, according to the received data from Mass industry company, the selling price per ton was $760 in 2023, while the cost per ton was $750 (from **Table 6**). ***It has been realized that the selling price per ton in 2023 was $760, and this price is constant for all types of products; it is the same if it is a 10 mm or 28 mm product.*** Also, total sales revenue for product 10 mm is $17,802,014 ($760 is the selling price per ton * 23,424 is the number of tons sold); this calculation would be repeated for other product types.

Then, the computation of gross profit is presented in the Table 7 below:

Table 7: Calculation Of Gross Profit Under Traditional Costing Method In 2023.

Type of reinforcing rebar steel products	Details		
	Sales revenue (dollar) (1)	Cost of goods sold (dollar) (2)	Gross profit (dollar) (1) - (2) = (3)
10 mm	17,802,240	17,560,506	**241,734**
12 mm	101,248,720	99,873,930	**1,374,790**
16 mm	37,316,760	36,810,161	**506,599**
18 mm	630,040	621,315	**8,725**
20 mm	6,237,320	6,152,738	**84,582**
25 mm	6,669,760	6,579,135	**90,625**
28 mm	3,800	3,736	**64**
Total	**169,908,640**	**167,601,521**	**2,307,119**

(Source: Prepared by the Researcher Based on Table 3 And Table 6).

3.4.4. The Implementation of RCA Costing Method

As it has been explained previously, the traditional costing method for today's business environment does not give reasonable and reliable information in order to rely on in terms of making decisions, planning, cost controlling, and assessing how well and efficiently the company works. The imperfection of traditional costing method is caused by the unfairness of indirect manufacturing overhead cost allocation. Therefore, the emergence of RCA helps to cover the weakness points of traditional costing method. Applying RCA is the first independent variable of this study, and it involves six essential steps that must be systematically followed, respectively.

Step one: create resource pools from the resources and determine their indirect costs that have occurred. In this step all resources that have been consumed in 2023 and 2024 by Mass industry company were gathered into resource cost pools. All comparable resource costs used in the manufacturing processes, including indirect labor, depreciation, power, utilities, security, and indirect materials, are integrated into the resource pool.

The resource pools are displayed in Table 8:

Table 8: Create Resource Pools from the Resources and Determine Their Costs That Have Occurred In 2023.

Recourse pools	Resources	Costs (in dollars)
		2023
Indirect martials	Lime charged (100% variable)	918,846
	Dolomite charged (100% variable)	377,822
	Carbon charged (100% variable)	364,409

	Carbon injected (100% variable)	453,834
	Carbon Powder (100% variable)	167,673
	FLUORSPAR (100% variable)	169,908
	FeSi (100% variable)	2,367,538
	FeSiMn (100% variable)	1,971,831
	FeMnHC (100% variable)	2,032,193
	CaSi Wire [Ø 13 mm] (100% variable)	15,649
	Refractory (Lump Sum) (100% fixed)	16,320,140
	Liquid Oxygen (100% variable)	961,323
	Liquid Nitrogen (100% variable)	55,891
	Liquid Argon (100% variable)	178,851
	Oil, Hydraulic & Grease (20% fixed)	4,247,708
	Spare parts (60% fixed)	10,731,051
Total		**41,334,667**
Indirect labor	Indirect manufacturing labor (65% fixed)	416,579
Total		**416,579**
Power	Electric energy (SEAF, LF, and HRM) (10% fixed)	21,462,102
	LPG (Liquefied Petroleum Gas) (100% variable)	13,275,204
	Maintenance and repair cost (50% fixed)	1,207,453
Total		**35,944,759**
Utilities and security	Protection and security cost (100% fixed)	16,667
	Utilities cost (30% fixed)	582,450
Total		**599,117**
Depreciation	Building	1,997,057
	Machinery & equipment	6,675,937
	Computer	6,017
	Electricity network	-
	Tools & modules	895,626
	Vehicles	241,604
	Cameras & fighting system	1,865
	Furniture & fixtures	101,364
Total		**9,919,470**
Total indirect manufacturing costs		**88,214,592**

(Source: Prepared by the Researcher Based on Table 1).

Five resource pools were established, as indicated in **Table 8:** indirect materials resource pool, indirect labor resource pool, power resource pool, and depreciation resource pool. Consequently, the indirect materials resource pool consists of lime charged, dolomite charged, carbon charged, carbon injected, carbon powder, fluorite (CaF_2), FeSi (ferrosilicon), FeSiMn (ferrosilicon manganese), FeMnHC (high carbon ferromanganese), CaSi wire [Ø 13 mm], refractory (lump sum), spare parts, liquid oxygen, liquid nitrogen, liquid argon, oil, hydraulic fluid, and grease. Also, the labor resource pool is made up of salaries and wages, whereas the power resource pool constitutes electric energy (SEAF, LF, and HRM), LPG (Liquefied Petroleum Gas), and maintenance and repair costs. Furthermore, the utility and security resource pool included protection and security costs and utility costs. The cost of each resource was presented in **Table 1** previously.

Step two: Classifying and determining the resource pools into fixed and proportional with related costs. In this step, the resource pools should be classified into fixed manufacturing overhead cost and proportional manufacturing overhead cost. The variable cost under RCA has been known as the proportional cost. This is because the variable cost varied with the number of produced units or objects. However, proportional cost is related to the output of the resource pool (Webber and Clinton, 2024). Actually, according to the nature of the Mass industry company and based on the semi-structured interview, the resource cost pool has been classified into fixed and proportional costs. In such a case, the researcher is required to analyze the manufacturing process; thereby, some costs could be directly classified as fixed or proportional, and some others indirectly segregate the resources cost pool, as it has been presented in **Table 9**.

