

Identifying operational improvements during the design process of costing system based on time-driven ABC (TDABC)

(The role of staff public participation and leadership style)

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Abstract

Time driven activity-based costing is a new way to overcome the problems in the traditional ABC, where the first stage of the allocation of resources is removed and used resources are expressed by the time equations. The present research focuses on the behavioral aspects (staff public participation and leadership style) of system design and shows that how behavioral aspects can lead to operational improvements during the design process of time driven activity-based costing. In this study, two types of costing system are examined by reviewing and analyzing the case study used by Hozee and Bergman (2010) about setting up the costing system in various warehouses of a company in Belgium. In the first type, the participation of all members of the organization, especially at low levels, has led to discussions about the input parameters in the costing model and when this group discussions about costing data are driven by aware responsible (people-centered management style), operational improvement will be appeared. In the second type, the operational staff in the design process are not participated and are intimidated of the new costing system and have perforce implemented the system that finally no operational improvements have been reached. Hence, the findings of the research show that the staff public participation and appropriate management styles (Thoughtful leadership style - based on participation rather than absolute - authoritarian leadership style) are unavoidable to achieve operational improvement during the design process of Time Driven Activity-based costing system, increase the chances of system success and finally lead to operational improvements.

Keywords: Management Accounting, Time-Driven activity based on costing system, The staff participation, Leadership style.

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1. Introduction

The main subject of the study is the design and implementation of activity-based costing system (ABC). In studies related to ABC, on the one hand, the traditional mathematical models which are implied to on certain aspects of the implications of ABC, have been developed, and on the other hand, the application and implementation of ABC in case studies have been considered to determine the organizational and environmental factors that are effective on selecting choices and implementing ABC and success of implemented ABC. Although the ability of ABC has been argued in support of operational and strategic decisions, but there is little empirical evidence to show that the ABC has an impact on performance. In addition, many organizations that were implementing ABC systems, stopped its implementation and discarded it due to difficulties encountered during the implementation process of ABC.

To overcome the problems in the traditional ABC, Kaplan and Anderson [1 and 2] introduced a new technique named time-driven ABC (TDABC). In this technique, In the first phase the allocation of resources to activities are removed and used resources are presented by the time equations that show the time required to perform an activity as a function of some time driving. The time equations are used to determine the time required to implement any activity in any event. The multiplication of time in the price per time unit of resources provides the estimation of each activity cost. Event data can be obtained from computer information systems, so an estimation of the total time required to carry out all available activities and events will be possible during a specific period. The difference between the total time and the practical capacity is indicative of the period of overcapacity. Kaplan and Anderson [1 and 2] proposed the awareness of capacity as one of the most important benefits of the time-driven ABC and just counted a sample of operational improvements that can be obtained by implementation of time Driven Activity-based costing. Given that there is no deeper understanding of how, why and when designing time-driven ABC system can result in operational improvement so the aim of the study is to clarify these issues by examining a case study conducted by Hozee and Bergman in connection with the design and installation of costing system in various warehouses of a company in Belgium. The study is specifically focused on the fact that how operational improvements can be provided at low levels of organization by using the time - driven ABC system reports and this matter requires more information about using and usefulness of accounting information at operational levels. In addition, most studies of ABC systems have been focused on technical issues while behavioral aspects associated with the design has been more considered in the present research. Thus, the objectives of this research are: 1) analyzing the features of time-driven ABC system design process, 2) Operational improvements that can be determined through this process, and 3) determining factors that can help to operational improvement by the implementation of time - driven ABC costing system.

2. Literature

1-2 Activity times as a basis to improve operation : One of the made claims for the time-driven ABC in Lukka and Granlund 2002 research was that the time-driven ABC provides operational improvements, for example, Kaplan and Anderson [1 and 2] in Kampez Company LLC showed that the implementation of time-driven ABC system provides the discovery of process inefficiencies by

tracking the cost of rework in producing, packaging, transporting and products delivery so that many customers orders were delivered with delays and time-driven ABC system revealed the high cost of frequent transfers and lower demand of customers to make order. Therefore, using time-driven ABC system data provided the possibility of reforming practices to Kampez Company LLC and other companies described by Kaplan and Anderson [1 and 2]. However, based on their descriptions, the exact path to achieve these improvements is not clear properly. Taylor believed that managers can determine a good way to run a task that is coupled with maximum efficiency by separating working procedures into discrete steps and establishing the standard procedures for each step (Epstein and Epstein [6]). Specially the departure time studies can also be effective in this regard and industrial engineers also consider to determine the optimal method by using textbooks and the separation of a specific task into its components, they sum the time of these components (In addition, the margin of time for cases that are likely to occur, such as fatigue) to achieve the standard time that a person is running a task. Any deviation from the standard procedure will be considered (Friedman [7]).

