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Time-Driven Activity-Based Costing in service companies: a comparative case study: FRENCH, BELGIAN, TURKISH AND THAI

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Abstract: The costing of services is a complex task due to the intangible nature of many services and the difficulty in identifying the resources and activities that contribute to their production. This leads to challenges such as the allocation of indirect costs, the identification of cost drivers, and the measurement of productivity. In order to address these challenges, management control tools such as Time Driven ABC (TD_ABC) have been developed.

TD_ABC is an innovative cost management technique that allows cost models to be designed for complex operations. The model works by modeling the time spent for each activity as a function of one or more parameters called time indicators. This provides a more accurate and detailed representation of the resources consumed by a service, which in turn allows for more accurate cost allocation and identification of cost drivers.

This paper is the result of a comparative study of four case studies that aimed to evaluate the strengths and weaknesses of TD_ABC as a management control tool in the context of service companies. The research highlights the potential benefits of the method, such as improved productivity measurement, planning, profitability analysis, internal benchmarking, and decision support. However, the study also reveals some limitations of the method, such as measurement error, specification error, aggregation error, and error in the allocation of fixed costs.

Overall, the research provides valuable insights into the challenges of costing in service companies and the potential of TD_ABC as a management control tool. The findings suggest that further research is needed to address the limitations of the method and to explore its potential in different service contexts.

Keywords: TD_ABC; Service company; Management control; Time equation; Cost systems.

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1. Introduction

The subject of innovation and its dissemination has been widely examined in scholarly literature. There is no universally accepted definition of innovation among researchers. According to Alcouffe et al (2003), managerial innovation can be defined as a new program, product, or technique that is perceived as novel by individuals or groups of individuals, and has an impact on the availability, quality, quantity, location, or nature of information used for decision-making within the organization where it is introduced.

This paper aims to analyze the TD_ABC method as an innovation in management control, by exploring the complexities of cost calculation in the service context (1) and introducing the principles of the TD_ABC model (2) through a comparative analysis of four empirical studies (3). The main objective is to assess the advantages and limitations of this new innovation in the service context (4).

The complexity of cost calculation in the service industry is a challenge, as it involves heterogeneous and intangible products that require a different approach to cost allocation compared to traditional manufacturing companies. By utilizing time indicators, the TD_ABC model presents a viable solution for tackling this issue as it models the duration of various activities.

The principles of the TD_ABC model involve defining the unit of analysis, selecting the appropriate time indicators, and calculating the time equation for each subtask. The model captures the interdependencies between subtasks by including interaction terms in the time equation.

Four empirical studies have been conducted to assess the TD_ABC model's efficacy in the service context. These studies highlight the model's usefulness in providing detailed and accurate cost information for productivity measurement, planning, profitability analysis, internal benchmarking, and decision support tools.

However, there are some limitations to the model, such as measurement error, specification error, aggregation error, and error in the allocation of fixed costs resulting from under-utilization of productive capacities.

In general, the objective of this article is to provide insight into the function of TD_ABC as a creative method of management control within the service industry. This will be achieved by examining its fundamental concepts, advantages, and drawbacks.

2. Costing issues in service companies

Service activities are different from industrial activities in four essential ways: intangibility, low standardization, simultaneous production and consumption, and impossible storage. These characteristics create unique challenges for service firms, such as difficulties in measuring the value of the service and the perishable nature of the services.

The most prominent distinction between goods and services lies in their intangibility, which presents a considerable obstacle to accurately measuring the value of a service, as the customer's perception plays a critical role in this assessment.Ward (1993) highlights that the lack of tangible elements makes it difficult to establish a standard for measuring the quality of service.

Additionally, service firms face challenges due to the perishable nature of the services. Unlike goods that can be stored, services cannot be stored, and they have a limited lifespan. Drury (2012) highlights that this perishability makes it difficult for service firms to plan for the future, and they must constantly adapt to the changing demand for their services.

Heterogeneity is another characteristic that distinguishes service activities from industrial activities. The diversity of situations encountered by service firms creates a wide variety of service delivery processes, making it challenging to standardize service delivery. Meyssonnier (2012) points out that this heterogeneity can affect pricing strategies since prices based on costs are determined after the service is delivered.

Simultaneous production and consumption also make service activities unique. Unlike goods that can be produced and then sold, services are produced and consumed simultaneously. This characteristic has the potential to influence costs since service delivery can be redefined as a result of the interaction between the service provider and the consumer.

