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The Role of Time Driven Activity Based Costing in Rationalizing the Preparation of Planning Budgets

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Abstract: This research aims to demonstrate the role of Time Driven Activity Based Costing (TDABC) technique in development of budgets, thus, increasing the effectiveness of planning, control and performance evaluation in light of the contemporary developments of the business environment in addition to identifying the most important elements that help to apply Time Driven Activity Based Budgeting (TDABB) technique in the economic entity and raise awareness level with their management the importance of this technique and the possibility of transformation from the traditional budgets systems to the time driven activity based budgeting. To achieve this, the researcher followed the analytical method by using the statistical questionnaire as a means to collect data from the research sample individuals from engineering, administrative, accounting, technical staffs and others, the research sample consisted of (60) persons and conducting statistical analysis of the data and hypothesis testing was the use of the Statistical Program (SPSS). The test and accept hypothesis after calculating a set of statistical measures such as the arithmetic mean, the standard deviation, coefficient of variation and weight percentage. This test was validated using the t-test of one sample. The test showed that the value of calculated (t) is greater than the value tabled (t) at statistical significance level (5%) and degree of freedom (59). The most important results were that the (TDABC) technique outputs are accurate cost information in the allocation of indirect costs which are inputs to the application of (TDABB) technique. In addition, the application of (TDABB) technique requires a set of components, including top management support and training courses for economic entity staff to promote the application of this technique and other components.

Key words: Time driven activity based costing, traditional budget, time driven activity based budgeting, statistical program, hypothesis testing, TDABB

INTRODUCTION

The budget is one of the most important means for planning, control and performance evaluation purposes and as an important means of allocating scarce resources in the economic entity. Due to the shortcomings of the traditional cost systems in the preparation and development of budgets, so, it was resorted to (TDABB) is one of managerial accounting techniques in order to plan and control on costs and contribute to the activation of decision-making, continuous improvement and provide the necessary information for decision-making such as the decision of scarce resources allocation, costs control and pricing decision. Therefore, this research focused on the role of (TDABC) in rationalizing the budgets preparation in addition to addressing the components of its application its advantages and its importance. This type of budgets provides accurate costs information how to manage them and improve the profitability of economic entity and gain competitive advantage.

Literature review

Concept of TDABC: Due to the difficulties associated with the application of Activity Based Costing (ABC) which suffers from high cost of application as it requires detailed data in addition to the existence of the human element resistance problem to the change and lack of experience and training and fear of its application, all these difficulties and factors led to introduced a new technique by Kaplan and Anderson it's called time driven activity based costing, a new method of calculating and measuring costs to overcome (ABC) weaknesses and the convert from a complex and costly technique to a technique that provides useful and accurate information for management at the lowest cost, TDABC uses time equations to convert cost drivers to time drivers that reflect the time required to achieve activities that result from activity time consuming (Adkins, 2008). The main difference between TDABC and ABC is that the first is more recent than the second it uses time as a basic driver to allocating costs directly to cost objects for products.

(Kaplan and Anderson, 2007). TDABC technique has several definitions as follows: TDABC defined as: "a modern technique that helps managers to be easily updated in the event of changes in operating conditions such as increasing the number of activities and the ease of updating activity cost drivers" (Szychta, 2010). It also defined: "A method that simplifies cost estimation by eliminating the interviewing of employee's and officials of the economic entity to assign the activity cost and then allocating them of cost objects such as products, services and customers which assigns resource costs for direct cost purposes and identification of activities that non value added to the economic entity to achieve continuous improvement and cost reduction" (Hajiha and Alishah, 2011). While (Max) defined it as: "a simplified and powerful method that is mainly based on understanding the amount of effort to conduct a process and then calculate cost appropriately according to activities" (Max, 2007). Also, defined that: "a technique focused on operations rather than on activities which leads to control of the cost system to know the capacity of each department or process" (Kowsari, 2013). It was also defined as: "cost method to calculate profitability of the product, the service or the customer with a focus on the allocation of indirect costs to calculate the costs of final products and avoid inaccuracy when calculating costs under the ABC technique" (Lourenco, 2013). Also, defined that: "a more accurate technique from ABC technique by identifying the amount of idle capacity and avoid them when calculating the costs of economic entity products in order to reduce costs and optimal utilization of resources". From the above, the researcher notes the following: TDABC technique is a modern approach to cost management by using time drivers rather than cost drivers to calculate product costs. This technique addresses the shortcomings in the (ABC) technique including not to calculate the costs of idle capacity, its implementation costs are high and difficult to calculate. This technique is working to reduce the number of activities used which leads to their ease of application. The possibility of analyzing the profitability of products, services or customers is available because of the role of this technique in providing detailed information on costs and profits. This technique needs to create a database to provide detailed information, whether financial or non-financial to contribute to the success of the application of this technique.