Using time equations as Taylor controlling method [5] to perform tasks by staff could lead to the strengthening of the staff understanding of business processes, which will have operational improvement. To prove it, some of the traditional ABC used by companies, which have used time as the basis for ABC method will be implied. Kaplan [8] described a costing system about "American Bank" which the time was used to process financial outcomes through any of their activities. The ABC system contained a detailed analysis for costs related to manual process required for most savings accounts. In the second case, Halton [9] explained that how DHL reduces the customer costs by using ABC, and particularly for many activities in direct contact with the clients, considerable time differences were found depending on customer characteristics. To correct inefficiencies, for example the staff in direct contact with the customers were asked why the work of one customer takes longer than other customer (regardless of cargo volume). Analyzing these transactions revealed problems associated with some clients, due to that several re-engineering improvement process were founded. In the third case, Innes and Mitchell [10] paid attention to investigate the use of measurement studies and determine the time standards of working unit for doing product distribution activities in a retail company. In this regard, operational inefficiencies were determined in distribution activities and charges were reduced by connecting the standard cost to used resources. Although the design of time-driven ABC system may result in operational improvements, but there is no possibility to implement some benefits. So in the next section, two factors will be considered in the design of time-driven ABC system that can be useful to operational improvements.

2.2 The preliminary of operational improvements in the design of time-driven ABC system:

Since time equations are shaped based on an interview with operational staff, they must inform the management and accountants about sufficient detail of their work activities. Therefore, researchers in information systems believe that the staff participation and appropriate leadership style increase the chances of system success.

1-2-2- The staff participation: Accounting studies have been earlier focused on participation and users adoption and the use of collective wisdom in designing information systems can lead to

greater effectiveness of the systems. Putting one supervisor for every user will not result in enhancing the participation in decision-making and using collective wisdom (Erez and Arad [11]). The participation literature explains that the relationship between participation and the desired effect is influenced by a whole series of intermediate variables and these variables are classified in two groups of cognitive factors (Noetic) and stimulating factors (drivers) (Locke and Schweiger [12]). So these factors should be combined by each user to achieve the desired results (Hunton and Price [13]). Accordingly, Hunton and Jason [14] supported the benefits of users public participation in the design of accounting information system. The discussion between users strongly affects on satisfaction of results, organizational commitment, the quality of sales order input data and the input of billing customers. Although some benefits may be revealed in terms of hierarchy but this situation is not examined in the present study. Relying on the theoretical framework provided by Hunton and Jason [14] and the support of organizational behavior research and budgeting, more explanation of intermediate variables categories (Cognitive factors and stimulating factors) will be presented as follows:

1-1-2-2- Cognitive factors: It is clear that collaboration provides access to more informed decision making compared to when decision making is delegated to one person. In particular, when people have incomplete information, the discussion will lead to better results and better decision can be collectively achieved (Stasser and Titus [15]). Also, when people work collectively, can provide the access to more and better information by combining information in a trade memory system compared to those who recall information alone. (Moreland et.al [16]). The collective discussion despite having the potential of moderator often discusses or approves available or discussed patterns and leads to the consensus. Stasser and Titus pointed out the data transfer process as biased sample data and proposed that not- shared information or information that are inconsistent with the priorities of the group members will be removed and the information that exchanged are biased information that are established as primary priorities of members. Hunton and price [13] considered to the theory of procedural justice to reveal the relationship between participation and results more . The theory of procedural justice is referred to individuals' perceptions of the fairness and appropriateness of the decision-making process (Leventhal [18]). In particular, 6 rules of procedural justice were proposed by Leventhal [18], he claimed that a violation of one or more of these rules may lead to unfair evaluation of the process. One of these rules represents a special connection with the present study. According to this principle, the staff evaluate decision-making process fair and unbiased through collaboration and frequent consultations with management. Such liability can gradually induce a sense of control in staff during the system design process, especially when they are allowed to participate in this process by expressing their views to system designers.

2-1-2-2- Stimulating factors: The motivating factor that can play a key role in collective decision-making is self-esteem. Wood and Bandura [19] showed that the belief of usefulness and effectiveness by the individual which are the determining factor in the performance will be emerged through mechanisms such as effort, perseverance, enduring the hardship, internal goals of competition and effective educational strategy. In addition, collaboration enhances self- esteem of people in usefulness (Hunton and Jason [14]). Also, if the staff have work-related knowledge, are allowed to participate and its implementation, the adopted decision will have a definite and positive

effect on performance. In studies conducted by Bragg and Andrews [20] on the sub systems of a hospital, it was observed that collective decision-making to find ways to improve the work practices with laundry staff significantly increases efficiency. Finally Erez and Arad [11], Hunton and Price [13] and Latham and Winters [21] expressed the certain connection between perception and motivation and it seems that this solidarity in groups is stronger rather than individual participation conditions. Based on expressed motivational and cognitive mechanisms, it can be concluded that the operational staff involved in group discussions that often share their knowledge related to their works with managers have better and fair attitude to a costing system, because their role in the system design process gives them a sense of control. In addition, providing feedback to system designers as a group can boost the belief of effectiveness in staff and this issue could enhance the operational improvement.