The classification can be detailed from the following points:

1. **Indirect material resource pool:** It can be seen that most of the incurred indirect material costs directly participate in the production process; consequently, it can be regarded as a proportional cost. Accept the cost of spare parts, which is 60% of the cost classified as fixed because, according to the process analysis, it has been found that spare parts material has been used just in urgent times based on scheduled maintenance, and it is not

used frequently in the production process and it is not stuck to how often the equipment is used. Also, according to the notification of the production manager of Mass industry company, oil, hydraulics, and grease 20% of the total cost are regarded as a fixed cost. Firstly, because machines and equipment frequently have to be lubricated with oil, hydraulics, and grease on a daily, weekly, or monthly basis, regardless of how much they are used. Because of this, costs are predictable and not directly correlated with production. Secondly, oil, hydraulics, and grease are necessary to maintain the functionality of machines. To avoid corrosion and damage, the machine has to be lubricated whether it is operating at maximum capacity or not. However, 80% of oil, hydraulics, and grease has been presented as a proportional cost. This is because it might be more realistic to classify lubricant consumption as a variable cost, as it increases with increased output or varies according to machine hours. In addition, a refractory (lump sum) is recognized as being fixed by 100%. This is because its usage does not depend on the output of the production.

2. **Indirect labor resource pool:** the separation of salary and wages costs depends on the nature of working in the manufacturing process. Approximately 65% of indirect labor costs are considered fixed, as these employees typically receive a consistent salary regardless of production levels. The remaining 35% is classified as variable, since those workers' compensation is tied to the volume of reinforced rebar steel produced.
3. **Power resource pool:** it can be considered that 10% of the total cost of electric energy is recognized as a fixed cost. This is because cost modeling and previous billing data are frequently the basis for this proportion. It shows the percentage of power costs that do not fluctuate depending on output levels. Also, since it covers baseline costs, including standing fees, meter rents, and minimum operating power requirements that do not change based on output volume. However, 90% is variable because it depends on the consumption of energy by machines and production level. In addition, another component of the power resource pool is LPG (Liquefied Petroleum Gas); it is classified 100% as a variable cost because it depends on the output level and the percentage of consumption. Moreover, regarding maintenance and repair costs, it has been presented that 50% is fixed because numerous maintenance procedures, including system checks, lubrication, filter replacements, and inspections, are carried out on a regular basis, for example, monthly or quarterly, and they are not dependent on the amount of machine and equipment utilized; these expenses are regular and predictable.
4. **Utilities and security resource pool:** the cost of protection and security is considered 100% fixed due to the fixed annual payment of the company, and this cost does not rely on the level of output of the resource and production. Also, regarding the utility, it has been considered that 30% of the total cost is fixed because it contains basic rates that do not change based on consumption, such as service fees, infrastructure costs, and minimum energy demand.
5. **Depreciation resource pool:** the cost of depreciation is considered a 100% fixed cost because it is a scheduled, constant expenditure that is independent of company activity or output volume.

The determination of fixed and proportional cost has been presented in Table 9:

Table 9: Classifying And Determining the Resource Pools as Fixed and Proportional with Related Costs In 2023 (In Dollars).

Resource pools	Resources	Fixed cost	Proportional cost	Costs
Indirect martials	Lime charged (100% variable)		918,846.00	918,846.00
	Dolomite charged (100% variable)		377,822.00	377,822.00
	Carbon charged (100% variable)		364,409.00	364,409.00
	Carbon injected (100% variable)		453,834.00	453,834.00
	Carbon Powder (100% variable)		167,673.00	167,673.00
	FLUORSPAR (100% variable)		169,908.00	169,908.00
	FeSi (100% variable)		2,367,538.00	2,367,538.00
	FeSiMn (100% variable)		1,971,831.00	1,971,831.00
	FeMnHC (100% variable)		2,032,193.00	2,032,193.00
	CaSi Wire [Ø 13 mm] (100% variable)		15,649.00	15,649.00
	Refractory (Lump Sum) (100% fixed)	16,320,140.00		16,320,140.00

	Liquid Oxygen (100% variable)		961,323.00	961,323.00
	Liquid Nitrogen (100% variable)		55,891.00	55,891.00
	Liquid Argon (100% variable)		178,851.00	178,851.00
	Oil, Hydraulic & Grease (20% fixed)	849,541.60	3,398,166.40	4,247,708.00
	Spare parts (60% fixed)	6,438,630.60	4,292,420.40	10,731,051.00
	Total	**23,608,312.20**	**17,726,354.80**	**41,334,667.00**
Indirect labor	Indirect labor (65% fixed)	270,776.35	145,802.65	416,579.00
	Total	**270,776.35**	**145,802.65**	**416,579.00**
Power	Electric energy (electric arc furnaces, ladle furnace LF, and HRM (Hot Rolling Mill) (10% fixed)	2,146,210.20	19,315,891.80	21,462,102.00
	LPG (Liquefied Petroleum Gas) (100% variable)		13,275,204.31	13,275,204.00
	Maintenance and repair cost (50% fixed)	603,726.50	603,726.50	1,207,453.00
	Total	**2,749,936.70**	**33,194,822.61**	**35,944,759.00**
Utilities and security	Protection and security cost (100% fixed)	16,667.00		16,667.00
	Utilities cost (30% fixed)	174,735.00	407,715.00	582,450.00
	Total	**191,402.00**	**407,715.00**	**599,117.00**
Depreciation	Building	1,997,057.00		1,997,057.00
	Machinery & equipment	6,675,937.00		6,675,937.00
	Computer	6,017.00		6,017.00
	Electricity network	-		-
	Tools & modules	895,626.00		895,626.00
	Vehicles	241,604.00		241,604.00
	Cameras & fire system	1,865.00		1,865.00
	Furniture & fixtures	101,364.00		101,364.00
	Total	**9,919,470.00**		**9,919,470.00**
	Total	**36,739,897.25**	**51,474,695.06**	**88,214,592.00**