Given these differences, the question arises as to whether service firms require a separate costing system. A new time-driven costing method (TD-ABC) has been successfully implemented for service operation (Everaert et al., 2008; Kaplan and Anderson, 2007b). This method focuses on the time spent on delivering a service, and it is particularly useful for services that are highly heterogeneous and have high indirect costs.

In conclusion, service activities differ from industrial activities in several fundamental characteristics, which create unique challenges for service firms. Although these differences may not necessarily require a separate costing system, a new method of costing has been developed to address the challenges associated with service activities. The TD-ABC method focuses on time spent on delivering a service, and it has been successfully implemented for service operations.

The traditional approach to activity-based costing (ABC) has been widely used for many years to assign costs to various products or services based on the amount of resources used. However, this method has some limitations, including its complexity and the challenge of maintaining it over time. Consequently, a simplified alternative called Time-Driven ABC (TD_ABC) has emerged to address these concerns.

3. Time-driven abc method (td_abc)

TD_ABC operates by grouping resources rather than activities. The key driver used to allocate resources is the normal execution time of the tasks performed by the resource group. This method enables a more streamlined and simplified approach, eliminating the need for complex activity analysis and providing a more efficient cost allocation process.

According to Gervais (2010), TD_ABC can be broken down into four phases. The first phase involves identifying the resources that contribute to homogeneous resource groups. This is done to ensure that similar resources are grouped together, which simplifies the cost allocation process.

In the second stage, the aim is to establish the standard work hours for each resource group, which helps in computing their unit costs. This involves dividing the total cost of each group by the hours of work that correspond to their normal capacity. This step ensures that the unit cost of each resource group is accurately determined.

In the third phase, the time normally required (i.e., the standard time) for the various groups is determined based on "time equations" where time drivers and action characteristics determine the time consumed. This step involves analyzing the time drivers of each resource group and using them to calculate the standard time required for each group to perform its tasks.

The fourth stage involves multiplying the unit costs of the resource groups by the duration needed to complete the cost object. This results in an accurate cost allocation for each cost object, taking into account the time consumed by each resource group.

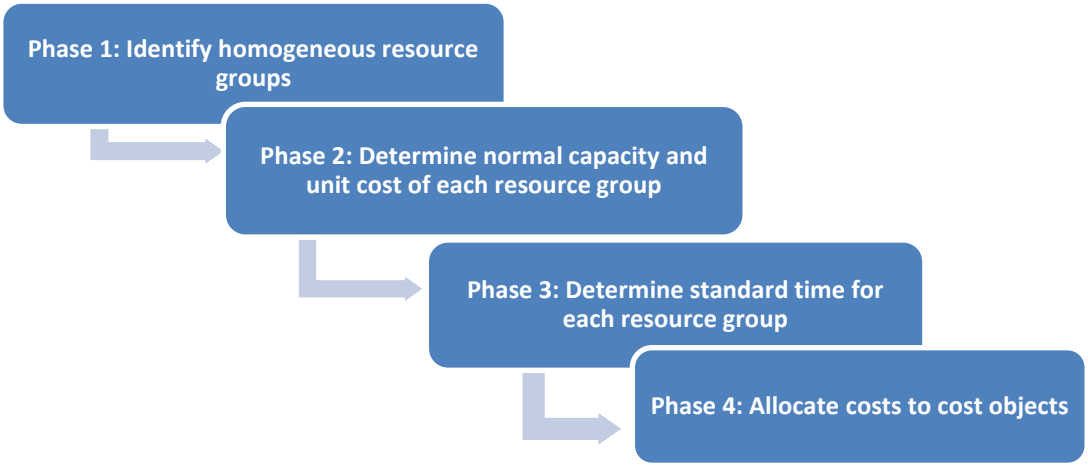

Figure 1: Steps to implement TD ABC, inspired by Gervais (2010)

In summary, TD_ABC is a simplified alternative to traditional activity-based costing that groups resources rather than activities. By using the normal execution time of tasks as a driver for resource allocation, TD_ABC provides a more efficient and streamlined cost allocation process. The four phases of TD_ABC involve identifying homogeneous resource groups, determining normal capacity, calculating the standard time required, and finally, multiplying unit costs by the time required to complete the cost object.