The following definition of TDABC can be formulated: "Alternative and emerging technique that addresses the shortcomings of ABC technology by integrating the ideal time of activity with cost to overcome the flaws and criticisms of traditional ABC technique which is the most important not calculating unused capacity".

TDABC advantages: Kaplan and Anderson (2007) and Bruggeman *et al.* (2005):

- Easy to update and speed in development and at the lowest cost
- Reduce the number of activities used because time equations show the difference in orders and behavior of customers without any complexity in the time model
- Provide relevant information on costs and profitability rapidly, it is inexpensive and providing information on required resources and forecasting demand
- Rapid adjustment according to operational variables, type of resources and their costs
- Focus on the unused capacity and provide a clear vision about the efficiency of operations and reduce measurement errors by measuring time per minute or hour

The researcher adds: Eliminate of the difficulty associated with the implementation of traditional (ABC) technique especially in large economic entity. This technique can be used in the preparation of estimated budgets for costs and idle capacity.

TDABC disadvantages: Nascimento and Calil (2009), Gervais *et al.* (2010) and Blocher *et al.* (2010). The services activities are irregular, leading to problems in the time-based model and the defect of the cost calculation in the service organizations. The adoption of the technique on the accuracy of time estimates and that the attempt to determine these estimates takes time and expensive as there are a number of activities not time-driven and preferably not included in this technique such as chemical companies that depend on the cost of materials and not the cost of time in determining activities. The problem of idle capacity is not a new discovery. It has been discussed in previous literature. In order to comply with IFRS it has been excluded from production costs for financial reporting purposes. Requires a large amount of data to meet the requirements of time equations as most studies indicate that the collection of data on the (TDABC) technique is complex and needs to update data and cost driver continuously.

The researcher adds: There is no guarantee of accurate assessment of the time required for each activity as the

Table 1: Differences between (ABC) and (TDABC)

ABC	TDABC
Depends on the cost drivers such as the number of the machines set up times	Depends on time drivers such as the time required to machines set up
Expansion of cost rates	The lowest expansion in cost rates
Only one factor can be used for each activity	The use of an unlimited number from factors with relationships between these factors
The activity that affects the cost cannot be controlled	Control the activity that affects the cost
You need to apply a new activity and separate when the difference in the achieving of the activity	You need to apply time equations whenever activities vary
Does not have the ability to identify unused capacity	Have the ability to identify unused capacity
Its application requires high effort and cost	It is fast and easy to apply and at the lowest cost
The resources are assigned to the activities and then to the cost objects	The resources are assigned directly to the cost and then to the cost objects

Dejnega

measurement of time is subject to personal judgment. In order to avoid previous criticism of the TDABC technique, the researcher believes that need to create a comprehensive system to provide information to this technique and interaction with systems responsible for providing operational information such as enterprise resources planning, customer relationship management, six sigma, etc.

Comparison between ABC and TDABC techniques: There is a set of differences between (ABC) and (TDABC) which can be summarized as follows (Table 1).