(Source: Prepared by the Researcher Based on the Data Received from Mass Iron and Steel Industry Company).

Step three: Identifying resource drivers for each resource pool together with determining practical and theoretical capacity for each resource pool. The RCA costing method could be different from the other costing methods by calculating and determining the practical and theoretical capacity. Indeed, identifying practical and theoretical capacity tends to help in identifying the cost of unused capacity, together with pointing out the actual used capacity. As it has been suggested by Horngren et al. (2018), the practical capacity is 80% of theoretical capacity. The main idea behind the theoretical capacity is that, based on the theoretical capacity, there should be no interruption in the manufacturing process; for example, machines should work 24 hours and workers should work for 365 days in a year. On the other hand, practical capacity depends on the standard of the organization; for instance, the standard working day is 5 days in a week, and it would be 260 days a year (52 weeks in a year × 5). In such a case, the researcher has presented the resource driver for each resource pool, which can be used as a base for computing the fixed rate and proportional rate that can be detailed in the fourth step. Therefore, by multiplying theoretical capacity to 80%, for example, the theoretical capacity of material handling as a resource driver is 141,900, and the practical capacity would be 113,520 (141,900 * 80%); this calculation will be repeated for all other resource drivers. Also, the theoretical capacity information has been provided previously in **Table 2.**

The following Table 10 presents the resource driver for each resource pool and finding practical and theoretical capacity:

Table 10: Identifying Resource Drivers for Each Resource Pool and Finding the Practical and Theoretical Capacity for Each Resource Driver For 2023.

Resource pool	Recourse drivers	Practical capacity	Theoretical capacity
Indirect material	Material handling	113,520	141,900
Indirect labor	Number of labor hours	1,145,088	1,431,360
Power	Number of kilowatts	6,480,000	8,100,000
Utilities and security	Square footage requirements for each activity	156,000	195,000
Depreciation	Number of machine hours	162,000	202,500

(Source: Prepared by the Researcher Based on Table 2).

Step four: computing allocation rate for fixed and proportional costs for each resource pool. In this step the researcher calculated the fixed allocation rate based on theoretical capacity. While the proportional allocation rate has been calculated based on the practical capacity. Therefore, the fixed rate has been calculated by dividing the total fixed cost of each category of resource pool (from step two) by the theoretical capacity of each resource driver. Also, each proportional rate has been calculated by dividing the total proportional cost of each category of resource pool by its resource driver.

For example:

Fixed rate of indirect material = $23,608,312.20 (from **Table 9**) ÷ 141,900 (from **Table 10**)

Fixed rate of indirect material = $166.37

Proportional rate of indirect material = $17,726,354.80 (from **Table 9**) ÷ 113,520 (from **Table 10**)

proportional rate of indirect material = $156.15

Table 11: Identifying Fixed Rate and Proportional Rate In 2023.

Resource pools	Fixed rate (in dollar)	Proportional rate (in dollar)	Total rate (in dollars)
Indirect material	166.37	156.15	322.52
Indirect labor	0.19	0.13	0.32
Power	0.34	5.12	5.46
Utilities and security	0.98	2.61	3.60
Depreciation	48.99	0.00	48.99

(Source: Prepared by the Researcher Based on Table 9 And Table 10).

Step five: finding the cost of resource pools and computing the cost of each determined activity. Before applying step five, there is some information that should be on hand in order to calculate the cost of each activity. The information is related to the distribution of practical capacity of the resource pool on activities, and this information was obtained through interviews with the production manager and the production engineers.

As it has been presented in the following Table 12:

Table 12: Distribute Practical Capacity of Resource Pools to Activities For 2023.

Cost allocation bases	Manufacturing Activities					
	Scrap Preparation	Melting	Rolling Mills	Laboratory and Quality Control	Services and industrial activity	Total
Material handling per year	27,720	19,800	46,200	6,600	13,200	**113,520**
Number of labor hours per year	27,648	518,400	345,600	46,080	207,360	**1,145,088**
Total number of kilowatts that were consumed	288,000	3,600,000	1,800,000	144,000	648,000	**6,480,000**
Square footage requirements for each activity	32,000	40,000	60,000	4,000	20,000	**156,000**
Number of working machine hours in a year	20,000	45,000	60,000	7,000	30,000	**162,000**

(Source: Prepared by the Researcher Based on Table 2).

According to the information from **Table 12**, the step five tends to be conducted such that it computes the cost of each activity based on practical capacity by multiplying the resource driver of each activity by the fixed rate and proportional rate separately from the previous step (step four).