Staff can be effective in system design through participation and obtain a better understanding of how to use the system (Barki and Hartwick [22]). Thus, operational improvements can come from the participation in the process of time-driven ABC system design. In addition, it is expected to implement some beneficial results as a group is more likely. Naturally, implementing operational improvements requires that staff play an active role in the process of time-driven ABC system design. However, it is expected that the staff participation is not enough alone. Following Bragg and Andrews [20], When discussions are taken place in groups that are directed by a proper leader, the possibility of operational improvements is increased during the design process. The theoretical framework provided by Gordon and Miller [23] and Macintosh [24] reveals the role of management style in the design process of accounting systems.

2.2.2 Leadership style: The management style plays a vital role in motivating individuals involved in the implementation of new information systems in an organization (Stone [25]). It can play an important role in combination with the effects of user participation in the success of information systems (Lu and Wang [26]). Many studies have been published about the participation in management accounting that have examined the staff participation in budgeting (Shields and Shields [27]). In particular, two aspects of leadership style are used in the budgeting, 1) Thoughtful style based on participation 2) Structured style based on task - absolute. In the first dimension, Brownell [28] explained that higher satisfaction among staff is associated with thoughtful leadership style. When he mentioned that budgetary participation affects on the relationship between leadership style and results, Kyj and Parker suggested that budgetary participation is a mediator (mediator). In addition, Shea [30] examined the effect of leadership style on improving the performance of staff in a factory during a period and found that leaders based on participation, strengthen the belief of the usefulness in staff by encouraging them that are capable of performing their duty, so result in performance improvements. In another dimension of leadership style, Otley and Pierce [31] found that absolute style leads to confusion and conflict in the minds of staff in audit when time budgets are limited and there are no the uncertainties in the complex operating environment. But some researchers have claimed that a high degree of both leadership styles may be indicative of effective leadership (Hopwood [32]). Others rejected the claim and found that severe management mainly disclaims the access to staff appropriate satisfaction and performance (Larson et al [33]). Hence, the overall result of studies on leadership styles indicate that thoughtful

manager tends to achieve desired results (Attlee and Pierce [31]) and the significant impact that thoughtful managers can impose is not limited only to the areas of individuals' participation. In group discussions literature, considering to the impact of the member participation, group leadership or democratic often has been considered more than leader-oriented style or authoritarian. For example, Larson and colleagues [34] found that leaders who partner employees at lower levels in decision making, acquire additional information relevant to the decision by hearing from these people. Therefore, leadership based on participation with a focus on peace and prosperity of own subordinates and honoring employee participation, creates an atmosphere that encouraged them to become involved. So, when employees are allowed to participate in the system design process and group discussions about the input parameters are directed by leaders with thoughtful management style, it is expected, achieving operational improvements will be increased.

3. The methods and research

In this study, the role of staff participation and leadership style in the process of time -driven ABC system design and understanding its effects on operational improvements have been discussed. In particular, the aim of the research is that how, why and when time - driven ABC system design results in operational improvements. Since the focus of the study is on the question of how, why and when, and considering to there is no deep understanding of how, why and when the process of time - driven ABC system design can result in operational improvement, and on the other hand there are some limitations in implementation of time - driven ABC costing system in Iran and the reluctance of companies to implement the system due to lack of sufficient knowledge of the system, so in this study, review and analysis of a case study conducted by Hozee and Bergman [3] in relation to the design and installation of costing systems in various warehouses in Belgium has been considered. In the conducted case study, specially participants reflection on their daily activities to the new costing system has been considered and the advantage of case study approach is direct, deep and wide contact with the participants. In addition, case studies often have other appealing aspects and such a conceptual consciousness is extremely valuable (Flyvbjerg [35]).