TDABC implementation steps: Everaert and Bruggeman (2008) and Szychta (2010). Determine the resources group that achieve the activity by time which resources to perform the economic entity activities. Determine the cost of resources group that achieve the activity such as wages, deprecation, rent, ..., etc. Calculate the practical capacity of each resources group for the department and eliminate the time of the inevitable stops or faults. Determine unit cost of time for resources group which calculate the average unit cost of time per resource group by dividing resource group cost on practical capacity. Estimate the time required per event in the activity depended on the different time drivers by applying the time equations for each activity. Multiply the average unit cost of time from the resources group in time needed for each event in the activity and then calculate the total cost of the product or service. The implementation steps of (TDABC) are illustrated in the following (Fig. 1).

Role of TDABC in rationalizing and developing budgets: Many managers in the 1980's tried to implement activity based costing and customer profitability analysis as a new perspective because of the many criticism to it, TDABC was used to overcome these criticisms (Kaplan and Anderson, 2007). Due to the large number of criticisms presented to it (ABC), the Activity Based Budget (ABB) has been subject to these criticisms, including measurement errors, inaccuracy of product costing, difficulty in cost estimation, resistance to change by economic entity staff, lack of top management support, the need for experienced cost accountants and the inability to use modern electronic systems prevents the application of ABB (Moustafa, 2005). Which led to the thought of the use (TDABC) in the development and rationalization of budgets and has been called the Time Driven Activity Based Budgeting (TDABB) which is known as: "The process of estimating costs according to TDABC technique and vary the assumptions and tests to reach the target profits of the economic entity" (Gill, 2015). TDABB is a budgeting method used in the case of the application TDABC as for ABB, TDABB works from the expected sales volume to determine the resources needed to support the production and sales plans. Economic entity assessing the resource requirements in each process to help forecast future production and sales estimation and to obtain these estimates, time equations can be used for each major activity or process and all these details can be provided through the ERP system. TDABC to simply the (ABB) processes and reducing complexity. TDABB allows the planning to be more carefully by managers and contribute to the short and long term profit goal. Studies have shown that TDABC has contributed mainly to both operational and strategic dimentions and it has been possible to determine common goals by activating the participation of all staff in the TDABB implementation and enables the analysis of available capacity to remove unused capacity. The implementation and preparation of TDABB contributes greatly to accurate estimation put and contributes to the achievement of the economic entity goals in the short and long term (Ozyurek and Uluturk, 2016) The researcher finds that the advantages of preparing (TDABB) are:

- Encouraging the application of the TDABC technique to calculate the costs of products and idle capacity
- Contribute to calculate the profitability of products or customers according to (TDABC)
- Assist in product pricing decisions, product design and customer satisfaction. Forecast production and sales for future periods and assist managers in the planning process