For example:

The fixed cost of indirect material for the scrap preparation activity = 27,720 (from **Table 12**) * $166.37 (from **Table 11).**

The fixed cost of indirect material for scrap preparation in 2023 = $4,611,776.40

Variable cost of indirect material for scrap preparation activity = 27,720 (from **Table 12**) * $156.15 (from **Table 11).**

Variable cost of indirect material for scrap preparation = $4,328,478

This calculation should be repeated for all other resource pool costs such as indirect labor, power, utilities, security, and depreciation in order to find the cost of other activities such as melting, rolling mills, laboratory and quality control, and services and industrial activity, as it has been presented in the following Table 13:

Table 13: Calculate The Cost of Each Activity Based on Practical Capacity For 2023 (In Dollars).

Activities	Resource pools					
	Indirect materials	**Indirect labor**	**Power**	**Utilities and security**	**Depreciation**	**Total**
Scrap preparation:						
Variable cost	4,328,478	3,594	1,474,560	83,520	-	5,890,152

Fixed cost	4,611,776	5,254	97,920	31,360	979,800	5,726,110
Total	**8,940,254**	**8,848**	**1,572,480**	**114,880**	**979,800**	**11,616,262**
Melting:						
Variable cost	3,091,770	67,392	18,432,000	104,400	-	21,695,562
Fixed cost	3,294,126	98,496	1,224,000	39,200	2,204,550	6,860,372
Total	**6,385,896**	**165,888**	**19,656,000**	**143,600**	**2,204,550**	**28,555,934**
Rolling Mills:						
variable cost	7,214,130	44,928	9,216,000	156,600	-	16,631,658
Fixed cost	7,686,294	65,664	612,000	58,800	2,939,400	11,362,158
Total	**14,900,424**	**110,592**	**9,828,000**	**215,400**	**2,939,400**	**27,993,816**
Laboratory and Quality Control:						
variable cost	1,030,590	1,137	737,280	10,440	-	1,779,447
Fixed cost	1,098,042	1,663	48,960	3,920	342,930	1,495,515
Total	**2,128,632**	**2,800**	**786,240**	**14,360**	**342,930**	**3,274,962**
Services and industrial activity:						
variable cost	2,061,180	26,957	3,317,760	52,200	-	5,458,097
Fixed cost	2,196,084	39,398	220,320	19,600	1,469,700	3,945,102
Total	**4,257,264**	**66,355**	**3,538,080**	**71,800**	**1,469,700**	**9,403,199**
Total	**36,612,470**	**354,483**	**35,380,800**	**560,040**	**7,936,380**	**80,844,173**

(Source: Prepared by the Researcher Based on Table 11 And Table 12).

Calculating the total cost of unused capacity under RCA costing method: Finally, the cost of unused capacity can be calculated by subtracting the total indirect manufacturing overhead cost of each resource pool under full capacity from the total indirect manufacturing overhead cost of each resource pool under practical capacity.

As presented in the following Table 14:

Table 14: Calculating Total Cost of Unused Capacity For 2023.

Resource pools	Incurred indirect cost	Allocated indirect cost under RCA	Total unused capacity cost
Indirect materials	41,334,667	36,612,470	4,722,197
Indirect labor	416,579	354,483	62,096
Power	35,944,759	35,380,800	563,959
Utilities and security	599,117	560,040	39,077
Depreciation	9,919,470	7,936,380	1,983,090
Total indirect manufacturing costs	**88,214,592**	**80,844,173**	**7,370,419**

(Source: Prepared by the Researcher Based on Table 9 And Table 14).

Step six: calculating total indirect manufacturing overhead costs together with total manufacturing cost for each type of product: in this step the total manufacturing cost would be calculated for each type of reinforced rebar steel product, but indirect manufacturing cost should be calculated first, and then total manufacturing cost will be found. In order to be able to find the total indirect manufacturing cost, there should be a resource driver according to each type of reinforced rebar steel product.

This information has been obtained by a semi-structured interview with the production manager, and then the indirect manufacturing overhead cost can be calculated. It has been presented in **Table 15:**

Table 15: Resource Drivers According to Each Type of Reinforced Rebar Steel Products In 2023.

Resource driver	Reinforce rebar steel products.							
	10 mm	12 mm	16 mm	18 mm	20 mm	25 mm	28 mm	Total
Number of labor hours per year	149,969	852,945	314,371	5,312	52,545	56,188	31	**1,431,360**
Total number of kilowatts that were consumed	848,669	4,826,775	1,779,009	30,062	297,347	317,964	175	**8,100,000**
Square footage requirements for each activity	20,431	116,200	42,828	724	7,158	7,655	4	**195,000**
Number of working machine hours in a year	21,217	120,670	44,475	751	7,434	7,949	4.5	**202,500**
Material handling per year	14,867	84,558	31,166	527	5,209	5,570	3	**141,900**
Number of tests and samples taken during the year	22,369	127,224	46,891	792	7,837	8,381	5	**213,500**

(Source: Prepared by the Researcher Based on the Data Received from Mass Iron and Steel Industry Company and Prepared Based on Using the Actual Number of Tons Produced In 2023 And Allocation Bases from Table 2).

For finding the indirect manufacturing overhead cost for each type of reinforced rebar steel product, it is important to identify the resource driver for each process activity.

Therefore, from the following Table 15, the resource driver is identified for each activity, and there is a homogeneous relation between activity cost and cost driver:

Table 15: Indicating Activities and Cost Drivers.

