

Implementing Time Driven Activity Based Budgeting (TDABB) In Educational Institutions: A Case Study

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Abstract: *This paper aims to encourage the educational sector to use modern budget entries as a budget approach on the basis of TDABB in order to provide more accurate information to budget users that it provides as well as tight control and increase the effectiveness of the planning process in the future. It also aims to motivate educational institutions, including the University of Babylon, to use contemporary cost management approaches such as the TDABB approach, which contributes to improving educational services and reducing their costs. The study adopts the case study method in one of the educational institutions in Iraq, which is the University of Babylon. The results show that the preparation of the operational budget in service institutions in general and educational institutions in particular differs from that in industrial institutions due to the difference in the characteristics of educational services and the nature of spending on them from the properties of products and elements of industrial costs. Educational services are produced and delivered at the same time. The goal of preparing the budget on the basis of TDABB is to prepare the resources that are required to produce and provide the educational service. Most universities have an inflexible organizational structure to the point where they cannot make the necessary adjustments when implementing the budget. The information provided by the cost approach can also be used on the basis of TDABB in preparing the operational budget in educational institutions.*

Keywords: *TDABB, Traditional Budgeting, Educational Institutions, Time Drivers, Activity.*

I. INTRODUCTION

Budgets are the backbone of the financial system in educational institutions and are one of the tools that contribute to shaping future policy if they are prepared objectively. The traditional cost entrance is no longer effective in directing and managing the activities and resources of educational institutions in a way that enables the preparation of operational budgets efficiently. Traditional budgets are prepared on the basis of estimates based on the results of past periods that do not keep pace with the rapid development movement in the contemporary environment. Which leads to misleading and subjective information. It has become imperative for educational institutions to adopt contemporary technologies that work to direct the optimal use of resources, which makes this budget more responsive and surround these changes, whether internal or external. The emergence of the use of the cost entrance has emerged on the basis of the time-driven activity that contributes to obtaining good data in measuring the cost of the educational service by providing verbal information related to the services and to assist the administration in performing its basic functions in planning and controlling and taking appropriate decisions for these institutions The emergence of the role of the budget on the basis of TDABB as one of the modern techniques in managerial accounting that are based on a set of principles and

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assumptions to delete activities that do not add value and enhance activities that add value, as the concept of this budget is related to the idea of reducing costs and achieving the optimal use of available resources and providing products of value to achieve More positive results during budget implementation. The budget approach based on TDABB's TDABB helped to give accurate information and provide management with the information and data it needs in preparing its plans in a more accurate, reliable and effective manner and carrying out its various functions. The main goal of this approach is to provide users with accurate, understandable, and vague data on how resources work. Educational services are one of the main pillars of social services that every country is keen to provide, finance, manage and supervise.

The research problem in educational institutions uses traditional approaches and methods to prepare operational budget estimates that give inaccurate data in measuring the budget. As a result, traditional approaches and management decision making are no longer meaningful and accurate to accommodate these challenges. In light of these developments and changes and given the qualitative leaps in the field of technological developments, they contributed to changing the methods of services provided by these institutions, which required them to search for administrative methods that enable them to cope with these changes. The emergence of this approach has helped service institutions prepare budgets efficiently and effectively because they depend on the wave of time to measure those activities through which weaknesses, defects, and deficiencies that may occur in budget allocations can be identified. Budgets have become the basis for financial planning that good management undertakes in order to preserve its resources from waste, loss, and control in a way that helps to carry out its functions on a systematic basis to achieve the goals accurately and to provide a control basis that can be compared with the actual performance of these institutions. Therefore, this paper seeks to explore the possibility of applying the budget on the basis of TDABB in one of the educational institutions, namely the University of Babylon.