The case study in this research is related to the mentioned system design in four distribution warehouses of a company in Belgium during October 2005 to May 2006 and the reason for choosing this particular case was that products, processes, customers were comparable in the four sections (warehouses). The similarity between different sections is useful in searching intersectional patterns and specifically, provides the possibility of comparing the characteristics of the design process and also emerged operational improvement. In this case study, initially at least two visits were conducted from four distribution centers from October to December 2005 to have a better understanding of exactly what equations are convenient in implementation, the way of distributing the goods from the warehouses and staff daily activities have been considered during these initial visits. In this way, internal detailed documentation is provided from time equations and time - driven ABC model that finally these visits have led to the establishment of a close relationship with employees. In this case study, data were collected in three ways: direct observation, interviews and internal documents and also sale and preparation meetings were held in February 2006, some revised data was collected on time equations and some notes were written about observations during these meetings, some deep interviews with managers at different organizational levels were held in

each four distribution centers between February and April 2006, and in particular, interviews with project managers, operations managers, warehouse manager and foreman have been conducted and internal documentation including time equations and other detailed information on the different versions of time-driven ABC warehouse model, which is collected during October 2005 and May 2006 allowed to time estimations be analyzed fully. Then, three-column table is drawn for each meeting and each interview to gain a basic understanding of the data which is obtained based on the rewritten of interviews and the data recorded, the first column is a preliminary description of the characteristics of the design process, the second column and the third column are backup quotations and name and corporate responsibility of each member, respectively. A similar work has been conducted for notes that were taken during the observation. Then, the table has been combined and reorganized repeatedly as Data Matrix to review and find emerged patterns. These sections were compared two by two and the similarities and differences were listed when the basic and logical understanding of the design process for each section were obtained. Although staff have alike written commentaries about the accuracy of time estimations and the number of made revisions, finally, the relevant data revealed that operational improvement is a prominent factor. Finally based on results , it was decided to combine first and third sections together and the combination was compared to second and fourth sections to determine the emerged operational improvements records in the process of time - driven ABC system design. Conversely basic patterns have been examined by raising specific questions in the face to face, phone and e-mail interviews with people. Also the validity of observations is strengthened by multiple sources of data. In addition, data was separately analyzed by the first reviewer before combining at each stage of data analysis (1. Transferring raw data to tables, 2. Transferring from tables to data matrix for each individual section and 3. sectional and intersectional comparisons) . Since this method of research works in the dynamic and complex environment, releases a set of goals for management reporting system. In the beginning, useful ways are provided to participate with customers, then the necessary information can be achieved about the total cost of the company and the drivers of these costs and finally a multifunctional profit and loss account is determined so that allocates resources to different sections and provides a useful analysis in detail.

4. Describing the case study

1.4 The purpose of the redesign: The redesign was conducted by two managers who felt that the time estimations are incorrect figures. This attitude was created by extensive discussions with operational staff as well as the unrealistic levels of unused capacity that was calculated by the time-driven ABC system. In preparation of meetings, operations managers were convinced by management accountants and others to review time estimations of all sections. To highlight this commitment, calculations and tables were developed and all time estimations and related subtasks were listed. Since time equations had been standardized on all distribution warehouses, inserting time estimations for subtasks in different parts of columns was easily possible. Finally, an additional column was added to show the average time estimations in front of different parts. Deviation from the average time estimations can be occurred for a particular section of a company due to 1) incorrect time estimation 2) differences in the operating environment or (3) inefficiency in the implementation of activities. The purpose of the review was not only the improvement of

accuracy, but was to understand the reason of the deviation. Specifically, each section had to justify time estimations that had deviation more than 10% of the average deviation of other sections. Any deviation which was justified by differences in the characteristics of the operating environment, was approved by managers and operational staff and its time estimation was accepted. For example, since different sections have different areas, it seems reasonable that time estimation of moving trucks not to be suitably the same to storage for all distribution warehouses. When the logical justification of deviation was not possible (for example, despite a similar distance, the much time of transferring was needed), it was the starting point on operational improvement. So cross-section discussions were facilitated on time estimations by the standardized time equations. Although the primary purpose of the review was more accurate evaluation of time estimations accuracy, but the ultimate goal of debates was consensus on the inevitable and possible time standards. The possibility was investigated by using the reports of the use of capacity. For example, when the operational staff were proficient in their assigned tasks and reports indicated that 20% of unused capacity, time standards were analyzed carefully to reveal unrealistic time estimations. So the development of time equations turned into a cross process to the consensus to be achieved on possible time standards and their accuracy not to be verified. Although the real time of any activities is unclear, but on average, departments must follow possible time standards, because all activities should be done within the existing capacity.