Activities	Cost drivers
Scrap preparation	Material handling
Melting activity	Number of kilowatts
Rolling Mills	Number of machine hours
Laboratory and Quality Control	Number of tests and taking samples
Services and industrial activity	Square footage requirements for each activity

(Source: Prepared by the Researcher Based on the Data Received from Mass Iron and Steel Industry Company).

Indirect manufacturing overhead cost can be found as follows, for example:

Indirect manufacturing overhead cost of scrap preparation for 10 mm in 2023:

Material handling has been used as a resource driver for finding the indirect manufacturing cost for scrap preparation activities.

Variable cost of scrap preparation cost for product type of 10 mm:

(14,867 ÷ 141,900) (from **Table 15**) * $5,890,152 (total variable cost of scrap preparation from previous step five (**Table 13))** = $617,117

Fixed cost of scrap preparation cost for product type of 10 mm:

(14,867 ÷ 141,900) (from **Table 15**) * $5,726,110 (total fixed cost of scrap preparation from previous step five (**Table 13**)) = $599,930

Indirect manufacturing overhead cost of scrap preparation for 12 mm in 2023:

Variable cost of scrap preparation cost for product type of 12 mm:

(84,558 ÷ 141,900) (from **Table 15**) * $5,890,152 (total variable cost of scrap preparation from previous step five (**Table 13**)) = $3,509,933

Fixed cost of scrap preparation cost for product type of 12 mm:

(84,558 ÷ 141,900) (from **Table 15**) * $5,726,110 (total fixed cost of scrap preparation from previous step five (**Table 13**)) = $3,412,180

This calculation should be repeated for all other types of products and also for other activity costs in 2023.

The total indirect manufacturing overhead cost is presented in Table 16:

Table 16: Total Indirect Manufacturing Overhead Costs of Each Type of Product In 2023 (In Dollars).

Details	Total indirect manufacturing overhead cost							
	Type of products							
	10 mm	12 mm	16 mm	18 mm	20 mm	25 mm	28 mm	Total
Scrap preparation:								
Variable cost	617,117	3,509,933	1,293,675	21,875	216,221	231,206	125	5,890,152
Fixed cost	599,930	3,412,180	1,257,646	21,266	210,199	224,768	121	5,726,110
Total	**1,217,047**	**6,922,113**	**2,551,321**	**43,141**	**426,420**	**455,974**	**246**	**11,616,262**
Melting:								
Variable cost	2,273,130	12,928,345	4,765,012	80,520	796,433	851,653	469	21,695,562
Fixed cost	718,788	4,088,083	1,506,749	25,461	251,841	269,302	148	6,860,372
Total	**2,991,918**	**17,016,428**	**6,271,761**	**105,981**	**1,048,274**	**1,120,955**	**617**	**28,555,934**
Rolling Mills:								
Variable cost	1,742,587	9,910,826	3,652,805	61,681	610,567	652,863	329	16,631,658
Fixed cost	1,190,474	6,770,724	2,495,467	42,138	417,117	446,014	224	11,362,158
Total	**2,933,061**	**16,681,550**	**6,148,272**	**103,819**	**1,027,684**	**1,098,877**	**553**	**27,993,816**
Laboratory and Quality Control:								
Variable cost	186,438	1,060,367	390,820	6,601	65,318	69,861	42	1,779,447
Fixed cost	156,689	891,173	328,460	5,548	54,896	58,714	35	1,495,515
Total	**343,127**	**1,951,540**	**719,280**	**12,149**	**120,214**	**128,575**	**77**	**3,274,962**
Services and industrial activity:								
Variable cost	571,869	3,252,466	1,198,766	20,265	200,354	214,265	112	5,458,097
Fixed cost	413,346	2,350,876	866,466	14,647	144,816	154,870	81	3,945,102
Total	**985,215**	**5,603,342**	**2,065,232**	**34,912**	**345,170**	**369,135**	**193**	**9,403,199**

Total manufacturing overhead cost	**8,470,368**	**48,174,973**	**17,755,866**	**300,002**	**2,967,762**	**3,173,516**	**1,686**	**80,844,173**

(Source: Prepared by the Researcher Based on Table 13 And Table 15).

Furthermore, total product cost could be found for each reinforced rebar steel product. Regarding direct material and direct manufacturing labor, costs are the same under both costing methods. However, the main difference between all costing methods is referred to as the different indirect manufacturing overhead cost allocation processes.

Consequently, the total manufacturing cost under RCA costing method has been presented in Table 17 as follows:

Table 17: The Total Manufacturing Cost for Each Type of Reinforced Rebar Steel Product In 2023 (In Dollars).

