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The use of Resource Consumption Accounting and Balanced Scorecard Methods as an Integrated Framework in Correcting the Economic Unit Performance: Applied Study

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Abstract: This research aims at highlighting the role of the Resource Consumption Accounting (RCA) in providing fair and accurate cost information to be used in feeding the Balanced Scorecard (BSC) amid modern developments in business environment in addition to understanding the effect of having an integrated and correlated relation between the resource consumption accounting methodology and the balanced scorecard departments on enhancing the efficiency of performance correction process within the economic unit researched in this study. To achieve this goal, the researchers resorted to the analytical technique through the use of statistical forms so as to collect data from participants who were staffers from accounting, technical, engineering and other departments and who all in all made the research sampling of (56) participants. The statistics program SPSS was used as the platform needed to carry out statistical analysis on gathered data as well as to test the hypothesis used in the study. Hypothesis involved in the current research have been tested and approved after calculating a number of statistical measurements like the arithmetic mean, the standard deviation, coefficient of dispersion and weighted percentage and after asserting the correctness of the test by applying (t) test on one sample where the calculated (t) value proved to be greater than the tabled (t) value at (5%) significance within a freedom degree of (55). The most significant result obtained was that the resource consumption accounting technique had a special role in providing quantitative and qualitative information relevant to each resource within the economic unit in addition to predicting results and enhancing the performance correction process. Moreover, the gained data could be used within the RCA inputs to be used in feeding the balanced scorecard in order to enhance indicators of performance within the economic unit.

Key words: RCA, resource, significance, process, performance, economic unit

INTRODUCTION

The beginning of the Resource Consumption Accounting (RCA) rose with the need to find a conclusive and integrated technique to be used in the cost management process that is capable of collecting data related to consumed resources on one hand and activity-based data on the other (Al-Ghabban and Al-Ghabban, 2016). Thus, the Resource Consumption Accounting (RCA) began in 2000 through combining the German cost system (GPK) and the Activity Based Costing (ABC) system (Sahib, 2016). It was apparent for the researchers of this study that both the GPK and the ABC have contributed to the Resource Consumption Accounting (RAC) to come into existence which in turn combines features of the two systems, so, to become an integrated and comprehensive system.

As a cost accounting technique and a managerial tool, the RCA has its own power in being based on resources derived from the German GPK system and on activities derived from the ABC system. The RCA also emphasizes on viewing resources as being the main cause of costs. The system provides detailed information to decision makers through classifying costs into fixed and proportional ones while allowing for the calculation of the costs of idle capacity which is not permitted to be added to products (Karaca and Kucuk, 2017).

Despite the fact that idle capacity is recognized by both the Resource Consumption Accounting (RCA) system and the time-driven Activity-Based Costing (ABC) system, the allocation of costs of resources in the Time-Directed Activity-Based Costing system (TDABC) is related to the time consumed by activities which in turn affect the levels of outputs whereas the allocation of costs of resources in Resource Consumption Accounting (RCA) system is related to the resources consumed through different activities. That is why the RCA is

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more efficient in managing the idle resources through monitoring the levels of resources committed to Al-Rubaiy (2016).

In 2008, the RCA institute was established by a number of academic professors and practitioners of the method or those interested in it, so that, to present it to the market, so as to elevate the level of the managerial accounting knowledge through encouraging disciplined practices. In 2009, the International Federation of Accountants (IFAC) considered the technique as (one of the good practices according to the International Good Practice Guidance ((IGPG)) and was called the evaluation and improvement of costs within the economic unit) (Inanlou *et al*., 2014).

According to the researchers, the development in the competitive environment surrounding the economic unit has led to the adoption of a new cost managing approaches aimed at reducing costs while maintaining quality as well as improving and increasing productivity in addition to retain the satisfaction of customers, not to mention the optimal use of resources. Due to the mounting criticism directed to the conventional cost accounting systems by then, researchers and those interested in the field engaged in searching for new approaches that could contribute in eliminating the drawbacks found in the old systems while increasing the accuracy in allocating costs which led finally to the invention of the resource consumption accounting technique.

The resource consumption accounting method has many definitions as follows: Resource consumption accounting is defined as (the process of determining strategic costs that combine between the German cost accounting system which focuses on the marginal costs and recourses with the activity-based or cost-based activity perspective within the context of an integrated performance management system such as the Thomson and Gurowka (2005). The researchers believe that this definition confirms the existence of two perspectives for this first technique. The perspective of resources is derived from German cost accounting and the second is the activity perspective which is based on cost based on activity. It is also known as: "an introduction to managerial accounting that stresses the creation of reliable information in order to minimize costs and maximize revenues, so that, to improve the productivity of a given project with the objective of achieving a noteworthy success in a highly competitive market" (Abbas, 2015). This definition focuses on the role of resource consumption accounting in reducing costs and increasing both productivity and profitability in an increasingly competitive environment. Furthermore, RCA is also defined as: "the introduction to cost management by means of optimal use of economic unity resources while not adding unused resources to products through the application of causality principle in the process of allocating the cost of consumed resources on cost targets, whether being products or services benefited from" (Daiem and Safa, 2014). The definition focuses on the role of resource consumption accounting in determining the cost of idle capacity and not charging it to the cost of production. Accordingly it contributes to cost reduction. It is also defined as one of the official cost management methods that has been recently developed and adopted by practitioners and administrative academics alike and thus, placing resources in the foreground, similar to the role of activities when viewed as an essential part of the costs based on the activity and quality that serves as a driving force in Total Quality Management (TQM) (Stenzel and Stenzel, 2003).

This definition emphasizes the importance of resources in being the starting point for all operations or processes and also the reason for the costs and thus, it contributes to graining of revenue contrary to activity-based costs which apparently focuses on activities. It is also known as: "An integrated, comprehensive and dynamic entry to administrative (managerial) accounting that provides managers with information supportive of the decision-making process for organizational improvement of the economic unity" (Rahimi *et al*., 2014).

The definition also shows how RCA is an integrated approach, since, it leads to the integration of costs based on activity along with the German cost accounting system. It also regarded as a comprehensive approach, since, it provides all information concerning the interrelations between resources including all information about resources, activities, primary and secondary costs, fixed costs, relative costs. Finally, it is viewed as a dynamic approach, since, it reflects all environmental changes surrounding.