4. Presentation of the four case studies

4.1. The Belgian case: (Sanac Company: Belgian wholesaler), (Everaert et al., 2008)

The aim of this article is to offer a perspective on the usage of time-driven activity-based costing (TDABC) by a Belgian wholesaler, in order to gain a better understanding of their experiences. This study aimed to answer three research questions related to the modeling of complex logistics operations, the accuracy of TDABC compared to activity-based costing (ABC), and the practical uses of TDABC cost information. A case study research methodology was employed, which involved conducting interviews and analyzing the cost and activity database of the company. According to the study's results, TDABC proved effective in accounting for the various complexities of logistics operations, thanks to its implementation of time equations. Moreover, the analysis indicated that TDABC produced cost information that was more precise than that of ABC, which simplified 64 percent of activities and misallocated 55 percent of indirect costs. This study provides a real company example of the technique of TDABC and its potential usefulness for profitability reporting and profit management. This paper contributes to the current discussion on logistics costing and cost drivers, particularly for companies with complex operations such as the Belgian wholesaler of crop protection products that was the subject of this study.

4.2. The Turkish case: (Hotel), (Dalci et al., 2010)

The objective of this research paper is to demonstrate the utilization of time-driven activity-based costing (TDABC) for implementing customer profitability analysis (CPA) in a hotel situated in the Çukurova region of Turkey. The study was carried out in a four-star hotel with a 100-room capacity and data was collected through direct observations, interviews, and documentation. The study findings revealed that TDABC helped to identify some previously unprofitable customer segments that were actually profitable, and it shed light on the costs associated with idle resources utilized for various

activities such as front office, housekeeping, food preparation, and marketing. It is worth noting that further research is necessary to be conducted in other hotels both in Turkey and abroad to overcome research limitations. The outcomes of this investigation could aid hotel administrators in comprehending the profitability of diverse client groups and implementing suitable tactics while maximizing departmental capacities through TDABC. This study stands out in the scarce research on profitability analysis in the service sector, particularly in the hotel industry, as it examines the utilization of TDABC systems for CPA in an actual hotel scenario.

4.3. The Thai case: (RC Transport), (Somapa et al., 2012)

Somapa et al. (2012) examine the application of time-driven activity-based costing (TDABC) in small logistics firms. Despite its effectiveness, small logistics businesses often avoid using TDABC due to its complexity. The article proposes a simplified TDABC model that enables small logistics businesses to accurately measure activity costs without excessive complexity. The authors present a case study demonstrating the benefits of TDABC, including identifying cost-creating activities, reducing wait times, improving efficiency, and increasing profit margins. Overall, the article suggests that small logistics businesses can leverage TDABC to improve their understanding of cost structures and streamline operations.

4.4. The French case: (Call centers of an insurance company), (Allain, 2009)

The study was conducted in the call centers of an insurance company. The data came from self-observations in 7 call centers over a period of 2 days.

The goal of this study is to determine the influence of service characteristics (provider/client co-production and necessary adaptability to demand) on the variability of transaction durations, as well as on the time equations. These analyses will allow the detection of new sources of specification errors.

5. Summary report: analysis and discussion

5.1. Reasons for implementing the TD_ABC method

The authors of the TD_ABC method have put forward several reasons for choosing this approach over the classical ABC method. One primary reason is the method's ability to capture the complexity of service provision, specifically service heterogeneity. The authors believe that this method provides more accurate costs than traditional ABC methods. These same arguments were presented by the method's initiators, Kaplan and Anderson (2008), who claimed that TD_ABC is simpler, cheaper, and more powerful than classical ABC.

The TD_ABC method's strength lies in its simplicity. Unlike the traditional ABC method, which relies on complex activity analysis, TD_ABC focuses on grouping resources based on their normal execution time for tasks. By identifying homogeneous resource groups and determining their normal capacity, the unit cost of each group can be calculated accurately. This method simplifies the cost allocation process by eliminating the need for complex activity analysis and provides a more efficient and streamlined approach to cost allocation.

TD_ABC also has the advantage of capturing the complexity of service provision, which is a significant challenge in cost accounting. Service heterogeneity makes it difficult to allocate costs accurately, but TD_ABC's grouping of resources based on the time required to perform tasks makes it easier to account for the variability in service provision.

Kaplan and Anderson (2008) also argue that TD_ABC is cheaper than traditional ABC methods. This is because the TD_ABC method eliminates the need for costly activity analysis and simplifies the allocation process. The method is also more powerful than traditional ABC because it provides more accurate costs for cost objects.