Details	**Type of products**							
	10 mm	**12 mm**	**16 mm**	**18 mm**	**20 mm**	**25 mm**	**28 mm**	**Total**
Direct material costs	8,220,883	46,755,570	17,232,478	290,946	2,880,327	3,080,023	1,755	78,461,982
Direct manufacturing labor cost	96,912	551,176	203,145	3,430	33,955	36,308	21	924,947
Total direct costs	**8,317,795**	**47,306,746**	**17,435,623**	**294,376**	**2,914,282**	**3,116,331**	**1,776**	**79,386,929**
Manufacturing overhead cost:								
Scrap preparation:								
Variable cost	617,117	3,509,933	1,293,675	21,875	216,221	231,206	125	5,890,152
Fixed cost	599,930	3,412,180	1,257,646	21,266	210,199	224,768	121	5,726,110
Total	**1,217,047**	**6,922,113**	**2,551,321**	**43,141**	**426,420**	**455,974**	**246**	**11,616,262**
Melting:								
Variable cost	2,273,130	12,928,345	4,765,012	80,520	796,433	851,653	469	21,695,562
Fixed cost	718,788	4,088,083	1,506,749	25,461	251,841	269,302	148	6,860,372
Total	**2,991,918**	**17,016,428**	**6,271,761**	**105,981**	**1,048,274**	**1,120,955**	**617**	**28,555,934**
Rolling Mills:								
Variable cost	1,742,587	9,910,826	3,652,805	61,681	610,567	652,863	329	16,631,658
Fixed cost	1,190,474	6,770,724	2,495,467	42,138	417,117	446,014	224	11,362,158
Total	**2,933,061**	**16,681,550**	**6,148,272**	**103,819**	**1,027,684**	**1,098,877**	**553**	**27,993,816**
Laboratory and Quality Control:								
Variable cost	186,438	1,060,367	390,820	6,601	65,318	69,861	42	1,779,447
Fixed cost	156,689	891,173	328,460	5,548	54,896	58,714	35	1,495,515
Total	**343,127**	**1,951,540**	**719,280**	**12,149**	**120,214**	**128,575**	**77**	**3,274,962**
Services and industrial activity:								
Variable cost	571,869	3,252,466	1,198,766	20,265	200,354	214,265	112	5,458,097
Fixed cost	413,346	2,350,876	866,466	14,647	144,816	154,870	81	3,945,102
Total	**985,215**	**5,603,342**	**2,065,232**	**34,912**	**345,170**	**369,135**	**193**	**9,403,199**
Total manufacturing overhead cost	**8,470,368**	**48,174,973**	**17,755,866**	**300,002**	**2,967,762**	**3,173,516**	**1,686**	**80,844,173**
Total manufacturing costs	**16,788,163**	**95,481,719**	**35,191,489**	**594,378**	**5,882,044**	**6,289,847**	**3,462**	**160,231,102**
Cost per ton	**717**	**717**	**717**	**717**	**717**	**717**	**717**	**717**

(Source: Prepared by the Researcher Based on Table 16).

Calculating gross profit under RCA costing method: unused capacity also could be calculated directly by subtracting total manufacturing overhead under traditional costing method $88,214,592 from the total manufacturing overhead cost under RCA $80,844,161, so unused capacity would be $7,370,419 ($88,214,592 - $80,844,173). Regarding sales revenue, as explained before under traditional costing method, the company's selling price was $760 per ton for all types of products; it is constant. Therefore, sales revenue is calculated by multiplying the selling price by the number of tons sold. The amount of sales revenue would not be changed under both costing methods.

Finally, the gross profit margin can be computed for each type of product, which has been presented in the following Table 18:

Table 18: Calculation Of Gross Profit for Each Type of Reinforced Rebar Steel Product In 2023 Under RCA Costing Method (In Dollars).

Details	**Income statement**
	Type of products

	10 mm	12 mm	16 mm	18 mm	20 mm	25 mm	28 mm	Total
Sales revenue	17,802,240	101,248,720	37,316,760	630,040	6,237,320	6,669,760	3,800	169,908,640
Cost of goods sold	16,788,163	95,481,719	35,191,489	594,378	5,882,044	6,289,847	3,462	160,231,102
Gross profit	1,014,077	5,767,001	2,125,271	35,662	355,276	379,913	338	9,677,538
Less cost of unused capacity								7,370,419
Gross profit after subtracting unused capacity								2,307,119

(Source: Prepared by the Researcher Based on Table 7 And Table 17).

3.5. Results and Discussion

After the implementation of both RCA and SAOI, the researcher tends to discuss and test the hypotheses based on the achieved result from comparing the consequences and outcomes of traditional costing and RCA costing methods, together with explaining the outcomes and the suggestion of the SAOI, which is implemented under traditional and RCA costing methods.

The discussion took place from the following area:

Testing and analyzing the study's hypotheses and results in terms of RCA:

Based on determined hypotheses of the study as assumed:

Hypothesis: The implementation of resource consumption accounting (RCA) contributes to improve financial performance by the following drivers:

A. The implementation of resource consumption accounting (RCA) tends to improve financial performance by identifying unused capacity and cost reduction.