It is also known as: "an entry to improve costs based on the activities existing within the accounting practices, providing us with an integrated and comprehensive method to be used in administrative (managerial) accounting. It is thus, based on the three axes of resources interrelationships between resources and how outputs are consumed" (Al-Sagheer and Al-Sayed, 2011). The definition shows the role of RCA in improving costs on the basis of activity while addressing the problems of not taking into account the interrelationship between resources and the way those resources are usually consumed in addition to not defining the idle capacity

cost. Accordingly the researchers were able to notice the following main points of these definitions: the resource consumption accounting method is concerned with optimizing the use of capacity and distinguishing between the cost of production and the cost of idle capacity in addition to differentiating between ownership of resources and their consumption which in turn, contributes to reducing costs and increasing productivity. Resource consumption accounting combines the advantages of the German accounting system which is cost-focused and the activity-based costing system. The resource consumption accounting provides an integrated, comprehensive and dynamic approach that is why it requires detailed data, regardless of being financial or non-financial and requires integration with the Enterprise Resource Planning (ERP) system. RCA as a technique contributes to improving the accuracy of cost measurement by taking into account the interrelated relationships and resources. The technique contributes in providing both financial and non-financial information and thus, it helps to predict the needs and requirements of each resource as well as the interrelationships between them.

Accordingly the researcher was able to define RCA as follows (RCA) is a cost management technique intended to improve the accuracy of the cost measurement of products by distinguishing between the acquisition and consumption of resources, excluding idle resources by not adding them to products that did not cause them in the first place so as to reduce costs and increase the productivity of the economic unity).

Philosophy and characteristics of RCA: The resource consumption accounting is based on the philosophy that resources are the main cause of cost and that these resources must be organized in homogeneous groups, i.e., pools. Each resource is then has its own set of inputs to be used to produce outputs which in turn used by other outputs or might be used to produce final goods and services (Al-Hawali, 2013).

The basics of RCA are not new, since, they originate many of its basics and principles from practices of the German accounting system that have been used for more than 60 years and which are based on rationality including sufficiency and development of cost modeling which maximizes revenue and minimizes costs. RCA is also based on using currently available data relevant to the current performance without the need to generate more new data with analyzing the current data being based on asking the following basic question: what causes the costs? Costs usually occur as a result of spending resources on the operation or process (Masters, 2013).

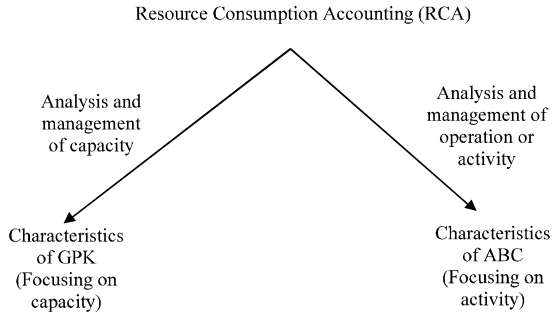

Fig. 1: Philosophy of RCA (Elshahat, 2016)

Additionally, this methods relies more on theoretical capacity than on practical one in determining the fixed rate of resource costs, since, RCA works on separating costs of theoretical capacity, so that, to be taken into account in decision making process (Al-Dibis, 2014).

Moreover, theoretical capacity is regarded the base needed for allocating fixed costs to products which means that indirect fixed costs are allocated for activities on the basis of theoretical capacity rather than on the actual production achieved within a certain period of time which in turn, leads to calculating the fixed cost of a product per unit. Therefore, this method proves that indirect fixed costs are in fact costs of the design theory which is fixed in nature and thus, should be treated by responding to the theoretical capacity and not the practical capacity. Whereas the planned capacity is used as the base needed for allocating proportional costs known as the conventional system of variable costs, i.e., the proportional cost average for unit is applied based on the planned productive capacity needed to calculate the overall proportional costs (Bhatt, 2014). Figure 1 illustrates the philosophy of the resource consumption accounting as follows.

Consequently, the researchers observe that the cost estimation model used in this technique is based on the consumption of resources as being the main reason for the cost and not the acquisition of resources. The method also takes into account the interrelationships between resources which are based on the quantitative model rather than being on the qualitative one with the result being an increase in the accurateness of allocating indirect costs compared to other cost-accounting techniques not to mention that the cost in this method is monitored on resource basis regardless of the activity, since, each resource has the power to create value for the customer.

Among other cost accounting systems, the resource consumption accounting methods is distinctive in a number of ways: it uses theoretical capacity as a base for

calculating fixed cost per unit of production. It also uses planned capacity as the base for calculating proportional costs and it uses replacement cost instead of historical cost in calculating depreciation.

Therefore, resource consumption accounting has the following characteristics: resource consumption accounting in a way is the blending of direct allocation of resource consumption in addition to the indirect allocation through the use of cost-based activity to calculate products cost (Bhatt, 2014). It provides a clear vision obtained through causal relationships between resources within the economic unity as a whole and the perspective of the process in terms of the amount of resources and the costs associated with them (White, 2009). The RCA approach provides a comprehensive vision on how to manage capacity resources and capacity costs and not merely providing estimated information on how to calculate the process (Al-Hawali, 2013). Depreciation in the RCA method is based on the replacement cost of the asset rather than being on the original (historical) cost or the book-accounting value adopted by the Generally Accepted Accounting Procedures (GAAP) which is consistent with the perspective of generating internal cost information that supports long-term administrative (managerial) decisions (Bhatt, 2014). In RCA method information is readily available for submission at multiple levels within the economic unit and to be used in reports of multi-dimensional marginal contributions and profitability whether at the level of product, service, customer, distribution channel or at other levels (White, 2009).

Is supports the customer guidance philosophy through a sound management of invested resources, directing it towards basic activities that provide value to customers. This is done in accordance with the market directions and fluctuations in investment activities that do not add value to the customer and thus eliminating wastes which in turn results in improving the performance of core activities of value to the customer, consequently achieving a higher degree of compatibility between the costs and activities of the company and value preferences as regarded by customers (Al-Sagheer and Al-Sayed, 2011). RCA is a technique that accurately and with no distortion to cost allocations, addresses all fluctuations in the quantity of outputs of the final product or service (White, 2009).

The researchers view the RCA as the next generation of cost management techniques that combines the characteristics and advantages of cost management based on German thought and the cost management system basis of activity that contributes to increasing the accuracy of allocation of costs while providing in details and as accurate as possible both the financial and operational information at the level of resources which in turn help decision makers achieve their objectives. Additionally, the RCA method aids in predicting and planning for resources in the future covering the interrelations involved.

Pillars of the resource consumption accounting: RCA has three main pillars which are the comprehensiveness, nature of costs and the use of the cost model on a quantitative basis (Merwe and Keys, 2002). The pillars of resource consumption accounting are addressed.

Comprehensiveness of resources: Resources are considered the starting point for all processes and methods that contribute to profit making, thus, the resource accounting technology deals primarily with resources (Stenzel and Stenzel, 2003). Resources are usually represented by available investments that a company has and could be either in materialistic forms needed to gain operational energies like personnel, raw materials, sums of money and equipment or in non-materialistic forms like information technology services (Sahib, 2016). This technology is mainly significantly based on resources and interrelationships. The quantities of those resources could therefore, be determined whereas the consumption of resources would be allocated from the cost pools directed towards products or different types of services, thus, the idle capacity could be identified and viewed (Ozyapici and Tanis, 2017).