II. LITERATURE REVIEW

The budget represents future plans that play an essential and important role in shaping the policy of economic unity through procedures and planning and organizational steps to allocate resources and then control them. Budget works in a country and at some point. Budgets may require change from one country to another and from time to time, each according to its circumstances and capabilities and its willingness to apply what suits it after providing the elements of the application and through which it is possible to determine the costs of the activities in which it operates and the method of linking these activities with each other and determining the expected direction of activity that is determined by time equations. These activities can direct the time that the budget works, which helps advance the process of preparing the time-based budget by providing more appropriate and accurate information (Kaplan & Anderson, 2003), (Union, Kadhim, & Ali, 2020). A budget based on time-driven activity can provide all of the data that it relies on to make future estimates well. It provides information on cost, profitability, resources and activities faster, taking into account the cost benefit standard (Azeez, Kadhim, & Kadhim, 2020), (Kbelah, Almusawi, & Almagtome, 2019), (Almusawi, Almagtome, & Shaker, 2019). In order to save time, focus on customers, achieve more profits, and not waste time, leading to maintaining budget allocations in all economic units (Kaplan & Norton, 2008). This kind of budgets increases the degree of accuracy of financial expectations, resources, activities and developments to clarify the relationship in an excellent way and reveal the time period related to each activity center to be performed in each process or sub-task to determine the amount of time directives for these activities and the presence of a number of participants for this type of Budgets (Becker, Bergener, & Räckers, 2009). It can be said that the budget approach based on time-driven activities is one of the modern methods that provides a deeper insight into the extent of capacity use and the use of available resources. These are continuous budget processes based on activities that operate on the basis of predefined time directions. It places responsibility on decision makers as responsible for monitoring, planning and assessing performance. It should be noted that budgeting on the basis of activities and depending on the time period reduces the

degree of complexity and focuses attention on cost management instead of focusing on the same costs that these institutions bear (Ozyurek & Uluturk, 2016).

It represents the administrative process based on the analysis of activities. The budget technique has been designed on the basis of time-driven activities and their relationship to operating levels by which the various activities are identified and work on continuous improvement of performance (Kadhim, Kadhim, & Azeez, 2020). As well as getting to know the cost management through time equations and setting performance goals in order to control the methods of control when preparing the operational budget in educational institutions. A set of questions related to TDABB was developed by (Coenen & Van, 2009). What are the reasons for the differences between the scheme and the actual? Can the TDABB approach be implemented according to the data that can be obtained successfully? And how does the TDABB approach affect profitability? What are the performance measures used? How can the TDABB approach provide information on the use of capacities and resources?

According to Ganorkar, Lakhe, and Agrawal (2018) the features of TDABB approach are:

- 1- It aims to evaluate activities as it begins to predict the needs of products or services provided to customers that are used in planning activities and those activities can be time-driven during the budget period and then determine the necessary resources for these activities.
- 2- It focuses on reducing the cost of production inputs in proportion to the cost accepted by competitors.
- 3- It is measured by a set of indicators that show the profitability that budgets add on the basis of time-driven activities to economic units as well as showing the impact on operational profitability and is measured by the statement of revenue minus cost.
- 4- The budget includes on the basis of time-driven activities a set of financial and non-financial indicators that together constitute the critical indicators of success that can be achieved by defining activities and directing them on a time basis.
- 5- The budget is presented on the basis of time-driven activities, analytical and detailed descriptions of future requirements for activities and the resources required for them.
- 6- This type of balance shows the untapped capacity in order to avoid wasting time because each activity has a specific time vector for it that can be controlled through time equations.

Kaplan and Anderson (2007) indicate the main steps of TDABB implementation as follow:

- 1- Determining the expectations of production and sales of the economic unit for the future period.
- 2- Determining the demand for capacity resources to meet the needs of the coming period.
- 3- Knowing the costs necessary to determine how to save capacity resources in the future.
- 4- Holding meetings with officials in order to explain this approach and obtain the support of the administration and then define the operations and activities in the economic unit.
- 5- Assigning activities to each sub-process, then knowing the amount of time orientation for these activities, with the involvement of the relevant parties in this identification of these activities.
- 6- Distributing the amount of time during which the drivers are determined according to the group that consumes these activities and for each of the sub-operations on the basis of time equations and then calculating the total time periods required for each activity by subtracting all stops and waste of time.
- 7- Calculating the practical capacity of the workers participating in these activities, after taking into account all the stops.
- 8- Knowing the amount of difference between the time required to carry out the activities and the time capacity of the workers associated with these activities.