From the **Table 19** below, it can be seen that the total cost of each type of reinforced rebar steel product is significantly higher under traditional costing method when compared to the total cost of each type of reinforced rebar steel product under the RCA costing method. This is because the traditional costing method has included and allocated the cost of unused capacity among reinforced rebar steel products with the distribution of overhead cost; it frequently hides idle capacity and shows that all resources are being utilized. However, RCA tends to determine and exclude the cost of unused capacity from the total manufacturing cost of produced products. It tends to indicate the actual amount of resources consumed, making idle capacity obvious as a distinct cost element. Moreover, this is frequently emphasized in RCA because, in contrast to traditional costing, which tends to distribute overhead throughout products, RCA tracks costs more accurately to resource drivers. Therefore, determination of the cost of unused capacity is one of the main differences between these two costing methods. While unused capacity is a major kind of resource, such as labor hours or machine hours, that is accessible but not employed in the production of products or services, it is referred to as "unused capacity." It can be seen that the total cost of unused capacity in 2023 is $7,370,419. Also, it has been realized that the 12 mm type of reinforced rebar steel products has the highest cost, $99,873,930, under traditional costing method and $95,481,719 under RCA; it took the highest portion of unused cost, $4,392,211, if compared with others, and the 16 mm is the second type in 2023 with a cost of $36,810,161 under traditional costing method and $35,191,489 under RCA with the unused cost of $1,618,672. This shows that these two types of reinforced rebar steel products are more profitable than other types; for that reason, the company has considered them. As a result, by implementing RCA, production cost can be reduced because the company could find the unused capacity cost; then, the company should manage its unused capacity by reducing or utilizing unused capacity, and then the company could reduce its cost. Recently, managing unused capacity has become the major way of cost reduction among many industry sectors. Also, if the company does not eliminate unused capacity, then it could be used in other aspects. For example, increasing the number of productions, thereby, helps to increase efficiency and effectiveness of the company. On the other hand, the company also can invest unused capacity in other aspects, such as adding a different product line. Another possible aspect that a company can use its unused capacity for is renting the unused capacity to other users. As a result, according to the result of the implementation and previous discussion, the company could reduce production cost by switching the traditional costing method to RCA; thereby, the financial performance of the company could be improved and supported by managing unused capacity and giving attention to cost reduction.

As it has been presented in the following Table 19:

Table 19: Determination Of Unused Capacity and Product Cost Under Traditional Costing and RCA Costing

Methods For 2023 (In Dollars).

Details		Type of reinforcing rebar steel products							
		Mass Iron and Steel Industry Company							
		31st December 2023 & 2024 under traditional costing and RCA costing methods							
		Type of products							
		10 mm	**12 mm**	**16 mm**	**18 mm**	**20 mm**	**25 mm**	**28 mm**	**Total**
2023		**Under traditional costing method in 2023**							
	Cost of goods sold	17,560,506	99,873,930	36,810,161	621,315	6,152,738	6,579,135	3,736	167,601,521
		Under RCA in 2023							
	Cost of goods sold	16,788,163	95,481,719	35,191,489	594,378	5,882,044	6,289,847	3,462	160,231,102
	Cost of unused capacity in 2023	**772,343**	**4,392,211**	**1,618,672**	**26,937**	**270,694**	**289,288**	**274**	**7,370,419**

(Source: Prepared by the Researcher Based on Table 7, Table 18).

This reduction in the cost of each product is referred to, excluding the cost of unused capacity. By doing that the product costs could be modified and reduced.

As a result, it can be said that the **Hypothesis A** has been accepted because, as demonstrated before, RCA causes the management of the company's unused capacity and cost reduction.

Based on the determined hypotheses of the study, Hypothesis B can be tested as assumed:

B. The implementation of resource consumption accounting (RCA) tends to improve financial performance by reassessment and improve selling price decision.

Before testing the **Hypotheses of B,** which is about the determination of selling price, it is important to indicate the gross profit per unit under both costing methods. It can be noted from **Table 20** that gross profit per ton was $10; this means that the markup percentage the company has added in 2023 was 1.33% (0.0133), but if the company used the same selling price under RCA, then the gross profit per ton would be $43 and the markup percentage in 2023 would be 6% (0.06). In such a case, underpricing or overpricing would be accrued under traditional costing method. Particularly, underpricing tends to occur when the product has been under-costed. This means that the cost of the product is higher than the cost that has been identified by the traditional costing method. Oppositely, overpricing would happen when the company has over-costed its products, as it has occurred in the Mass industry company. Therefore, in such a case, if the company uses RCA costing method and the company sells its product at the same price as it is, then this shows that the company has slightly overpriced its product in 2023. However, if the company uses the same markup percentage as it is, 1.33% (0.0133), then the company could modify its selling price from $760 to $726.39; Mass industry company has over-costed its products. Thereby, the company could be more competitive and attractive to the market and customers. Consequently, it can be said that the **Hypothesis B** has been accepted because, as demonstrated before, RCA causes improvement in the selling price decision. **Table 20** shows the calculation of competitive price and gross profit per ton.

Table 20: Determination Of Competitive Price.

Details	Cost per ton	Markuppercentage	Selling price
Cost per ton under traditional costing method	**750**	**0.0133 (1.33%)**	**760**
Cost per ton under RCA costing method	**717**	**0.0133 (1.33%)**	**726.54**

(Source: Prepared by the Researcher Based on Table 6 And Table 17).

For example, if a company uses a cost base for the determination of selling price (under RCA), the Cost base (**Table 20**), under RCA in 2023: $717.00

Markup percentage is 1.33% (0.0133 * $717) = $9.54.

Prospective selling price $ 726.54

This finding supports the reduction of the selling price from $760 to $726.54 if the same markup percentage has been used. As it has been known, the company could identify its selling price based on different bases, such as cost base, customers, and competitors. However, the industry company does **same markup percentage has been used:**

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not focus on cost base in their selling price determination; perhaps it focuses on the market and the iron and steel financial market. This is a common way of determining selling price for iron and steel industry sectors in the Kurdistan region because this has been checked by the researcher by asking and interviewing different iron and steel companies. For example, Med Steel Company in the Erbil, Kurdistan region tends to sell its product for $650. Also, the selling price of the product per ton of Hritan Iron and Steel Ltd. in 2023 was $725. As a result, Mass industry company has the highest price in the market; therefore, it is important for the company to review and reassess the determination of the selling price decision.