The main pillar upon which the RCA is based begins with taking the decision to invest which in turn requires the acquisition of necessary resources represented in properties and thus, constituting its additional capacity resulting from that decision. capacity is studied and examined as a function in the resource pools that are considered as a means of managing capacity. Then resources are allocated to different departments, one for example is dedicated to research and development, the other for production and services, a third for marketing and sales, a forth for other supportive activities (Khattab, 2009).

Defining resources in the light of this technique includes not only the resources consumed by the activities but also the resources consumed between them. Thus, when calculating costs, RCA takes into account the overlapping consumption of resources within resources. Additionally, allocating costs based on cost-objectives is usually done in accordance to the resources which is in turn, very important in determining relations within resources as well as in determining costs objectives in

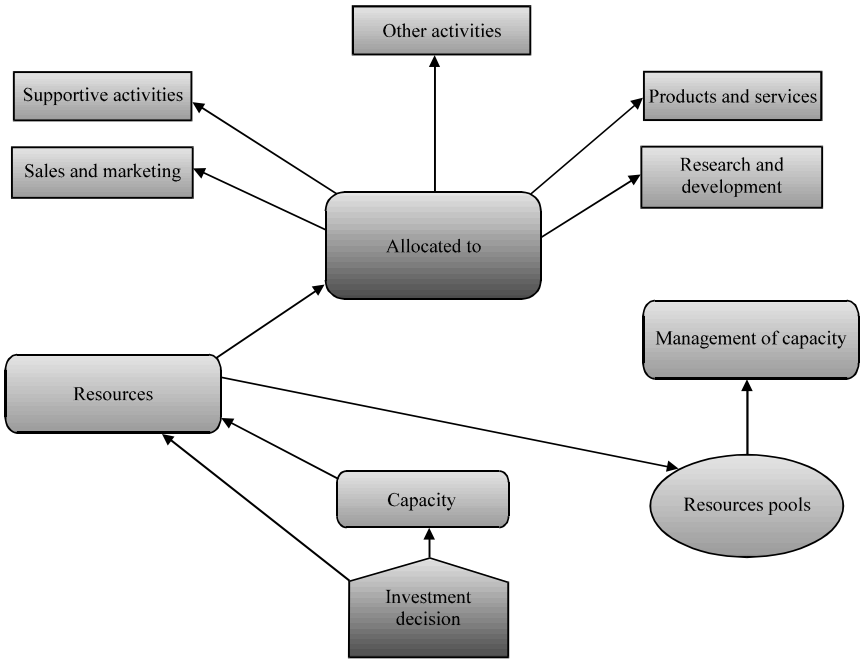

Fig. 2: Comprehensiveness of resources (Khattab, 2009)

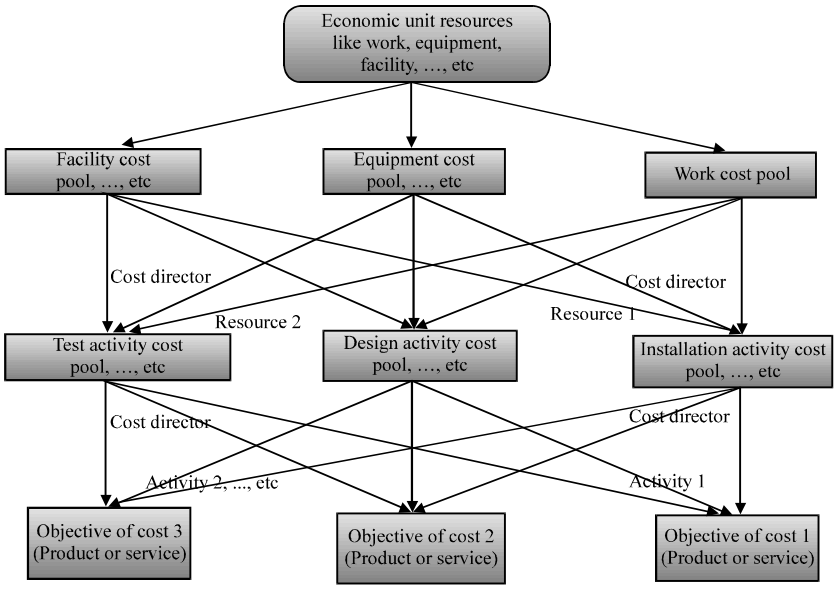

Fig. 3: The steps of implementing the RCA (prepared by the researchers)

which resources are to be consumed (Okutmus, 2015). The focus this method applies to resources and the study of interrelations between them increases the ability of companies to manage scarce resources better and more efficiently in addition to having the monitoring process focused on the resources level (Mohammed and Mansour, 2014). Flows of resources and resources pools are essential concepts in the resource consumption accounting system. They (flows of resources, resources pools and products) are usually interrelated with each other. For example, resources pools requires certain inputs in order to have outputs which in turn could support another pool of cost or product or a customer pool. Accordingly it is significant to have flows moving towards the right direction since the goal behind the RCA is to provide managers/directors with information based on cause and effect relationship, so that, they would be able to take right decisions (Jonsson, 2012) (Fig. 2 and 3).

Resources are characterized by certain features as follows

Capability: Which means the ability to find value regardless if each resource was alone or interacting with other resources. This is a descriptive feature of resource. For instance, how the individuals are trained and what is the quality of the equipment needed to produce and deliver the relevant service. Accordingly each resources pool contains resources that share the same characteristics, descriptions and properties (Al-Danaf and Omar, 2013).

Capacity: The Institute of administrative accountants suggested in its administrative accounting statement number (12) different models of capacity, explaining that the resources consumption accounting adopted by the Consortium for Advanced Manufacturing-International (CAM-I) focuses on the use of hypothetical capacity of resources. Human resources might be considered under working hours bases included in the employees contracts or the financial resources that could be owned or hired with no restrictions, so, they are considered available. (Rahimi *et al*., 2014). Capacity has been subdivided into three types (Ajaz and Moosa, 2001) as follows.

Productive capacity: Where the resource provides all the products or services designed to be achieved or produced.

Non-productive capacity: Which means using the resources in works of maintenance installations assembly, planning and also losses in the case of having bad-quality products that are not in line with the determined specifications.

Idle capacity: Like when using a resource in the basic activity due to the inability to carry out works due to some shortage in demand or the when the designed capacity exceeds the current demand or due to legal or contracted agreements that include conditions under which no work is allowed to be done like for example when the space of the office is naturally idle for (2-16 h/day) when adapting one-shift plan in one office as per valid instructions.