9- Determine the average time cost of capacity by dividing the total costs spent by the total practical capacity of the two worlds.

The authors suggest the following steps to prepare TDABB in educational institutions: -

1. The budgeting process begins on the basis of time-driven activities by identifying cost targets for educational services.
2. Estimate the size of the educational service provided to customers.
3. Measuring the size of time drivers for activities required by a cost goal for each activity.
4. Aggregating time drivers for each activity that supports the service delivery process, where activity directives measure the consumption of activities by cost goals and thus calculate the average cost of the activity time wave and then calculate the final service cost.

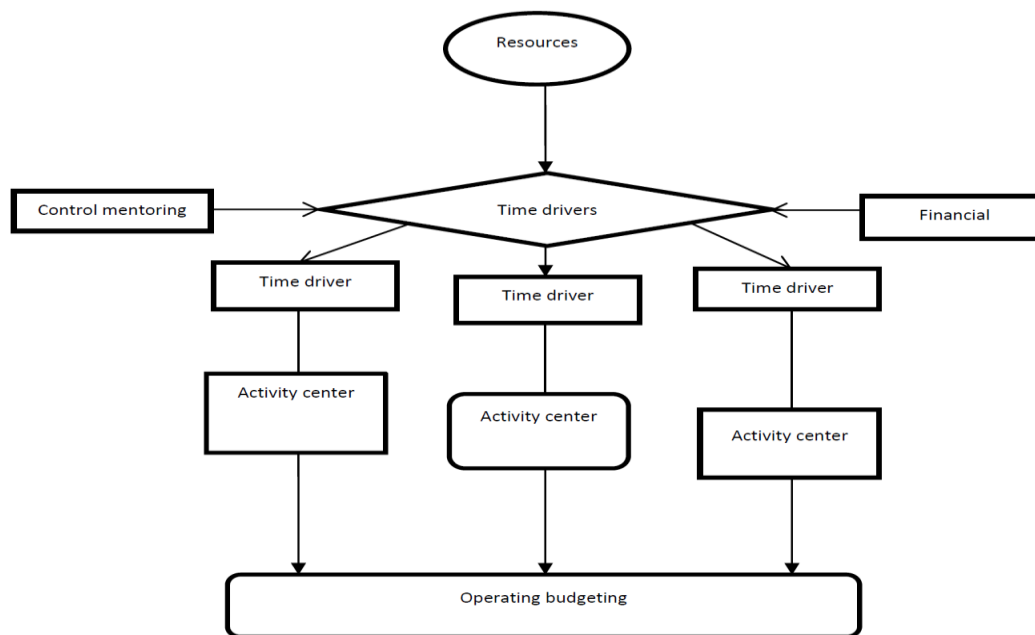


Figure 1. Steps of TDABB budgeting

When preparing the operational budget, we divide it into activity centers and each activity is concerned with its own time wave. The time drivers are calculated with time equations and all of these drivers are grouped into a complex called the cost pool that is subject to the regulatory guidance for the purpose of determining the amount of necessary resources as shown in Figure 2.