2.4 Using time equations to determine the operational improvement: the time equations should be reviewed for several reasons during the redesign process. Some equations had to be modified to correct more than one issue. For example, some equations had improper structure and also incorrect time estimations. Apart from some incorrect estimations, there were two other reasons for the review. First, the procedure shifts required changes in the time equations, and second, the observation of some incorrect parameters in time equations structure required to be modified. For example, the time equation of activity "manual choice", an additional requirement was introduced for avocation "correct the mistakes". While facing with inefficiency, organization members were encouraged to find a better way to do "manual choice". Or for example, analyzing a condition into two separate conditions in one time equation created more special integration of additional conditions. The review not only improved the observed incorrect time equations but also provided more detailed understanding of the complexity of activity. When the causes of review were realized, it was determined that they were important and indeed had a significant effect on the final costing results. Time equations were structured to analyze activities in to minor subtasks. Large worksheet with various time estimations provides clearness and more understanding of the operation of warehouse processes. In the first and third sections, members of different organizational levels regularly gathered around a large print (size A3) of the worksheet to talk about their time estimations, in addition if any additional input time was needed, the staff were invited and temporarily abandoned their activities to participate in the discussions. In the meantime, the comparing all members activities of organization with others in other parts was facilitated by the worksheet. In particular, managers of the first and third sections were involved due to apparent differences between sections. One of them wrote: "When a reviewer should cover a greater distance, it is clear why more time is needed. But even most processes are exactly run the same way, their time estimations can be unusually different. This is what we think is good, all sections

must be responsible for diversion more than 10% of average diversion of company. "when different time estimations are considered for apparently similar activities, cross sectional discussions will be started. In some cases, as given above, there were logical explanations for the differences. However, wherever activities were according each other, the managers of inefficient section met the managers of efficient section to discuss about the ways of operational improvement with workers and foremen. For example, the debate about the activity "the order selection " revealed that workers in the tertiary section to act more efficiently. Because they arrange the items in layers. Subsequently, the first part reorganized the arranging activity by reducing the number of units that are stored manually and constantly increased the number of layers .in addition, as time equations provided the possibility of further separation of layering activities, cross sectional comparisons revealed the chance of further operational improvements for some existing minor subtasks in the activity. Probably the improvements will be remained hidden in the average time activities without any time equations. A similar improvements were determined for activities such as scanning, packing, loading and unloading. The possibility of reorganization of logistics activities was provided by these improvements which led to reduce fixed costs in the first and third sections. Although the traditional ABC system theoretically could also reveal some performance improvements by analyzing the activity and the use of time stimulants, but probably completing the time schedule was impractical for all possible combinations of different subtasks, especially when there are continuous time drivers (such as weight or distance) or discrete variables that can adopt many different values.

3.4 The role of staff participation and leadership style: The findings related to staff participation, leadership style and operational improvement are shown in table 1. The backup results associated with this table will be presented as follows. In fact, since operational improvements were taken place only in the first and third sections, the process of redesigning them will be simultaneously described in section 1-3-4. The process of redesigning will be discussed on the second and fourth sections. Finally, in section 3.3.4, cross sectional comparisons will result in an understanding of the difference between the two groups of sections.

Table 1: Intersectional Comparisons

	section 1	section 2	section 3	section 4
The staff participation				
Individual participation	Yes	Yes	Yes	No
Group participation	Yes	No	Yes	No
The leadership style				
Thoughtful- Based on participation	Yes	Yes	Yes	No
Absolute - Autocratic	No	No	No	Yes
Operational improvements	Yes	No	Yes	No

1-3-4- The features of the redesign process in the first and third sections: In the first and third sections, all workers, foremen, and managers at all levels of the organization were involved from the beginning of the time driven ABC project. As one of the operations managers states: " In this way I explained everything clearly and emphasized that time equations is not a tool to monitor (motivate) them, but also is a tool to allocate storage costs to our customers (sales departments). " More importantly, the staff knowledge of low levels is the main input of time equations, because it is believed that they are those who have the best knowledge of how to implement the activities and whether the various sub-activities have been mixed properly in time equations or not. In other words, they are everything. Tasks of managers were solely limited to deal with time estimations. As one of operations managers explained: "It is not right to allow managers to estimate the time. If a manager estimates the time, it is necessary to know everything about different things, and I really think this is not true. "

The operation managers took the worksheet to warehouse and explained about vital inputs related to them in making right management decisions to inform the operational staff of how their active roles are important in the design of time equations. One of the operations managers states: " Most people who work in the warehouse think that : I work 8 hours a day, work here and then can go home. To change the mood, you have to offer more things. You have to engage them and show them that time equations are used for management levels. If you can make it clear to them, you'll quickly see that they are eager to learn more. It is very important to them that you understand them." Another way to show the staff at the lowest levels that are important is not to implement new time estimations in the model quickly. For example, operational staff are encouraged when feel that views on the exact definition of the activities and subtasks to be heard through group discussions. The issue was taken place for the activity of "cutting plastics". First, the time required to throw plastic to container was not detected. Another issue was in a certain time equation related to the start time. After several rounds of discussions, finally the time estimation increased to from zero to 40 or 60 seconds (depending on whether the number of storage units is more than 20 or not). Hence, actions, motivations and time estimations were discussed before the deduction of possible time equations. In the meantime, users were allowed to increase accuracy by creating changes within the time estimations. When the general consensus was not obtained about the accuracy of time estimations on subtasks, staff were eager to pay special attention on time spent by doing these subtasks. For example, when employees were not convinced that a specific time estimation is correct, a stopwatch was used to calculate the time to modify their time equations. Therefore, the development of costing model and consensus on the accuracy of obtained estimations was a gradual process that achieved by trial and error. The another method used in this process was the review of the capacity that is explained by a operation manager as estimated duration activity "correct the mistakes" for any palette. We first started with the calculation of seconds per pallet, but the calculations showed that one or two people had to correct mistakes during the day that was impossible. Hence, we decided to obtain a real-time for each pallet by daily time estimation and dividing it into average pallets and errors per day. Similarly, we underestimated the longer activity of "load" that was associated with the deliveries of more than one client and more than given storage units .We found that this is