Cost structure and behavior: Cost resources reflect the properties of the resources involved. For example, human resources include the wages paid, bonuses and pensions. While equipment resources involve maintenance, operating processes, powers to run the operations like electricity, space and other things. Thus, each resource pool has its own characteristics, properties and specifications and it also produce homogenous outputs by adding their relevant costs to other pools of resources or by adding these costs to the final product to be offered to customers. Costs are essentially linked to the flow of resources, so when the flows of resources are clearly displayed then the corresponding costs would be clearly displayed as well (Rahimi *et al*., 2014). The researchers observe that capacity is available within resources and not activities and hence, it could be productive or non-productive or it could be idle. This is why it is considered an essential pillar within the resource consumption accounting technique, since, the RCA has the ability to differentiate between theoretical capacity and practical capacity which means it has the ability to determine the amount of idle capacity, so that, it is not added to the costs of products or services.

Nature of costs: The concept of resource consumption accounting is described as an administrative or managerial accounting system that classifies costs into fixed and variable (proportional) ones in addition to supporting decision making process by accurately determining the idle capacity, showing real costs data of a product or a service (Elshahat, 2016). RCA approach supposes that all resources are to be consumed along with their related costs either in a fixed way or proportionally. That is because the fixed consumption of resources is determined when the quantity of consumed inputs is influenced by the outputs levels or by the costing measurement issue, hence, the input costs are regarded as being fixed whereas the proportional consumption of resources occurs when the quantity of consumed inputs does is influenced by the output level or the costing measurement, hence, input costs are regarded as proportional (Al-Danaf and Omar, 2013). Based on their correlation with the resources pool, costs are divided into two categories: primary costs which basically arise from a certain resource pool like direct work cost and secondary costs which are costs that are added to the resource costing pool when it is based on another resource pool. Secondary pools are used to support the main resource pool like costs of maintenance and general untilities and others (Tabikh, 2014).

Steps of implementing RCA: Implementing RCA takes a number of steps as follows: enclosing all resources within the economic unity and for all main productive departments and the supportive service departments (in a package), classifying those departments whether being essential or supportive into resources pools like resource of resources pool, resource of work pool, resource of machines pool, resource of facilities pool and other pools (Ajaz and Moosa, 2011). Resource pools are classified or

grouped into core (essential) resource pools that support activities used to make salable products/goods or commodities within the economic unit such as the production resource and supportive resource pools responsible for providing services supportive to the main and secondary pools in a proportional way like Information Technology (IT) resource (Al-Ghabban and Al-Ghabban, 2016).

Dividing costs within each resource pool into two parts of costs, one for fixed costs and the other for costs that are proportional (Al-Dibis, 2014). Deciding whether costs are fixed or proportional is determined by the way of consuming resources. Electricity for instance is one of the resources that is usually classified based on the way it is consumed. If it is used only to run machines it is then considered proportional. But if it is used as a resource for daily illumination or A/C purposes it is then classified under fixed costs (Al-Ghabban and Al-Ghabban, 2016).

The use of quantitatively-measured resource consumption guidelines to allocate resource costs to other resource pools that redistribute them based on costing objectives and that through the use of activity costing guidelines in a way directed towards the final goals of costs. For example, if a machine is regarded as a resource, then the costs involved in running it are allocating depending on its outputs per running hours, so that, it would be possible to calculate the average cost which in turn should be added to resources output, i.e., the overall working hours consumed to get the final product as the ultimate goal of the entire process. In this way, the relationship between the resource and the cost objective/target arises (Bhatt, 2014).

Determining the amount of resources consumed in production as well as the amount of idle capacity whether unconsumed as a stock or lost as a loss occurring for each of the resource pools within the economic unit with the goal being to identify those responsible for the losses and to take corrective actions accordingly (Ajaz and Moosa, 2011). Determining cost target issue (the goal behind the cost) depending on the nonmaterial flow of resources (Al-Ghabban and Al-Ghabban, 2016). The researchers also observe that the RCA steps begin with resources, passing through resources pools, then to the activities involved and after that to the products or services as the final target of costs. Thus, it takes into account the interrelationships between resources where allocating costs becomes more accurate compared to other cost accounting systems. Whereas the activity-based cost accounting system begins with resources passing through to activities and then finally to products, not taking into consideration the interrelationships between resources which is one of the flaws of the ABC.

Knowledge basics of balanced scorecard and its role in correcting performance: The balanced scorecard was widely used by many companies in the late 1990's where companies tended to focus only on short-term performance measurements and indicators. For not enough attention was being directed towards non-financial indicators. But the situation has change as there is some growing interest by both profitable and non-profitable economic units on this indicator with the goal being to help in carrying out strategies and achieving desired objectives (Blocher *et al*., 2009). The balanced scorecard is considered the translation of the organization's mission and strategy through a set of performance measurements that provide a framework for the implementation of its strategy. It (the balanced scorecard) does not only focus on achieving short-term objectives of financial nature but also on long-term nonfinancial ones that the economic unity should aim to achieve. In fact, the balanced scorecard was named, so, because it balances between the use of measurements and indicators of financial and non-financial nature alike so as to correct the performance in the short-term and long-term run in one unified report (Horngren *et al*., 2000). A key feature of the balanced scorecard is that it enhances the ability of managers, directors and other employees to make decisions that influence profitability due to the cause-and-effect existing relationship. Thus, the balanced scorecards is not merely a list of indicators and benchmarks used to correct performance but rather a means involving also causes and effects. For example, a decrease in the rate of faulty production leads to a slowdown in the time cycle of production due to recycling faulty units. Consequently, the importance of properly preparing balanced scorecards is felt on different levels of administrative positions (Hilton *et al*., 2000). According to Zimmerman (2000), the balanced scorecard represents an integral and comprehensive framework of interrelated strategic objectives of the economic unit which includes a group of harmonized performance indicators, consequently the researchers notice the following: this technique is based on the cause and effect relationship by paying attention to performance indicators of non-financial nature in addition to financial indicators.

The technique equivalently represents financial and nonfinancial indicators, both in the short and long run alike. It is also suitable for advanced business environment. This technique aims to strategically achieve the task and mission of economic unity, contrary to conventional benchmarks of performance which are unable to do so.