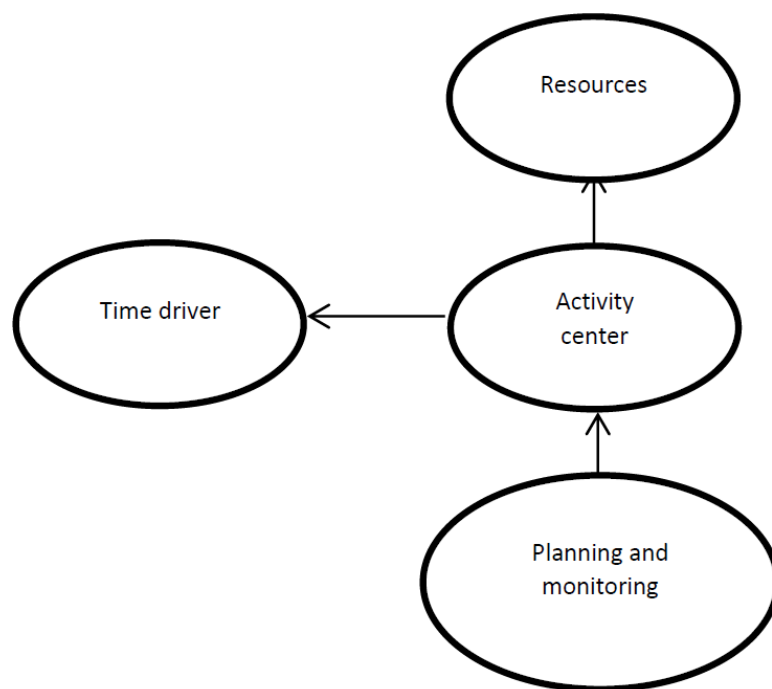


Figure 2. Components of TDABB budgeting

The components of the budget technique can be summarized on the basis of time-driven activities as follows:

1- Activity:

It is a unit for a specific objective and forms a group of operations or procedures that constitute the core of the work that is performed within the economic unit and includes activities at the unit level and activities at the batch level and activities at the product level and activities at the level of facilities for the economic unit as a whole (Atkinson, Kaplan, Matsumura, & Young, 2012).

2- Time driver:

Time driver the variables or characteristics that determine the time required to carry out an activity, and time drivers are characterized as one of the basic elements that include time-causing variables in the standardized form of time equations (Everaert, Bruggeman, Sarens, Anderson, & Levant, 2008).

3- Time Equations:

It is the use of time as a major cost orientation due to the capacities of most resources such as staff and equipment that can be measured by the estimated time required to carry out a particular activity. The required time can be measured by direct observation of time equations that are calculated during the implementation of the work, interviewing employees and managers, studying books and related research, and estimating time for similar economic units (Kaplan & Anderson, 2007).

4) Activity pools:

It is the group of resources that can be traced to activities and it is clear that they constitute a homogeneous specific activity and it is an aspect of the production process that the administration wants to prepare detailed reports on the cost of these activities (Cooper, 1990). It can be noted that the technique of budgeting on the basis of time-wave activities are techniques that determine the practical capacity based on the analysis of activities. Working with budget technology on the basis of time-driven activities in the service or industrial sectors and its relationship to operating levels provides these units with good planning and control and forecasting financial allocations in the future to adopt this type of budget on time directors and thus there is to avoid wasting time and measuring unused or idle capacity for these units This

technology has been applied in educational institutions, including the University of Babylon, in order to measure the cost based on time-driven activities, practical and theoretical capacity measurement, and untapped capacity extraction. With the aim of proving the research hypothesis which states: The cost technology on the basis of time-driven activities provides appropriate information about the cost of educational services and determining the relationship between cost elements and their directives, which facilitates the preparation of operational budgets on the basis of time-driven activities.

III. RESULTS

The current paper is a case study in one of the Iraqi government educational institutions. The University of Babylon was chosen as a sample for this study. Babylon University is one of the educational institutions and it is one of the Iraqi governmental universities. It is located in the governorate of Babel, located in central Iraq, on the banks of the Euphrates River. The university consists of 19 colleges distributed in three basic complexes, all of which are located in the city of Hila, the central campus is located west of the city of Hila on the road linking Babylon and Najaf.

After applying the steps of the TDABB entrance by defining the main activities of the University of Babylon and calculating the cost pools for these activities and knowing the practical capacity for each activity, the unit cost of capacity was calculated according to the following formula: -

$$\text{Unit cost of capacity} = \text{resource costs per activity} / \text{practical capacity} \quad (1)$$

After determining the time required for each event in the activity on the basis of the time equation, it is multiplied by the unit cost for each resource group at the time required for each event in the activity for the purpose of calculating the total cost of the educational service and the untapped capacity cost in the activities of the University of Babylon as follows:

Table 1. Unexploited capacity in the University of Babylon

Activity costs	Vice rector for scientific affairs	Rector office	University rector	Vice rector for administrative affairs	Total
Total costs of available capacity	2356296537	6052245650	1875758092	22394934710	32679234989
Costs of utilized capacity	(2147898720)	(5632454391)	(1840078290)	(21767485826)	(31387917227)
Costs of unutilized capacity	208397817	419791259	35679802	627448884	1291317762

For the purpose of preparing operational budget estimates based on time-driven activities at the University of Babylon, the Budget Committee at the University of Babylon met and estimated the increase in the number of auditors for 2019, an increase of 10% over the previous year. Therefore, the budget is prepared on the basis of time-driven activities on the activities of the University of Babylon in the event that the number of auditors increases 10% from last year and as shown in the tables below.