As presented in **Table 21** below, it can be seen after applying RCA how the financial performance of Mass industry company has been improved; for instance, the cost of goods sold has been reduced by 4.60%. Also, profit margin has been increased by 76.16%. There is no doubt that the reduction in total cost and the increase in gross profit led to a lower cost per ton, a higher profit margin per ton, and ultimately, improved financial ratios as implemented. Worthily, it can be seen that the Mass industry company could modify its selling price and reduce it by 4.61% in 2023; thereby, the company could achieve a competitive position that led to the enhancement of market share. The following **Table 21** calculated the percentage of financial improvement when the traditional costing switched off to RCA costing method.

Table 21: Presenting The Impact of Adapting RCA On Each Aspect In 2023.

Details	2023		
	Under traditionalcosting method	**Under RCA costing method**	**The consequence of adapting RCA**
Cost of goods sold	$167,601,521	$160,231,102	**-4.60%**
Cost per ton	$750	$717	**-4.60%**
Gross profit (dollar)	$2,307,119	$9,677,538	**76.16%**
profit margin per ton	$10	$43	**76.74%**
Selling price	$760	$726.54	**-4.61%**

(Source: Prepared by the Researcher Based on Table 6, Table 17, And Table 20).

4. CONCLUSIONS

1. It has been found from Mass industry company that there is a significant indirect manufacturing cost that has been allocated by using just one cost pool and one cost allocation base under the traditional costing. Whereas this technique has been improved by RCA because it attempts to separate all indirect manufacturing costs to different resource pools, and each resource pool has its resource drivers. Thereby, managers are better able to see which items and activities actually bring value. Thereby, better pricing plans, cost-control measures, and resource efficiency are conducted.
2. Under traditional costing method, most of the indirect manufacturing cost has been classified as output-level costs. While RCA has classified costs based on the output level of resource pools, it classifies them as proportional and fixed costs. In 2023, the indirect manufacture overhead cost of the mass industry company consists of around 53% of proportional costs and 47% of fixed costs.
1. It has been observed that product costs under the traditional costing method are relatively higher, amounting to $750 in 2023. In contrast, when RCA is applied, product costs decrease to $717. This reduction occurs because RCA allocates indirect manufacturing overhead more precisely and accurately. Such precision enhances the reliability of operating income analysis and strengthens the validity of financial performance evaluation.
2. According to the concept of causality, RCA defines costs as fixed and proportional, which gives the ability to separate unused capacity costs. Under RCA, indirect manufacturing overhead cost tends to decrease from $167,601,521 to $160,231,102; this is because RCA has excluded the unused capacity cost from indirect manufacturing cost, which is equivalent to $7,370,419 (4.71%). This figure shows that the company does not utilize its resources optimally.
3. Managers of Mass industry companies may learn about the costs of producing and marketing a variety of products by applying RCA. Managers can use this data to decide on price and product mix. As it has been found that the company in 2023 has a markup percentage of 1.33% and the cost per ton was $750 under traditional costing method, when the company switches to the recent costing method and implements RCA, then its cost per ton tends to reduce from $750 to $717. In such a case, it could reduce its selling price with the same markup percentage, 1.33%; it can modify its selling price from $760 to $726.54. The company can still make a profit while it adapts RCA, but this situation will differ under traditional costing method because it shows a

loss when the company's selling price is \$726.54. This is because the selling price of \$726.54 could not cover the cost per ton of \$750. However, if the company decides not to change the selling price of \$760 under both costing methods, then the markup percentage will be increased from 1.33% under traditional costing method to 6% under RCA in 2023.

4. Evidence indicates a significant improvement; the profit margin per ton and gross profit margin increased substantially, reaching approximately 76.16%. As a result of declining total manufacturing cost and cost per ton by 4.60%.

5. RECOMMENDATIONS AND LIMITATIONS

5.1. The Study Recommendation

1. RCA education and training is the foundation of employee empowerment. To allow workers in every department of a company to apply their understanding to create changes, management accountants must spread knowledge throughout the whole company. It not only provided its employees with knowledge but also set up a reward system that awarded them a portion of the cost savings. Because workers were inspired and empowered to carry out many cost-saving efforts, the outcomes were remarkable. Employees must receive training in contemporary managerial accounting and cost accounting methods so they can use them successfully and efficiently.
2. It has been strongly recommended that many businesses and companies adapt RCA costing method because it has combined the benefits of the ABC and GPK costing methods. In such a case, both tend to support long- and short-term decision.
3. In order to achieve optimal utilization, business units should give special consideration to the available resources and indicate the capacity of each kind of resource together with determining the quantity of unit consumption of its capacity; thereby, the idle capacity could be calculated.
4. The study provides strong justification for implementing RCA across multiple business sectors in different geographic areas, given their potential to enhance financial performance and operational accuracy.

5.2. The Study Limitations

1. The availability of data was restricted because in some dimensions, researchers required the secondary data, such as an internal report regarding cost, or in some other dimension, they required operational reports in order to predict and determine the resource drivers.
2. The implementation of the RCA costing method is inherently complex, as it requires the creation of multiple resource pools, each demanding its own allocation base to calculate the cost of specific activities. This complexity led the researcher to exert a greater deal of effort because every resource pool must be assigned an appropriate resource driver and measured according to the extent of its consumption by each activity.
3. The classification of resource pool costs into fixed and variable categories presents additional difficulties. This process is time consuming, requiring careful investigation, analysis, and judgment, and it is not always straightforward.

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