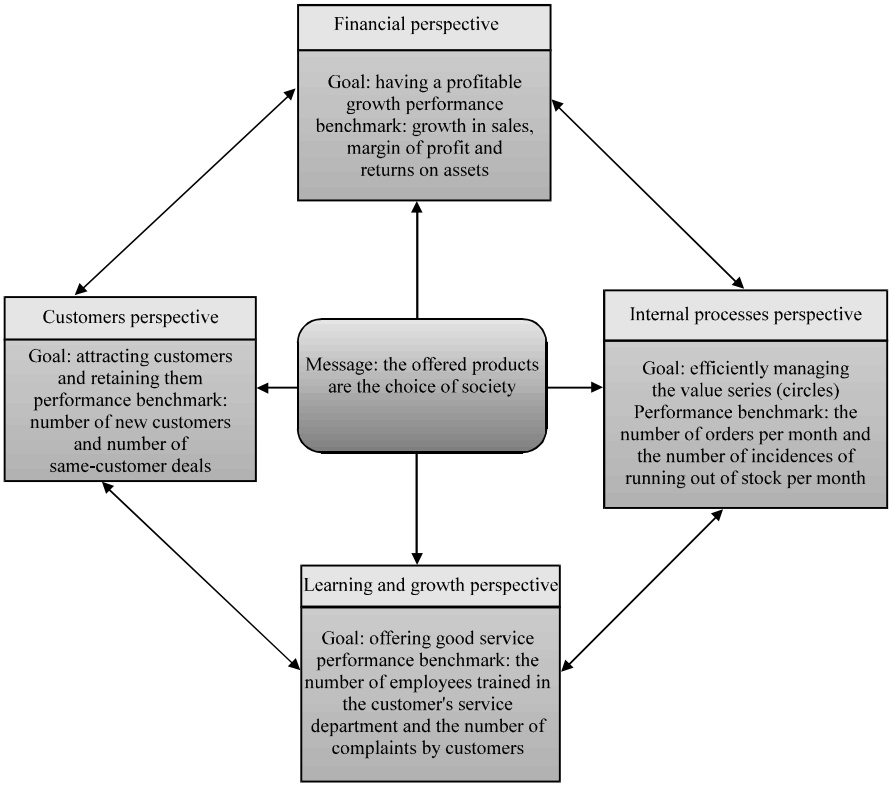

Fig. 4: Perspective of balanced scorecard

Perspectives of balanced scorecard: The balanced scorecard is consisted of the following perspectives.

Financial perspective: Financial benchmarks are regarded as the main components within the balanced scorecard, since, those benchmarks are directed towards achieving the objectives designed to understand levels of profits achieved by economic unity strategy by reducing costs compared to the competition. Also, they are usually directed towards achieving growth in sales which is to be viewed as one of the important strategic initiatives. Accordingly this perspective is aimed at achieving the beggist amount of returns possible for the investors (owners and shareholders) as its benchmarks include profitability, growth of sales, economic value added, cost reduction and similar things (Al-Samiraaiy *et al*., 2012).

Customer's perspective: This is a perspective that adds value to the customer through determining market customers that the economic unity is aimed at attracting. It is also used to measure the success the capability of the economic unity to retain those customers in addition to keep monitoring the growth of objectives that this perspective aims to accomplish through the use of certain measuring tools like market share, since, it is possible through connecting with customers to retain his/her loyalty as well as to know the number of new customers while maintaining their satisfaction (Horngren *et al*., 2000).

Learning and growth perspective: This perspective focuses on determining factors that are critical for the success of the economic unity under its current techniques and capabilities since hard competition requires continuous improvement in order to achieve the desired value to both customers and owners. Additionally, the perspective is aimed at developing the employees abilities and winning their satisfaction in order to increase the productivity while maintaining the quality needed for all operations and products. Besides, it helps enhancing databases while motivating the employees through application of the incentive system so as to accomplish a more distinctive performance within the economic unity (Al-Samiraaiy *et al*., 2012) (Fig. 4).

Internal operations perspective: This perspective focuses on the internal processes that help in adding value to customers according to the customer's perspective and adding value to shareholders according to the financial

perspective. It is consisted of three sub processes: first creativity which involves creating products, services and procedures that would meet the needs of customers. Secondly, is the operation process which involves delivering products and current services to customers and thirdly the after-sale-services which involves providing services and support to customers after sales or after delivering the products or services to customers (Horngren *et al*., 2000). The researchers realize the big role the balanced scorecard plays in correcting performance through providing a comprehensive picture on the performance of all departments and branches within the economic unit in addition to providing a group of indicators and benchmarks that could be internally or externally compared to other similar units.

The researchers note that the balanced scorecard plays a significant role in enhancing the performance correction process by providing a comprehensive view or picture about the performance of all departments and branches of the economic unit in addition to providing a number of indicators and benchmarks that could be compared internally or externally with similar units.

MATERIALS AND METHODS

The research problem: The insufficiency of conventional cost accounting systems in providing detailed accurate information has an impact on the effectiveness of performance correction indicators within economic units that is why those system have become incompatible with the modern business environment, hence, is the need for an integration of modern cost accounting techniques including the Recourse Consumption Accounting (RAC) along with the balanced scorecard and its perspectives in order to develop and enhance the performance correcting indicators of the economic unit being researched. Accordingly the research problem could be summarized by the following tow question: is it possible to benefit from the outputs of the resource consumption accounting technique in applying the balanced scorecard so as to provide a comprehensive picture about the benchmarks and indicators of performance?

Does the integration between the two techniques of the resource consumption accounting and the balanced scorecard and its perspectives contribute to increasing the efficiency of performance correction process of the research sampling?

The importance of research: Addressing the most important techniques of contemporary cost management represented by the resource consumption accounting and the balanced scorecard and their roles in increasing the efficiency and effectiveness of performance correction in addition to showing the role of information provided by the resource consumption accounting in the implementation of the balanced scorecard by providing an integrated set or group of benchmarks and indicators, both financial and non-financial and their effectiveness in applying the strategy of the economic unit.

The objectives of the research: Demonstrating the knowledge bases of both the resource consumption accounting and the balanced scorecard in addition to showing the role of the resource consumption accounting in providing fair and accurate cost information that is to be used as inputs to feed the balanced scorecard in the light of modern business environment.

Recognizing the influence of having an integrated and correlated relationship between the resource consumption accounting and balanced scorecard perspectives in enhancing the efficiency and effectiveness of performance correction within the economic unit of the research sampling.

Hypothesis: The researched is based upon an essential hypothesis that states (the integration between the resource consumption accounting technique and balanced scorecard perspectives affects the efficiency and effectiveness of performance correction process within the economic unit of the research sampling). The main hypothesis of the research is subdivided into the following: the integration between the resource consumption accounting technique and the financial perspective affects the efficiency and effectiveness of the performance correction process within the economic unit of the researched sampling. The integration between resource consumption accounting and the customers perspective affects the efficiency and effectiveness of the performance correction process within the economic unit of the researched sampling. The integration between the resource consumption accounting and the learning and growth perspective affects the efficiency and effectiveness of the performance correction process within the economic unit of the researched sampling. The integration between resource consumption accounting and the internal processes perspective affects the efficiency and effectiveness of the performance correction process within the economic unit of the researched sampling.