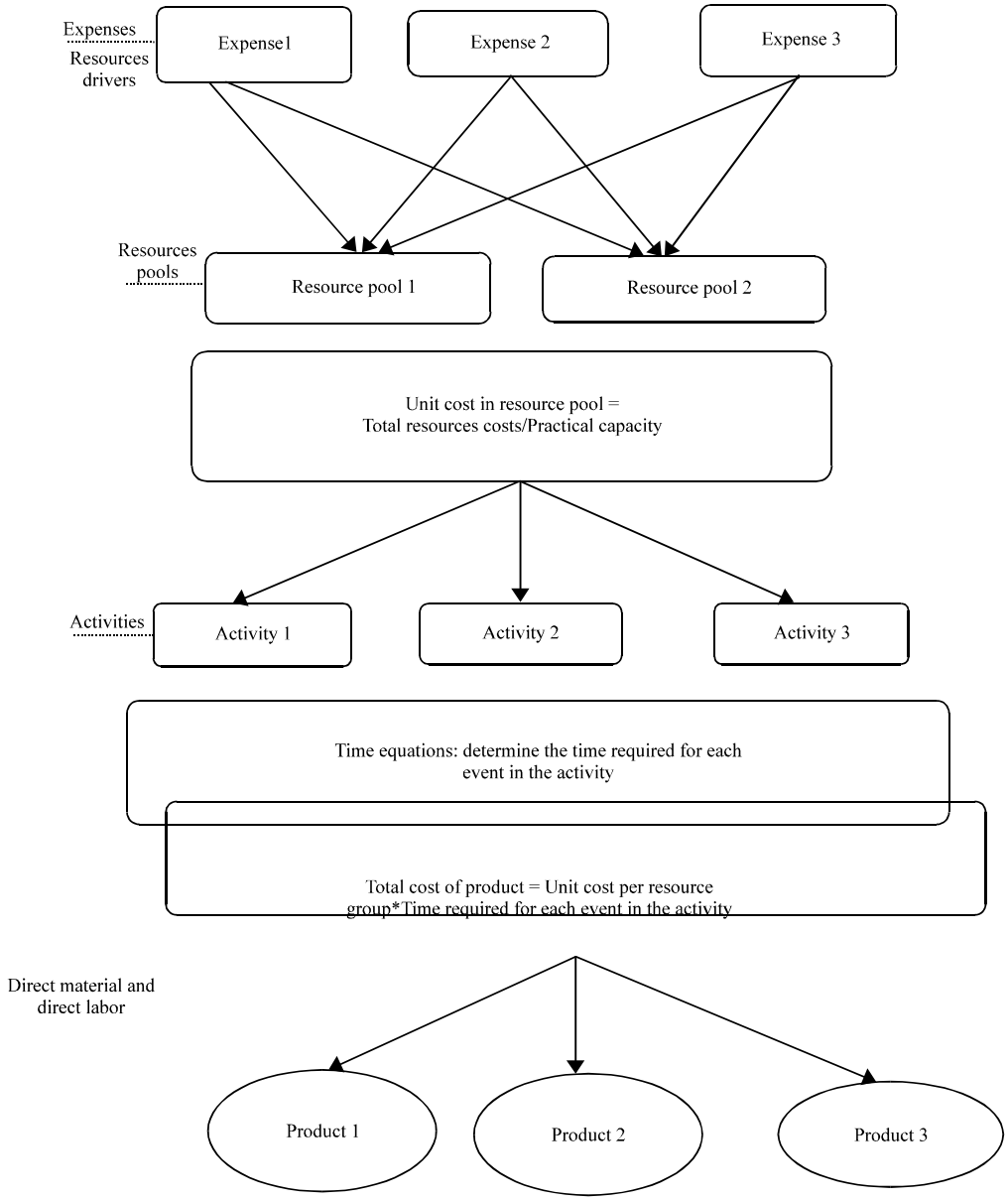

Fig. 1: TDABC implementation steps

- Increasing the level of the economic entity profits by meeting the needs of customers
- Activating the participation of staff in the budgets preparation
- Knowledge of the capacities and possibilities available in the economic entity
- Identify the strengths and weaknesses of the economic entity in a fast and flexible manner
- Provides more accurate information on the allocation of indirect costs
- Achieve competitive advantage by applying the least cost strategy or differentiation strategy or both

The components of the TDABB application are: Blocher *et al*. (2009) and Cardos (2014).

- The top management recognizes the importance of implementing TDABB and working to change its culture and ensure that top management adopts for activities and time based concepts

Table 2: The differences between ABB and TDABB

ABB	TDABB
Depends on the (ABC) technique in their application	Depends on the (TDABC) technique in its application
The cost object is assigned then the activities and then the resources	The cost object is assigned then the costs and then the resources
Do not predict unused capacity	Predict unused capacity
Difficult to prepare and need effort and time	Easy to set up, flexible and fast
Its application requires high cost	Its application requires a lower cost
Their quantitative information shall be measured in time by hour or minute minute and non-time such as meters or kilo grams	Their quantitative information shall be measured in time by hour or only

- Provide the appropriate organizational structure that determines the authorities and responsibilities. In addition, to contribute to make flexibly changes in the implementation of budgets and involve all various administrative levels in the budgets preparation
- Provide the automated accounting systems for the application of (TDABB) to obtain information to plan, control and determine the activities and times necessary to achieve and the amount of unused capacity
- Provide human resources qualified for change towards this new method of budgets and accept the continuous change by employee's
- Increasing the need for this type of budgets due to increased competition and diversification of products offered by economic entities

A number of differences between ABB and TDABB can be summarized in the following (Table 2). The steps required to prepare Time Driven Activity Based Budgeting (TDABB) are: Kaplan and Norton (2001) and Dejnega (2011).