In summary, the authors of the TD_ABC method have put forward several reasons for choosing this approach over traditional ABC methods. They believe that TD_ABC is a solution to the problems associated with classical ABC, specifically its ability to capture service heterogeneity and its accuracy in providing costs. The strength of the TD_ABC method lies in its simplicity, which makes it a cheaper and more powerful alternative to traditional ABC methods.

5.2. Exploitation of cost data from the TD_ABC method

Precisely determining expenses is of utmost importance for any entity for various reasons. To begin with, the final cost of a product or service is heavily reliant on its total expenses since the cost-based pricing approach is still the most commonly used pricing method (Mills, 1988; Ruhl and Hartman, 1998). Additionally, product expenses significantly impact the efficiency and profitability of each product (Brignall et al., 1991; Ruhl and Hartman, 1998). Thirdly, precise product expenses allow organizations to differentiate between profitable and unprofitable products (Drury and Tayles, 1994). Finally, accurate cost details are crucial for product introduction and allocation of capital (Worthy, 1987).

In his 1978 article, Dearden explained why traditional costing methods do not provide relevant information to managers of service organizations. He argued that cost information in service businesses is not necessary for inventory valuation or useful for cost control, and it is generally not needed in short-term decisions. This leaves only profitability analysis as a potential use for cost information in service organizations.

However, a comparative study has identified different uses of cost data with the new time-based costing system (as presented in Analysis Table 1). This new method, which is based on time-driven ABC, offers several advantages over traditional costing methods. By grouping resources based on their normal execution time for tasks, this method provides a more accurate allocation of costs, particularly for service organizations with heterogeneous service provision.

Moreover, the time-based costing system offers more than just profitability analysis. It provides valuable information for process improvement and decision-making related to product introduction and capital allocation. This information is crucial for organizations looking to optimize their operations and increase their profitability.

In conclusion, accurate cost information is essential for organizations to determine the price of products, evaluate their performance and profitability, and make informed decisions related to product introduction and capital allocation. While traditional costing methods may not be relevant for service organizations, the time-based costing system offers a more accurate and valuable alternative, with applications beyond profitability analysis.

Table -1: Use of Cost Data

	Belgian	Turkish	Thai
Use of cost data	- Provide **profitability** reports for each client. - measure the **productivity** of the resource centers. - measure **effectiveness**. **- internal benchmarking**	- Analyze **profitability** by hotel guest group. - Cost data is used for **planning** (labor, efficient use of human resources, and estimation of training needs). - measure the **productivity** of each department in the hotel **- decision support** tool.	- Understand the **profitability** and cost reduction opportunities of each route. - enable cost reduction and improved resource utilization. **- decision support** tool.

Analysis Table 1 shows five possible uses of cost data in service companies:

i. To measure the productivity of each resource group, such as department or service, the Belgian wholesaler used capacity utilization data which compares hours consumed versus hours required. This allowed them to measure the efficiency of their warehouse and logistics resource centers by analyzing the ratio of "hours consumed" to "hours required" per department.

ii. By analyzing capacity utilization reports, the Belgian wholesaler was able to identify areas for organizational improvement and achieve a better balance of supplied and requested capacity across their departments. For instance, they were able to allocate employees more effectively by reassigning them from underutilized to overloaded departments based on a better understanding of required versus available capacity in terms of full-time employees in the warehouses.

iii. The TD_ABC system was used to gain insights into the profitability of service strategies by providing profitability reports for each costing object, including customer, product, service, and route. For example, in the case of the Thai company, the system calculated the process cost per unit for each service route and destination, which was then analyzed to identify profitability and cost reduction opportunities for each route.

iv. Decision support tool: If one were to place the method, as advocated by Malmi and Brown (2008), between decision support tools and those that are more behavioral in nature, the TD_ABC method should be placed in the former category (decision support). Therefore, it is recommended that the managers of the Turkish hotel review their managerial strategies for these customers based on the profitability analysis results and adjust their strategies accordingly. Moreover, the hotel management will be able to identify the customer mix that will produce the highest returns in the future.

v. Internal benchmarking tool: the method presents opportunities for internal benchmarking. "TD_ABC has also facilitated the improvement of logistics processes by comparing time equations in different warehouses (Everaert et al., 2008).