totally wrong and ultimately changed the time of loading to 30 - 45 minutes. In short, the design process of time equation in the first and third equations was gradual process which included exact review, discussion and learning and was largely obtained from staff knowledge who conducted activities.

2.3.4 Characteristics of redesign process in Sections 2 and 4: Even though the general belief was that there were significant spaces to improve the accuracy of time estimations in Sections 2 and 4, but none of these sections significantly revised their time equations. In the second section, only 22/15% of the terms were modified. This was due to the uncertainty in activity of the section. Especially, although inputs related to users was vital at the beginning of the costing project, managers did not tend to foster an active dialogue about the time equations to redesign. So, group discussions were halved by closure of the section. The fourth section refused any adjustment in the time equations. The lack of effort was not due to hesitation in the future, but the apparent lack of motivation to review the time equations totally was due to the management was reluctant to empower operational staff and their active participation in the process of designing. Unlike other sections, the operational staff of the fourth section were not involved in the time -driven ABC project even from the beginning. In addition, the executives of the fourth section believed that the concept of time equations is beyond the understanding of operational staff; "we tried to explain staff that what the time equations are, but when even management t does not understand his well, how do you expect the employees understand it? " Wherever managers were uncertain on time estimations, conducted detailed discussions with each other and without the presence of operational staff. When managers were not able to reach a consensus, measured the time that workers spend on their activities by the stopwatch. "I remember that we did not agree on the time required to transfer pallets from packing to loading zone area. Since the warehouses were observable from our offices, the hidden calculation was very easy by stopwatch. " In the final and classification or reclassification, managers asked the workers and foremen to estimate the time of the activity. Since the operational staff were not familiar with the time-driven ABC project, got anxious. Because they think they are in control. As a warehouse manager states: " "When I asked how long it takes to check out a shipment, often answered as follows: What do you mean? I'm not fast enough?"

3-3-4- Inter sectional comparisons : Since the time equations in the first and third sections were based on the knowledge of low levels staff that can change the range of time estimation, they were encouraged to learn to improve their works. Thus, engaging and encouraging staff not only improved the model, but also revealed inefficiencies and areas required to operational improvement and the search for the correct time was developed. In fact, it was proved that these improvements are the main advantages of the first and third sections. As the operation manager of the first section states : the operation manager of the fourth section believe that the improvement of the model is not possible. We spent several stages and we discovered something new at each stage especially when we compared our estimations to other sections, the possibility of the changing the time equation range is seeking some thing more than improving the accuracy of the model. I believe that the fourth section did not understand that all staff participation in the recovery process to what extent is important. " In contrast, operational staff in the second and fourth sections did not have any enthusiasm to change the time equations range, they were not similar to other operational staff who

stopped working and held group discussions to examine other means of doing specific activities or measured specific time estimations that were uncertain about them. As a result, these staff did not tend to offer new ideas or thoughts on opportunities to improve. In addition, in the fourth section, unlike another 3 sections, the time equations have not been founded based on the knowledge of operational staff. Also, the space available in the fourth section was widely different from other sections. Several interviews revealed a deep gap between manager and operation staff in the fourth section. As one of the operation managers states: "Definitely the mood of isolation is dominated there, I truly believe that the managers never have checked a shipment themselves. In my opinion, a warehouse manager does not know what is happening there." Numerous interviews attributed the difference in space to a lack of "acquaintance". Even in large sections, the administrator can create the acquaintance by daily walking in warehouse. Acquaintance is "Knowing what happened in the warehouse, speaking with individuals and understand them". Such a big gap between managers and staff in warehouse can stifle the development of new ideas and initiatives. As the operation manager in the first section points out: "we introduced a new scanner system several months ago. In the beginning, the time required to scan the product was very long, but after a while, our staff were able to do scanning much faster. During one of the daily views of the warehouse, one of my staff noted that the time equations must be adjusted due to a reduction in the time required to scan product. To be sure, if I ever sat in his sanctum, it was never clear to me." Director of operations in the fourth section claimed that he was unwilling to participate in the review, because he felt that his time equations did not need to any modifications. Other managers attributed the reason of differences with process redesign to their opposition by giving power to their staff. According to the director of operations in the first section, Time Driven ABC system can create a favorable trend in improvement if only "individuals at low levels have the ability to express their views such as managers." Not only operational staff in the fourth section did not play an active role in the design of time equations, but the time equations were used to force them to act. Representative sample is offered by warehouse manager in this regard as follows "At some point in time it occurred to me that forklift drivers waste a lot of time, I hidden started timing their activities. I also check their arrival and departure times in the morning and in the evening. Since I knew they were dealing with how many and what type of pallet and how much time would take to pick them, I could easily calculate the time that they are unproductive. Because they could not justify why they need more time to carry out their duties and they were not paid for the extra time. We simply deducted the time. As a result we did not have any extra time this year and did not do some extra work. This is something that I knew for long time, and finally we have the means to prove it." Hence, the design process of time equations in the fourth section was significantly different compared to the first and third sections after managers tendency to participate the operational staff. Managers in the second section claimed that have intimate relationship with employees and the workers as first and third sections but have abandoned the mutual and encouraging group discussions due to the section closure.