Estimating the volume of production and sales for the future periods: Estimating the size and mix of the product sales, the target customer's variety and types and the information related to the total production achievement such as the time necessary for completing the purchase, transfer, receipt, ..., etc.

Estimating the demand for activities and measuring time: At this stage is to identify the necessary activities for the production and sale of products and work to measure the time drivers for each activity.

Determine the resources required to accomplish the activities: Identify the resources according to the drivers of the activities measured in time and work on estimating the quantity and types of resources required to meet the requirements of those activities.

Estimating the amount of resources required to meet the demand: Estimating the total resources to be provided for each type of resource used and according to the financial and technical possibilities available in the economic entity and its desire to achieve optimal exploitation and reach its to strategic goal.

Work on comparing actual resources with expected demand: When comparing actual resources with expected resources for future requests and if the estimated resources exceed the actual resources of current capacity in this case it should be allowed to increase spending when preparing the budget to obtain on additional resources while the estimated resources were less than the actual resources of the current capacity. Take the necessary actions to reduce the resources that were not required and to reduce the expenditure. Figure 2 illustrates the steps of preparation (TDABB) as follow:

The research problem: The problem of research is the lack of traditional cost systems in the process of budgeting and development. Under the strategic approach to management, these traditional systems have become less efficient and effective in providing appropriate information that contribute to the implementation of their strategies due to increased competition and diversity of customer's desires, (TDABB) as one of the tools that help management in the planning and control of costs and evaluate the performance efficiency of the economic entity and can raise the problem of research according to the following questions:

- Does the application of TDABC help in the preparation and development of budgets?
- Are the basic components of the time driven activity based budgeting in the economic entity is available?
- What extent of perception the economic to the importance and advantages of the TDABB application and its role in planning, control and evaluating performance

The importance of research: The importance of the research stems from the role of planning, control and evaluating performance in achieving the objectives of the economic entity. The budget is one of the important tools

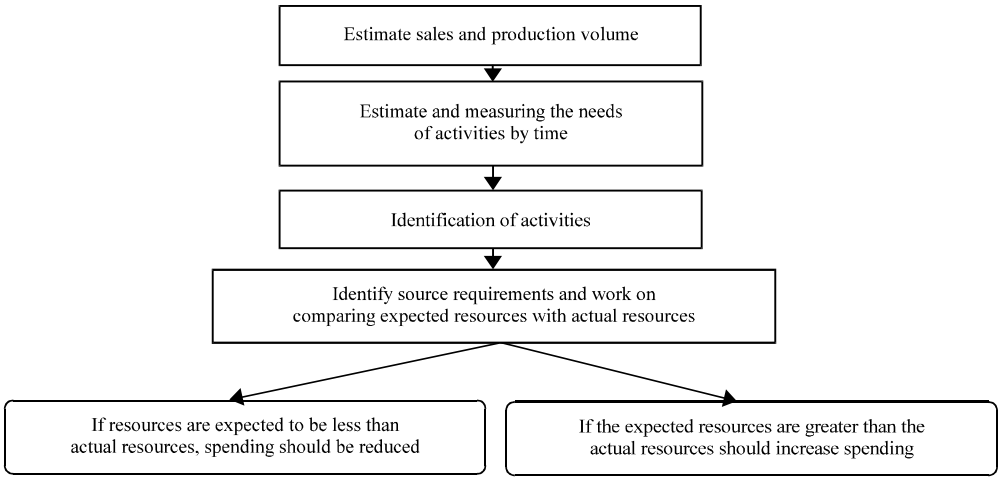

Fig. 2: Suggested steps for prepare TDABB

to implement the strategy of the economic entity in order to achieve its objectives and enhance its competitive position in addition to the importance of developing methods of budgets preparation using one of the strategic cost management techniques is the TDABC.