The research sampling: The research sampling contained (56) forms distributed among the accounting, administrative, technical, engineering and production

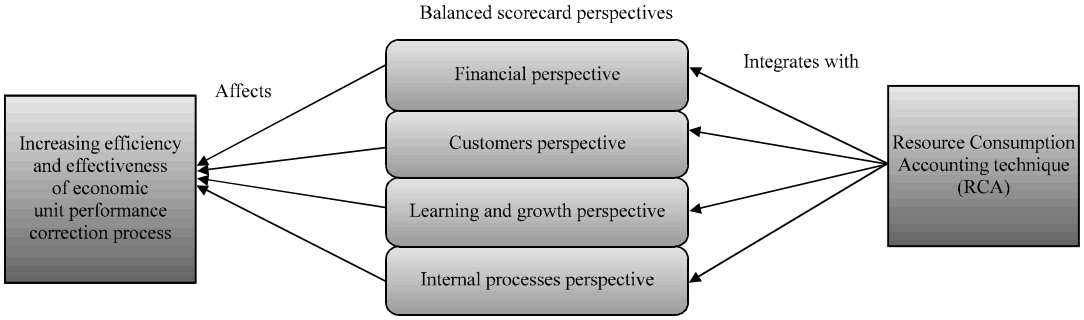

Fig. 5: Independent variables and dependent variable (prepared by researchers)

designers staff at the Babil Cement Factory, Sadat Al-Hindiya plant which is one of the factories of the state enterprise for Southern cement as one of the companies affiliated with the Ministry of Industry and Minerals.The period of applying the questionnaire from January to March 2018 (Fig. 5).

RESULTS AND DISCUSSION

Theoretical framework

Analyzing the opinions and responses of the participants: This study is dedicated to show and analyze the data collected through the questionnaire form by virtue of studying the opinions and responses of the participants involved in this research who were a number of accountants, administrative employees, technicians, engineers and production designers. Furthermore, this study includes the description of the research's most significant questions related to relevant hypothesis in order to identify the difference in opinions among the participants involved in this research, so that, to test the validity of the hypothesis. In doing, so, the researchers used Likert pentagonal method with the participants being accountants, administrative employees, technicians, engineers and production designers who are scientifically and practically qualified as follows (Table 1).

The statistical analysis of the research sampling participant's answers on testing the four hypothesis included in the study would be clarified as follows: the testing of the four research hypothesis will be clarified as follows.

Testing the first hypothesis: This hypothesis states that: (the integration between the resource consumption accounting technique and the financial perspective affects the efficiency and effectiveness of the performance correction process within the economic unit of the researched sampling). The statistical analysis of relevant variables shows the following:

Results shown in Table 2 that includes five questions, that the general average of the participant's response reached (81.357%) with a weighted arithmetic mean of 4.068 and with a standard deviation of 0.914 and a coefficient of variance of 22.587%, since, item 2 is the most significant among items contributed to enriching this variable which states that (optimal use of resources leads to improvement of profits and the growth of sales within the economic unit) as the intensity of response was (85.714%) with a weighted arithmetic mean of 4.286 and with a standard deviation of 0.706 versus a coefficient of variance of 16.478%. The first item came second which stated (implementation of RCA improves financial returns within the economic unit). It achieved a response intensity of 83.214% with a weighted arithmetic mean of (4.161) and with a standard deviation of 0.968 versus a coefficient of variance of 23.269%. The least was the third item that stated (implementation of RCA leads to cost reduction in the short and long run alike without impacting quality of products) as it achieved a response intensity of 76.429% with a weighted arithmetic mean of 3.821 and a standard deviation of 0.993% versus a coefficient of variance of 25.981%. It is noteworthy that the weight percent for all items when beyond (70%) and that the arithmetic mean for the sampling opinions surpassed the hypothetical average of performance benchmark of (3) with a significance of 5% covering all the variables of the first hypothesis as is shown in the next table of (t) test of one variable of the first hypothesis at a significance of 5% and with a freedom degree of (55).

As is shown in Table 3, the calculated (t) value was greater than the tabled (t) value for a freedom degree of 55 and a significance of 5% and that for all of variables of this hypothesis. The same is true in regards to the general average of those variables where calculated (t) value of 9.013 was greater than the tabled (t) value of 1.673 for a freedom degree of 55 and a significance of (5%). This leads to accepting the first hypothesis that

Table 1: Distribution of research sampling

	Academic qualification			Years of service			
Job	Diploma degree	Bachelor degree	Higher studies	0-1	1-5	5-10	10 and more
Accountants	5	7	2	2	4	5	3
Administrative employees	6	8	3	3	6	5	3
Engineers	5	8	3	1	4	6	5
Production designers	2	5	2	1	3	3	2
Total	18	28	10	7	17	19	13

Prepared by research

Table 2: Weighted arithmetic means, standard deviations, coefficients of variance and weight percentages for the research sampling responses concerning the first hypothesis N = 56

		Statistical indicators			
References	Items	Weighted arithmetic mean XW	SD	CV (%)	Weight (%)
Abbas (2015)	Integrating the resource consumption accounting technique with the financial perspective affects the efficiency and effectiveness of the performance correction process	4.161	0.968	23.269	83.214
Daiem and Safa (2014)	Optimal use of resources leads to improvement of profits and the growth of sales within the economic unit	4.286	0.706	16.478	85.714
Ajaz and Moosa (2011)	Implementation of RCA leads to cost reduction in the short and long run alike without impacting quality of products	3.821	0.993	25.981	76.429
Al-Danaf and Omar (2013)	Accurate allocation of costs based on RCA contributes to the monitoring of financial and materialistic resources	4.054	0.942	23.247	81.071
Al-Dibis (2014)	RCA helps in providing quantitative and qualitative information on the requirements of each resource as well as predicting results and enhancing the performance correction process	4.018	0.963	23.963	80.357
General average of the first hypothesis variables		4.068	0.914	22.587	81.357

Table 3: Results of (t) test for the first Hypothesis (freedom degree 55, significance 5%)

Variables	1	2	3	4	5	General average
Calculated (t)	8.972	13.624	6.191	8.367	7.911	9.013
Tabled (t)	1.673	1.673	1.673	1.673	1.673	1.673

Prepared by the researchers depending on the SPSS Program

states (the integration between the technique of resource consumption accounting and the financial perspective affects the efficiency and effectiveness of performance correction process).

Testing the second hypothesis: This hypothesis states that (the integration between the technique of resource consumption accounting and the consumers perspective affects the efficiency and effectiveness of the performance correction process). The statistical analysis of the variables of this hypothesis shows the following.