5. Discussion

The process of time-driven ABC system design is almost identical in sections 1 and 3 and they were allowed to fully benefit the information provided by time equations. The time-driven ABC system in

sections 1 and 3 was shaped by involvement of low levels staff and frequent group discussions with the management that encouraged users to share working information. Therefore, they were more eager to participate in the process of trial and error, the issue stimulated them to have better understanding of their processes and led to certain operational improvement. Apart from this, as was clear in the first and third sections, the managers' leadership style plays a central role in the process of redesigning the time-driven ABC system that resulted in operational improvements. Specifically, in the first and second sections, the gap between managers and operational staff was smaller than the second and fourth sections. Managers had a more intimate relationship with their workers and foremen, which has been done through daily visits from the warehouse. They also encouraged and appreciated their subordinates. Therefore, in accordance with our expectations, the leadership style based on participation and thoughtful leadership of managers were proved as the main element for the realization of operational improvement in the first and third sections. Even though the second section operational staff were involved in the costing project and the leadership style of managers was also based on participation, the group discussions were halved by the imminent closure of the section. Lack of job security in the future guided managers to stop counter-arguments on time equations. Hence, the operational staff had no desire to change the time equations range operational improvement was not emerged.

The design process in the fourth section was totally different. Low levels staff were not at all involved in the design process. Here, time equations were shaped by managers' knowledge and without the staff participation who actually conducted these activities. In addition, managers did not feel any needs to improve the time equations through continuous dialogue about the definition and accuracy of time estimations. The lack of staff and foremen participation led to they see a new costing system as a threat, not a tool to help them to learn. In addition, managers applied the time equations as a means of control, they secretly measured the time of their employees activities. Unlike other sections and as expected, managers in the fourth section were absolute (authoritarian) who prevented from the staff counter-arguments where they could share their knowledge associated with their works and because of that the operational improvements were not achieved in this section.

1.5 The role of time estimation accuracy : Previously it was emphasized that the ultimate goal of the design process of time equations was the consensus on the inevitable possible time standards. The case study also made clear: 1) The way that managers handle the process of costing system design to achieve consensus and 2) How the correct time equations and operational improvement are mixed together. The strategic committee applied three mechanisms to achieve consensus on possible time estimations. Costing data was created when the sufficient analysis of capacity suggested the possibility of them, suspected times were measured and when additional times were logically explained based on established operations in various warehouses. Specifically, the calculation of average company for each subtasks made the determination of suitable areas for improvement easy. Searching efficient and accurate times of activity was simultaneously done.

Therefore, when applying time -driven ABC for continuous improvement, it may be asked about the importance of correct measurement error. Basically, managers have no interest in knowing the exact and correct time, but they would like to reach a consensus on the possible time standards because

the operational staff may control the activities. In fact, the discussion about the importance of accuracy towards time estimations in the time equations is much like the discussion of the differences between the accuracy of demand forecasting and the goal of sales budget. It is assumed there is the random process of demand that could be difficultly controlled in the forecasting, while in budgeting, managers put themselves to the goals and believe that can affect sales by more efforts and reach the deviation from the target to zero (Anthony and Govindarajan [36]). In general, bargaining on possible time standards, in fact is the aim not time estimation, the management of the possibility of time estimations consisted of the requirement to time estimations simultaneously that is possible only if operational staff actively encouraged to debate on their working information in group meetings, because this issue simulates them that time estimations are equal to actual time of activity and the situation enhances operational improvements. Finally, since the time equations designed are considered as a process of field - goal, it is reasonably expected that the participation and leadership style, play an important role in the recovery process (Brownell [28], DeCoster and Fertakis [37] and Hopwood [32]).