The research objectives: To recognize the role of TDABC in the process of budgeting and development in order to increase the effectiveness of planning, control and performance evaluation. Identify the most important elements that help the application (TDABB) in the economic entity. To raise awareness of the economic entity management for the importance of (TDABB). Studying the possibility of converting from the traditional budgets systems to the time driven activity based budgeting and thus, leading to the optimal utilization of resources.

The hypothesis of research: This research is based on a main hypothesis that: (The application of TDABC technique facilitates the process of budgeting and development which leads to more effective planning, control and evaluation of performance).

The research boundaries

Territorial boundaries: Represented by the garment factory in Najaf of the general company for textile industries in Hilla/Ministry of Industry and Minerals in Iraq.

Time boundaries: Duration of the questionnaire application from September to November 2018.

The research sample: The research sample consisted of (60) form questionnaire distributed among the accountants, administrators, technicians, designers, engineers and others in the garment factory in Najaf.

Practical aspect

Brief introduction to the garment factory in Najaf: The garment factory in Najaf belongs to the general company for textile industries in Hilla. These factory from the advanced and important factories in Iraq, generally and the Najaf especially. It is specialized in manufacturing and producing garments for men such as civil and military garments, students garments etc. The factory developed greatly because the efforts of the company's management, the support of the government and the Ministry of Industry and Minerals after, the modernization and development of the production lines of the factory and strengthened by advanced machines with high technology and the implementation of successful investment projects which contributed to increase production capacities and improve the quality of products in addition to expand and diversify production to meets the needs and requirements of the local market and suits the tastes of consumers, according to the latest designs and models, also, competing importer and rose to the level of export at reasonable prices. Field tour of the factory departments and its production locations and to speak to the officials in it we found it necessary to give sufficient attention to this important industrial building and highlight the manufacturing potential and high production capacity possessed by this factory and its importance in providing all state institutions with their needs of civil and military supplies, its main role in maximizing the resources

of the company, the operation of workforce and activating the industrial movement in Najaf Province as well as to identify the most important obstacles that hinder the continuation of the wheel of production and progress in it, work on the preparation of their budgets, according to the strategic cost management techniques such as (TDABC).

MATERIALS AND METHODS

The data presented by the questionnaire will be analyzed according to opinions and responses of the individuals in the study sample from the study community, including accountants, administrators, engineers, designers etc. In addition to describe and diagnosis the most important research questions of the hypothesis in order to identify the different opinions of the individuals for the research sample and test the validity of the hypothesis. The researcher used the Likert method to conduct statistical analysis for the responses of individuals and research hypothesis which states that: (The application of TDABC technique facilitates the process of budgeting and development which leads to more effective planning, control and evaluation of performance).

RESULTS AND DISCUSSION

The results of Table 3 which includes (12) questions, indicate that the general response rate of the sample was 77.877% with a weighted average of 3.894 and a standard deviation of 1.215 and a coefficient of variance of 32.071% The most prominent paragraphs that contributed to the enrichment of this variable are the first paragraph: (The preparation of TDABB depends on the time driven activity based costing outputs). The response intensity 91.667% was at a weighted mean of 4.583 and a standard deviation of 0.497 and a coefficient of variance of 10.847% and the following is the third paragraph: (TDABC contributes to the development of budgets preparation by increasing the effectiveness of planning, control and evaluating performance). The response intensity 88.214% was at a weighted mean of 4.411 and a standard deviation of 1.073 and a coefficient of variance of 24.336% while the lowest percentage in this variable is for paragraph (11): (The concepts of TDABC and TDABB are modern concepts not well known in economic entity). The response intensity was 64.286% with a weighted mean of 3.214 and a standard deviation of 1.326 versus coefficient of variance of 41.264%. It is noted that the percentages of most the paragraphs exceeded (70%) and that the mean of

Table 3: Statistical indicators and methods of individual responses for search sample about hypothesis variables N = 60