Table 2. Total costs of the studies and planning activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Studies and Planning Activity					
The first group	5940	95	564300	53.046	29933857
The second group	2750	24	66000	53.046	3501036
The third group	22000	70	1540000	53.046	81690840
Total costs of the studies and planning activity			2170300	53.046	115125733

Table 3. Total costs for a science affairs activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Science Affairs Activity					
The first group	60500	13.5	816750	254.678	208008256
The second group	28600	33	943800	254.678	240365096
The third group	38500	17.5	673750	254.678	171589302
Total costs for a science affairs activity			2434300	254.678	619962654

Table 4. Total costs for student affairs and registration activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Student Affairs and Registration Activity					
The first group	13200	63	831600	525.935	437367546
The second group	10450	49	512050	525.935	269305016
The third group	7150	68	486200	525.935	255709597
Total costs for student affairs and registration activity			1829850	525.935	962382159

Table 5. Total costs for continuing education activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Continuing Education Activity					
The first group	15730	65	1022450	249.639	255243395
The second group	17050	37	630850	249.639	157484763
The third group	19360	53	1026080	249.639	256149585
Total costs for continuing education activity			2679380	249.639	668877743

Table 6. Total costs for the activity of the electronic computer center

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
The Computer Center					
The first group	10450	100	1045000	666.792	696797640
The second group	13750	66	907500	666.792	605113740
The third group	6270	117	733590	666.792	489151943
Total costs for the activity of the computer center			2686090	666.792	1791063323

Table 7. Total costs of the university performance activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
The University Performance Activity					
The first group	17160	39	669240	671.287	449252111

The second group	7425	43	319275	671.287	214325156
The third group	9350	37	345950	671.287	232231737
Total costs of the university performance activity			1334465	671.287	895809004

Table 8. Total costs for media and public relations activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Media and Public Relations Activity					
The first group	7150	35	250250	706.753	176864938
The second group	6050	54	326700	706.753	230896205
The third group	15400	40	616000	706.753	435359848
Total costs for media and public relations activity			1192950	706.753	843120991

Table 9. Total costs of oversight and internal audit activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Oversight and Internal Audit Activity					
The first group	4950	60	297000	690.868	250187796
The second group	6050	37	223850	690.868	154650801
The third group	8250	63	519750	690.868	359078643
Total costs of oversight and internal audit activity			1040600	690.868	718917240

Table 10. Total costs of Central Library activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Central Library Activity					
The first group	18150	74	1343100	676.584	908719970
The second group	13200	46	607200	676.584	410821804
The third group	21560	43	927080	676.584	627247494
Total costs of Central Library activity			2877380	676.584	1946789268

Table 11. Total costs of DNA research activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
DNA Research Activity					
The first group	16720	34	568480	251.117	142754992

The second group	17600	16	281600	251.117	70714547
The third group	8250	22	181500	251.117	45577735
Total costs of DNA research activity			1031580	251.117	259047274

Table 12. Total costs of the environmental studies activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
The Environmental Studies Activity					
The first group	22000	62	1364000	330.546	450864744
The second group	19030	49	932470	330.546	308224228
The third group	12650	44	556600	330.546	183981903
Total costs of the environmental studies activity			2853070	330.546	943070875

Table 13. the activity of civilizational studies

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
The Activity of Civilizational Studies					
The first group	20570	50	1028500	360.604	370881214
The second group	17270	41	708070	360.604	255332874
The third group	11550	47	542850	360.604	195753881
Total costs of the activity of civilizational studies.			2279420	360.604	821967969

Table 14. Total costs of financial affairs activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Financial Affairs Activity					
The first group	28073	108	3031884	727.783	2206553633
The second group	31350	32	1003200	727.783	730111905
The third group	23731	61	1447591	727.783	1053532120
Total costs of financial affairs activity			5482675	727.783	3990197658