2.5 The similarities with the traditional ABC studies : Notably, the findings of this research are linked the traditional ABC studies in several ways. First, the results of the second section are similar to the traditional ABC studies in the staff suspicions to the ABC for fear of reducing the costs and losing their jobs. Secondly, using ABC data, as a basis for comparing costs between sections in the production process have been earlier reported in in the study electronics by Iness and Michael [10]. Third, and probably the most important one is the operational improvements that were used as the basis for allocation the costs in the traditional ABC studies. If someone asked you this is a method based on activity rather than time equation, it would reflect the real attention. However, in this study, time equations have the separation of activities into different subtasks with detailed levels of these activities which proves that, group discussions on operational improvement opportunities is quite insightful way. Time - driven ABC system easily creates the cost information at the level of transaction for every possible combination of subtasks instead of working with average costs and a time for every single cost driver. In addition, capacity can be calculated and the capacity reports are applied to examine the feasibility of time standards. The timeline must be completed for any possible combination of different subtasks to provide information on levels of transactions by the traditional ABC system. In addition, standard and actual volumes all cost drivers must be compared to examine the feasibility of the time standards. Thus, the results of the present study confirms that the time equations have certain features that provide a fuller understanding of the business activities and the use of tanks capacity, the information is not easily obtained from traditional ABC system, especially when the environment is logistics and complicated. Future studies may investigate this issue in more detail that what new type of ABC can achieve operational improvements compared to the more traditional ABC method.

6. Conclusions, limitations and suggestions to future research

This study shows that how the staff participation and leadership style determine whether the designing a time-driven ABC system results in the operational improvements. Specifically, to implement the operational improvements, it is important the group discussions to be guided by leaders with appropriate management styles. In particular, participation-oriented leadership -

thoughtful style is required to achieve optimal results. When the group discussions are handled by absolute leadership, the operational improvements may be delayed and TDABC system is simply turned into another kind of Taylorism. This is the first study on time-driven ABC system design process which include the identification of the operational improvements. As this study provided the reviewing the records of operational improvements, also offered opportunities to help ABC literature and literature operating systems. In relation to the literature ABC, this study is different from previous studies in three ways. First, in the case study (a company), TDABC design process which is a new kind of introduced ABC was analyzed and the results showed that time equations have specific characteristics that provide a fuller understanding of business activities and the use of tanks capacity which are very useful and clear in in identifying operational developments. The second, the case study presents better insight of how the consensus on the time estimations and operational improvement should be provided. The research completed the study which proposed costing system has high accuracy but may not always required or desirable. This article claims that the negative process of negotiations in possible time standards could be seen as a field - goal process not as a time estimation process. Third, whereas most previous studies have focused on the design of ABC systems, the findings are related to behavioral aspects of design which has been called the staff participation and leadership style. In addition, it is hoped, the study will be a guide for the actors and management accountants involved in the recovery process of time-driven ABC system design and be applicable such as the possibility of low levels staff involvement in groups guided by appropriate observers. Regarding to literature on information systems, unlike previous studies that primarily examined the role of leadership in small group discussions and applied the experimental change of the behavior of elected leaders in in non-generalized experimental groups, the validity of the study is approved and the findings have been occurred naturally in groups. Although the importance of the participation had been pointed out by Hunton and Jason [14], their vision was expanded in several ways in the present study. In this study, the leadership style was added as an additional factor in the design of information systems. In addition, an ABC costing system and more specifically a time-driven ABC system that is a specific example of accounting information systems was investigated. More importantly, unlike the Hunton and Jason [14], the possibility of hierarchical groups as paired groups was provided by a company under study.

The main limitation of the study is the disability to obtain certain quantitative information about fixed operating costs in the first and third sections that could be reduced through operational improvements. Although the performance of total cost in the fourth section was not favorably compared with the first and third sections, it is believed that although the performance of data is quantitative and leads to the results strengthening but for was not important to this article. The second limitation of this study, like most of the case studies is related to collect data, the review and interpretations and definitions could be done by more information. However, it is felt that the case study method was appropriate because made the understanding of TDABC system design process possible. In addition, because few companies have used this version of ABC at the beginning, Specific considered methodologies were not possible in practice.

Finally, four potential areas are recommended for further investigation. First, the study of design characteristics and the design process of time-driven ABC system will be invaluable in other

companies. Second, a general review of whether the designing a new time-driven ABC system results in the operational improvements compared to traditional ABC. Third, since the consensus about time-driven ABC was emerged in the company under study, the wide study of TDABC system can be attractive. Fourth, it can be considered in other studies that leadership style is prior to the staff participation and if so, how the relationship between staff participation and operational improvements are affected.

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