	Statistical indicators			
Paragraphs	Weighted arithmetic mean	SD	Coefficient of variance (%)	Weight (%)
The preparation of TDABB depends on the time driven activity based costing outputs	4.583	0.497	10.847	91.667
Under the TDABC technique, the time of implement activities within the economic entity is monitored and studied	4.268	1.235	28.929	85.357
TDABC contributes to the development of budgets preparation by increasing the effectiveness of planning, control and evaluating performance	4.411	1.073	24.336	88.214
The possibility of identifying wastes in resources and time under the (TDABB) technique	4.339	1.143	26.344	86.786
TDABB provides the ability to continuously monitor on employee's to see how well their assignments are completed within the specified time frame	3.357	1.348	40.153	67.143
The need for flexible accounting systems that contribute to the application of TDABB	3.804	1.353	35.576	76.071
The traditional budget system does not rely on accurate information to calculate the cost of the product compared to the time driven activity based budgeting	4.018	1.203	29.933	80.357
The availability of sound organizational structure helps in the preparation of time driven activity based budgeting	4.054	1.240	30.590	81.071
The diversity at the time of the activities completion to produce the economic entity products stimulates the application of TDABB	3.571	1.380	38.639	71.429
The top management believes is not possible to rely on the traditional budget for purposes of performance evaluation and the increased need for implementation of TDABB	3.589	1.395	38.875	71.786
The concepts of TDABC and TDABB are modern concepts not well known in economic entity	3.214	1.326	41.264	64.286
Provide TDABB components through the use of expert accountants and training of staff to implement it and not to exceed the implementing costs the TDABB benefits derived from it	3.518	1.385	39.367	70.357
General average of the hypothesis variables	3.894	1.215	32.071	77.877

Table 4: Results of (t) test for search hypothesis variables (degree of freedom 59 and significant level 5%)

Variables (t)	1	2	3	4	5	6	7	8	9	10	11	12	General average
Calculated	24.669	7.685	9.835	8.767	1.983	4.444	6.333	6.358	3.099	3.160	1.209	2.798	6.695
Tabled	1.671	1.671	1.671	1.671	1.671	1.671	1.671	1.671	1.671	1.671	1.671	1.671	1.671

the opinions for the sample exceeded the mean of the measurement performance of (3) and significant (5%). As shown in the following table, test (t) for one sample of the research hypothesis variables at a significant level (5%) and the degree of freedom (59) (Table 4).

It is clear from the Table 4 that the value of (t) calculated is greater than the value of (t) tabled for the degree of freedom (59) and the significant level (5%) for the most variables of this hypothesis as well as the general rate of these variables in which the value of (t) calculated (6.695) is greater than the value of (t) tabled (1.671) with a degree of freedom (59) and a significant level (5%). This leads to acceptance of the research hypothesis that: the application of TDABC technique facilitates the process of budgeting and development which leads to more effective planning, control and evaluation of performance.

CONCLUSION

The traditional budget system based on financial indicators in the modern business environment is not able to increase the effectiveness of planning, control and evaluation of performance. (TDABC) technique outputs are accurate cost information in allocating indirect costs that are inputs to the application of TDABB technique. The application of the (TDABB) technique needs a set of elements, including the support of top management and the create of training courses for the competent staff to promote the application of this technique and other components. The results of the statistical analysis of the research showed that the general average of the variables for the research hypothesis in which the value of (t) calculated (6.695) is greater than the value of (t) tabled (1.671) with freedom degree (59) and significant level (5%). This leads to acceptance of the research hypothesis that: the application of TDABC technique facilitates the process of budgeting and development which leads to more effective planning, control and evaluation of performance.

RECOMMENDATIONS

The need to benefit from (TDABC) technique outputs in the preparation and development of budgets to improve indicators of performance evaluation in the economic entity. Recommend the creation of a database that will provide all the information for the application of the TDABC and TDABB techniques. The cost of implementing the TDABB technique should not exceed the benefits resulting from the application of this technique. Study all obstacles and problems that prevent the application of this technique by providing support from the economic entity management and the establishment of training courses for staff to help them develop their skills and experience in the application of this technique.

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