Results shown in Table 4, that includes five questions indicate that the general average of intensity of response of the participants was (82.429%) with an weighted arithmetic mean of 4.121 and a standard deviation of 0.834 and a coefficient of variance of 20.347%. The most significant item that enriched the variable was the fifth item (retaining current customers and gaining new ones through RCA improves the performance of the economic unit) as it achieved an average intensity of response of 85.714% with a weighted arithmetic mean of 4.286 and with a standard deviation of 0.706 and a coefficient of variance of 16.478%. Next came the first item (RCA aims at taking care of customers through budgeting (rationalizing) of resources management) as it achieved an average intensity of response of 84.673% with a weighted arithmetic mean of 4.232 and with a standard deviation of 0.738 and a coefficient of variance of 17.446%. The least percentage belonged to the third item (retaining quality while reducing costs leads to meeting the needs

Table 4: Weighted arithmetic mean, standard deviation, coefficient of variance and weight percent for the research sampling responses concerning the second hypothesis N = 56

		Statistical indicators			
References	Items	Weighted arithmetic mean XW	SD	CV (%)	Weight (%)
Abbas (2015)	RCA aims at taking care of customers through budgeting (rationalizing) of resources management	4.232	0.738	17.446	84.643
Daiem and Safa (2014)	RCA contributes to cost reduction of the products offered to customers	4.125	0.788	19.095	82.500
Ajaz and Moosa (2011)	Retaining quality while reducing costs leads to meeting the needs and desires customers as well as gaining their satisfaction	3.911	0.996	25.467	78.214
Al-Danaf and Omar (2013)	Gaining satisfaction of customers through RCA supports marketing share of the economic unit	4.054	0.942	23.247	81.071
Al-Dibis (2014)	Retaining current customers and gaining new ones through RCA improves the performance of the economic unit	4.286	0.706	16.478	85.714
General average of the first hypothesis variables		4.121	0.834	20.347	82.429

Table 5: Results of (t) test for the variables of the second hypothesis (freedom degree: 55, significance: 5%)

Variables	1	2	3	4	5	General average
Calculated (t)	12.488	10.688	6.843	8.367	13.624	10.688
Tabled (t)	1.673	1.673	1.673	1.673	1.673	1.673

Prepared by the researchers depending on the SPSS Program

and desires customers as well as gaining their satisfaction) as it achieved an average intensity of response of 78.214% with a weighted arithmetic mean of 3.911 and with a standard deviation of 0.996 and a coefficient of variance of 25.467%. It is noteworthy that weight percentages for all items exceeded (70%) and that the arithmetic mean for the participant's opinions have exceeded the performance hypothetical mean of 3 with a significance of 5% and for all the variables of the second hypothesis. Next table shows the results of (t) value test for one sample of the second hypothesis variables at a significance of 5% and with a freedom degree of 55 as follows.

As is shown in Table 5, the calculated (t) value was greater than the tabled (t) value for a freedom degree of 55 and a significance of 5% and that for all of variables of this hypothesis. The same is true in regards to the general average of those variables where calculated (t) value of 10.402 was greater than the tabled (t) value of 1.673 for a freedom degree of 55 and a significance of 5%. This leads to accepting the second hypothesis that states (the integration between the technique of resource consumption accounting and the customers perspective affects the efficiency and effectiveness of performance correction process).

Testing the third hypothesis: This hypothesis states that (the integration between the technique of resource consumption accounting and the leaning and growth perspective affects the efficiency and effectiveness of performance correction process). The statistical analysis of the variables of this hypothesis shows the following.

Results shown in Table 6, that includes five questions indicate that the general average of the participant's intensity of response was (80.286%) with an weighted arithmetic mean of 4.014 and a standard deviation of 0.908 and a coefficient of variance of 22.761%. The most significant item that enriched this variable was the fourth item (increasing the capacities of database systems of costs by providing all useful information in order to improve decisions related to economic unit) as it achieved an average response intensity of 84.643% with a weighted arithmetic mean of 4.232 and with a standard deviation of 0.809 versus a coefficient of variance of 19.112%. Next came the fifth item (carrying out quantitative and qualitative analyses for economic unit resources is a significant indicator of performance correction) as it achieved an average response intensity of 82.500% with a weighted arithmetic mean of 4.125 and with a standard deviation of 0.854 versus a coefficient of variance of 20.706%. The least percentage belonged to the first item (Launching educational and training courses under the implementation of strategic cost management techniques increasingly encourages employees in doing their tasks)

Table 6: Weighted arithmetic means, standard deviations, coefficients of variance and weight percentages for the researched sampling responses regarding the third hypothesis N = 56

		Statistical indicators			
References	Items	Weighted arithmetic mean XW	SD	CV (%)	Weight (%)
Abbas (2015)	Launching educational and training courses under the implementation of strategic cost management techniques increasingly encourages employees in doing their tasks	3.839	1.092	28.436	76.786
Daiem and Safa, (2014)	Providing suggestions about growth and development of strategic planning of costs and resources in order to increase the effectiveness and efficiency of the economic unit performance	4.018	0.771	19.190	80.357
Ajaz and Moosa (2011)	Having highly qualified and highly experienced individuals in the light of modern techniques of costs leads to improving the performance	3.857	1.017	26.360	77.143
Al-Danaf and Omar (2013)	Increasing the capacities of database systems of costs by providing all useful information in order to improve decisions related to economic unit	4.232	0.809	19.112	84.643
Al-Dibis (2014)	Carrying out quantitative and qualitative analyses for economic unit resources is a significant indicator of performance correction	4.125	0.854	20.706	82.500
General average of the first hypothesis variables		4.014	0.908	22.761	80.286

Table 7: Results of (t) test for the variables of the third hypothesis (freedom degree: 55, significance: 5%)

Variables	1	2	3	4	5	General average
Calculated (t)	5.753	9.879	6.309	11.400	9.856	8.639
Tabled (t)	1.673	1.673	1.673	1.673	1.673	1.673

Prepared by the researchers depending on the SPSS Program

as it achieved an average intensity of response of 76.786% with a weighted arithmetic mean of 3.839 and with a standard deviation of 1.092 versus a coefficient of variance of 28.436%. It is noted that weight percentages for all items exceeded (70%) and that the arithmetic mean for the participant's opinions have exceeded the performance hypothetical mean of 3 with a significance of 5% and for all the variables of the third hypothesis. The following table shows the results of (t) value test for one sample of the third hypothesis variables at a significance of 5% and with a freedom degree of 55 as follows.

As is shown in Table 7, the calculated (t) value was greater than the tabled (t) value for a freedom degree of 55 and a significance of 5% and that for all of variables of this hypothesis. The same is true in regards to the general average of those variables where calculated (t) value of 8.639 was greater than the tabled (t) value of 1.673 for a freedom degree of 55 and a significance of 5%. This leads to the acceptance of the third hypothesis that states (the integration between the technique of resource consumption accounting and the learning and growth perspective affects the efficiency and effectiveness of performance correction process).