Table 15. Total costs of construction and project activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Construction and Project Activity					

The first group	27500	100	2750000	675.998	1858994500
The second group	21450	55	1179750	675.998	797508640
The third group	25300	126	3187800	675.998	2154946424
Total costs of construction and project activity			7117550	675.998	4811449564

Table 16. Total costs of student services activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Student Services Activity					
The first group	24200	52	1258400	964.701	1213979738
The second group	19250	39	750750	964.701	724249276
The third group	23100	29	669900	964.701	646253200
Total costs of student services activity			2679050	964.701	2584482214

Table 17. Total HR activity costs

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
HR Activity					
The first group	28930	60	1735800	698.613	1212652445
The second group	80850	23	1859550	698.613	1299105804
The third group	57200	39	2230800	698.613	1558465880
Total HR activity costs					5826150

Table 18. Total costs for the legal affairs activity

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
Legal Affairs Activity					
The first group	28600	50	1430000	906.331	1296053330
The second group	30250	37	1119250	906.331	1014410972
The third group	23100	44	1016400	906.331	921194828
Total costs for the legal affairs activity			3565650	906.331	3231659130

Table 19. the university secretariat affairs activities

Activity	Expected number of beneficiaries	Total time	Total estimated time	Cost per unit of time	Costs allocated to each activity
The University Secretariat Affairs Activities					

The first group	33000	106	3498000	720.930	2521813140
The second group	24695	39	963105	720.930	694331288
The third group	26950	105	2829750	720.930	2040051667
Total costs of the university secretariat affairs activities			7290855	720.930	5256196095

Table 20. Total budget costs of the University

#	Activity	Costs
1.	Studies and Planning Activity	115125733
2.	Science Affairs Activity	619962654
3.	Student Affairs and Registration Activity	962382159
4.	Continuing Education Activity	668877743
5.	The Computer Center	1791063323
6.	The University Performance Activity	895809004
7.	Media and Public Relations Activity	843120991
8.	Oversight and Internal Audit Activity	718917240
9.	Central Library Activity	1946789268
10.	DNA Research Activity	259047274
11.	The Environmental Studies Activity	943070875
12.	The Activity of Civilizational Studies	821967969
13.	Financial Affairs Activity	3990197658
14.	Construction and Project Activity	4811449564
15.	Student Services Activity	2584482214
16.	HR Activity	5826150000
17.	Legal Affairs Activity	3231659130
18.	The University Secretariat Affairs Activities	5256196095
Total university budget costs		<u>34530343023</u>

IV. CONCLUSIONS AND DISCUSSION

This study aims to encourage the educational sector to use modern budget entries as a budget approach on the basis of time-driven activities in order to provide more accurate information for budget users that it provides as well as tight control and increase the effectiveness of the planning process in the future. There is a strategic role for the TDABB approach in the planning and control process, as it relies on accurate and appropriate information to enable it to monitor implementation, identify deviations and address them. Most universities have an inflexible organizational structure to the point where they cannot make the necessary adjustments when implementing the budget. In addition to the lack of qualified human resources necessary to implement the budget technique on the basis of time-driven activities. The TDABB approach is an administrative accounting approach that is not widely known to the administrative levels at the university of the research sample. In spite of this, Babylon University possesses the basic ingredients needed to prepare and implement the budget approach based on time-driven activity. Through the field coexistence of the presidency of the University of Babylon, there is some lack of financial allocations due to the imbalance in the preparation of the traditional budget because it gives misleading results for its reliance on inaccurate data when preparing estimates and financial allocations for the coming period and this is what the University of Babylon suffers from a lack of financial

allocations for the lack of Effective planning or oversight in preparing budget estimates and allocations for the coming period. The TDABB approach is based on linking activities with time vectors that give accurate estimates, and the University of Babylon mainly depends on budget allocations for educational services that the university provides to auditors and determining the share of each of the university's activities independently. The model for preparing the proposed operational budget for the university shows, when the number of auditors increases by 10% compared to last year, the total cost of the university budget 34530343023)).

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