5.3. Advantages and limitations of the TD_ABC method

5.3.1. The advantages of the method

The Time-Driven Activity-Based Costing (TD_ABC) model appears to be a promising solution for designing cost models in complex activity environments, particularly in service companies. The TD_ABC model allows for the inclusion of multiple subtasks within a single equation by incorporating different time indicators for each subtask. This feature enhances the accuracy and efficiency of the costing process by capturing the various interdependencies between subtasks.

In addition, the TD_ABC model allows for the inclusion of interaction terms in the time equation, enabling the capturing of interdependencies between subtasks. The inclusion of interaction terms in the equation of time provides more precise cost estimates by accounting for the interrelatedness of tasks and resources.

One of the key advantages of the TD_ABC model is its ability to capture the complexity of service provision by considering homogeneous resource groups rather than activities. By focusing on resource groups, the model provides a more accurate representation of the costs associated with service provision. This enhances the model's ability to distinguish profitable from unprofitable products or services.

Furthermore, the TD_ABC model simplifies the costing process, making it easier and more cost-effective to implement. Compared to traditional Activity-Based Costing methods, the TD_ABC model is simpler, cheaper, and more powerful. This makes it a practical and accessible option for organizations of all sizes.

Overall, the TD_ABC model presents a promising solution for designing cost models in complex activity environments. Its ability to capture the interdependencies between subtasks and resource groups makes it a powerful tool for accurately estimating costs in service companies. The simplicity and cost-effectiveness of the TD_ABC model also make it a practical and accessible option for organizations seeking to improve their costing process.

5.3.2. Limitations of the method

The TD_ABC method offers significant benefits for organizations, but its implementation and use can also present certain challenges. Datar and Gupta (1994) have identified three types of errors that may arise:

The first type of error is measurement error, which can result from mistakes in recording the units of resources consumed by cost objects. This may be due to inaccuracies in the accounts or errors in estimating the level of the driver.

The second type of error is specification error, which occurs when an input is omitted, an incorrect input is used, or a false relationship is assumed between the cost of the activity and its input. Gervais and Lesage (2006) explain that this may lead to incorrect cost allocations and inaccurate pricing decisions.

The third type of error is aggregation error, which arises when resources that are consumed by cost objects in different proportions are aggregated. De la Villarmois and Levant (2007) describe this as the cost homogeneity problem, where resources are grouped together that have different cost structures.

Another issue that may arise is an error in the allocation of fixed costs, which can result from under-utilization of productive capacities. This was demonstrated in the case of the Belgian wholesaler, where unit costs were calculated based on normal time for the actual level of activity, without accounting for under-activity. This can lead to inaccurate cost information and decision-making.

It is important to address these potential errors to ensure the accuracy and usefulness of TD_ABC cost information. Proper measurement and specification of resource consumption, appropriate grouping of resources, and careful allocation of fixed costs are all necessary to ensure the validity and reliability of cost data. By addressing these challenges, organizations can fully leverage the benefits of the TD_ABC method and make informed decisions based on accurate cost information.

6. Conclusion

The paper examines the use of the TD_ABC cost management technique to model services in a way that offers comprehensive and precise cost information. The authors highlight the advantages of utilizing TD_ABC in developing cost models for intricate service operations. By employing this approach, a cost designer can create a model that factors in the time taken for each activity based on one or multiple parameters, referred to as time indicators, thus effectively capturing the complexity of services by incorporating the relevant time indicators for each subtask. The study reveals that TD_ABC can be used for productivity measurement, planning, profitability analysis, internal benchmarking, and decision support tools in service companies.

However, the authors also acknowledge that the implementation of TD_ABC may encounter difficulties such as measurement error, specification error, aggregation error, and errors in the allocation of fixed costs. For instance, the allocation of fixed costs can result from under-utilization of productive capacities, as shown in the case of the Belgian wholesaler for the calculation of the unit

costs of the resource groups. In such cases, actual costs are related to the normal time for the actual level of activity, which does not allow the under-activity to be valued.

Despite these limitations, the study proposes ways to improve the TD_ABC method in the service context by incorporating the specificities of the sector into the time equations. This line of thought opens up the possibilities of further enhancing the method to provide more accurate and relevant cost information for service organizations.

In conclusion, the authors highlight the importance of accurate cost information for service organizations and emphasize the benefits of the TD_ABC cost management technique in providing such information. The study identifies multiple uses of the cost data derived from TD_ABC and raises potential avenues for improving the method to better capture the complexities of service operations.

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