Testing the fourth hypothesis: This hypothesis states that (the integration between the technique of resource consumption accounting and the internal processes perspective affects the efficiency and effectiveness of performance correction process). The statistical analysis of the variables of this hypothesis shows the following.

Results shown in Table 8, that includes five questions indicate that the general average of the participant's intensity of response was (81.643%) with an weighted arithmetic mean of 4.082 and a standard deviation of 0.854 and a coefficient of variance of 21.019%. The most significant item that enriched this variable was the fifth item (improving internal processes within the economic unit leads to creating value for customers) as it achieved an average response intensity of 85.357% with a weighted arithmetic mean of 4.268 and with a standard deviation of 0.646 versus a coefficient of variance of 15.146%. Next came the second item (inventing new products that benefit the economic unit results in maintaining customers) as it achieved an average response intensity of 82.857% with a weighted

Table 8: Weighted arithmetic means, standard deviations, coefficients of variance and weight percentages for the researched sampling responses regarding the fourth hypothesis N = 56

References	Items	Statistical indicators			
		Weighted arithmetic mean XW	SD	CV (%)	Weight (%)
Abbas (2015)	Carrying out enhancements and developments on internal processes in the light of modern techniques contributes to strategic improvement of performance	4.054	0.999	24.634	81.071
Daiem and Safa (2014)	Inventing new products that benefit the economic unit results in maintaining customers	4.143	0.773	18.657	82.857
Ajaz and Moosa (2011)	The resources consumption accounting technique helps in monitoring the internal processes and also leads to the optimal use of the economic unit resources	3.911	0.920	23.526	78.214
Al-Danaf and Omar (2013)	Improving the internal processes within the economic unit results in creating value for both owners and shareholders	4.036	0.934	23.131	80.714
Al-Dibis (2014)	Improving internal processes within the economic unit leads to creating value for customers	4.268	0.646	15.146	85.357
General average of the first hypothesis variables		4.082	0.854	21.019	81.643

Table 9: Results of (t) test for the variables of the fourth hypothesis (freedom degree: 55, significance: 5%)

Variables	1	2	3	4	5	General average
Calculated (t)	7.896	11.065	7.408	8.303	14.677	9.870
Tabled (t)	1.673	1.673	1.673	1.673	1.673	1.673

Prepared by the researchers depending on the SPSS Program

arithmetic mean of 4.143 and with a standard deviation of 0.773 versus a coefficient of variance of 18.657%. The least percentage belonged to the third item (the resources consumption accounting technique helps in monitoring the internal processes and also leads to the optimal use of the economic unit resources) as it achieved an average intensity of response of 78.214% with a weighted arithmetic mean of 3.911 and with a standard deviation of 0.920 versus a coefficient of variance of 23.526%. It is noted that weight percentages for all items exceeded (70%) and that the arithmetic mean for the participant's opinions have exceeded the performance hypothetical mean of 3 with a significance of 5% and for all the variables of the fourth hypothesis. The following table shows the results of (t) value test for one sample of the fourth hypothesis variables at a significance of 5% and with a freedom degree of 55 as follows.

As is shown in Table 8, the calculated (t) value was greater than the tabled (t) value for a freedom degree of 55 and a significance of 5% and that for all of variables of this hypothesis. The same is true in regards to the general average of those variables where calculated (t) value of 9.870 was greater than the tabled (t) value of 1.673 for a freedom degree of 55 and a significance of 5%. This leads to the acceptance of the fourth hypothesis that states (the integration between the technique of resource consumption accounting and the internal processes perspective affects the efficiency and effectiveness of performance correction process).

CONCLUSION

Conventional performance benchmarks that are based on financial indicators have become insufficient for performance correction within the economic unit of today's business environment. The resource consumption accounting method is distinguished by a number of features like the allocation of costs in a fair and accurate way as well as accomplishing the optimal utilization of resources in addition to reducing costs and improving the profitability of the economic unit. And resource consumption accounting method helps in providing both quantitative and qualitative information concerning the needs of each of the resources of the economic unit and also in predicting results and enhancing the performance correction process.The possibility of using information in the light of the RCA method as inputs to be used to feed the balanced scorecard so as to enhance the indicators of performance correction within the economic unit. Statistical analytical results showed the following: the overall average of the first hypothesis variables of a (t) calculated value of (9.013) is greater than the tabled (t) value of (1.673) at a freedom degree of (55) and a significance of (5%) which leads to accepting the first hypothesis that states that (integrating the resource consumption accounting technique with the financial perspective affects the efficiency and effectiveness of the performance correction process).

The overall average of the second hypothesis variables of a (t) calculated value of 10.402 is greater than the tabled (t) value of 1.673 at a freedom degree of 55 and a significance of 5% which leads to accepting the second hypothesis that states that (integrating the resource consumption accounting technique with the customers perspective affects the efficiency and effectiveness of the performance correction process).

The overall average of the third hypothesis variables of a (t) calculated value of 8.639 is greater than the tabled (t) value of 1.673 at a freedom degree of 55 and a significance of 5% which leads to accepting the third hypothesis that states that (integrating the resource consumption accounting technique with the learning and growth perspective affect the efficiency and effectiveness of the performance correction process)

The overall average of the fourth hypothesis variables of a (t) calculated value of 9.870 is greater than the tabled (t) value of 1.673 at a freedom degree of 55 and a significance of (5%) which leads to accepting the fourth hypothesis that states that (integrating the resource consumption accounting technique with the internal processes perspective affects the efficiency and effectiveness of the performance correction process).

RECOMMENDATIONS

The necessity of integrating the balanced scorecard with the resource consumption accounting in order to benefit from the RCA outputs in enhancing the indicators of the performance correction process within the economic unit.

It is recommended to establish a database that contributes in providing all the operational and strategic information needed for achieving integration between the resource consumption accounting and the balanced scorecard in addition to taking advantage of the project's resource planning system in order to support this integration.

The necessity to pay attention to all the financial and non-financial indicators involved in the balanced scorecard technique and that in accordance with the cause-and-effect relationship in order for these indicators and benchmarks to reasonably reflect the process of performance correction.

Being careful when determining non-financial benchmarks, since, they are subjective in nature and are susceptible to personal judgment. Accordingly they should be determined by highly skilled and experienced individuals.

Working on educating the employees on how to apply these techniques and their results that could be used to effectively and efficiently correct the performance of the economic unit in a way that contributes to raising the efficiency and effectiveness of that performance in addition to conducting many studies about the constituents and problems that impede the integration between RCA and BSC and how to deal with them in order to find good new systems of rewards and incentives.

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