

PROJECT MANAGEMENT AND COSTING SYSTEMS: ABC SCRUM

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ABSTRACT

In this article we advocate the use of project management principles and agile methodologies used mainly in software design to support the development of more effective costing systems. In this context, it is important to highlight two elements: the project with its phases, initiation, planning, execution, monitoring and control and closure, and the product, which would be within the execution phase of the project, design and implementation. The proposed scrum methodology for the design of activity-based costing (ABC) models is presented and discussed. Its advantages but also some use difficulties are presented. Namely, it facilitates the active participation of stakeholders, which increases the degree of acceptance of the costing system. On the other hand, among the problems encountered in applying the proposed ABC Scrum we highlight the need of regular meetings to give and receive feedback.

INTRODUCTION

A measure of success in a costing system was detailed by Anderson and Young (1999), where they propose three measures of evaluation which are accuracy, use and an overall dimension. The accuracy is related to the improved accuracy of product cost information relative to the traditional or previous cost system (which in some cases may be non-existent). The use is related to the fact that the costing system is used for cost reduction and used to produce costing data for process improvements. The overall dimension is related to the general perception of stakeholders about the costing system and its degree of acceptance, this perception can be in favor or can recognize the advantages of the costing system.

Gosselin (1997, 2006) identified at least four phases in the design and implementation of a costing system which are: the adoption (i.e. the decision to adopt), the design of the system, the implementation and the routinization. In the adoption phase, the organization recognizes the need for a costing system and decides to adopt a particular one, this phase is characterized by high levels

of uncertainty about the utility of the costing system, and several factors can lead to take a decision in favor of a new implementation namely, pressures from several stakeholders and institutions, the need to improve the management of resources or even aspects related to the market where the organization is inserted.

In the design phase, the organization works to develop the necessary infrastructure for the project to begin and to be executed. In the implementation phase, the organization introduces the innovation and evaluates its impact and during the last phase, the routinization, the costing system is part of the day-to-day use of the organization.

In terms of design and implementation Shields (1995) highlights that it is important to create an organizational culture that guarantees that once the costing system is implemented it will be effectively a decision making tool. For this to happen it is essential to have the support of the organization, particularly from the top management. It is important that the cost system and the information that is generated are aligned with the organization's strategy and that there is an appropriation and assimilation of the system by the personnel of the organization. The costing system is a strategic tool for good internal management. However, to meet their objective, administrative, operative, and support staff must be involved in its design and implementation.

Taking into account these issues in the implementation of costing systems and considering that the function of project management can be defined as the process of monitoring and controlling the achievement of a project's objectives, it can be viewed as useful for the improvement of costing systems design and implementation. The use of project management concepts, approaches and tools and techniques can increase the probability of success in designing and implementing a costing system (Munns & Bjeirmi, 1996; Rose, 2013; Too & Weaver, 2014). Furthermore, in addition to the technical aspects of the costing system implementation, it is important to carry out an adequate management of the resources and also of the stakeholders' expectations, for which project management contributes greatly (Atkinson, 1999; Eskerod, Huemann, & Ringhofer, 2015).

Thus, this paper presents and propose the use of an agile project management methodology for the design and

implementation of a costing system with the objective of increasing the probability of success of this type of projects.

For the development of this study the process of investigation of the Design Science Research is used, where an important unsolved problem is addressed through an innovative way. The Design Science Research process involves six steps: problem identification and motivation; objectives of the solution; design and development, demonstration; evaluation; and communication (Peppers, Tuunanen, Rothenberger, & Chatterjee, 2007). The problem identified is related to the low success rate in the design and implementation of costing systems; here it is proposed to use the Scrum methodology to improve the rate of success of this type of projects; i.e. the ABC Scrum methodology.

LITERATURE REVIEW

The role of project management is to achieve well-defined goals through the development of activities supported by tried and tested tools and techniques for planning, organizing, control and evaluation of work (Kolltveit, Karlsen, & Grønhaug, 2007; Munns & Bjeirmi, 1996). These activities are carried out in order to meet project constraints; such restrictions are usually related to: scope, time, cost, quality, risk, and benefits (Cooke-Davies, 2002; Rose, 2013). Project management is a productive ground for creative, spontaneous and intuitive applications of particular models, theories, or methodologies to meet the stated goals in a continually changing environment (Klein, Biesenthal, & Dehlin, 2015).

For project management there are several tools that have been developed over the decades, these tools are not only focused on technical aspects, but also on behavioral ones. For example, the Project Management Body of Knowledge (PMBok) standard from Project Management Institute (PMI) provides information on the processes that can be carried out for effective management, and different useful techniques and tools, but the exposed contents must be adapted to the peculiarities of each project. According to PMBoK, all projects are composed of processes, which must be previously selected and which need a range of knowledge areas to be applied. Whoever manages a project must be able to manage the scope, time, cost, quality, human resources, communications, risk, procurement and the relationship with the stakeholders in an integrated way (Rose, 2013).

Another project management standard is the IPMA Competence Baseline (ICB) developed for the International Project Management Association (IPMA). ICB identifies the competences of those who lead and manage a project, these competencies are grouped in: contextual, behavioral and technical competences (Gaupin et al., 2006).

Among project management methodologies, an agile-iterative methodology could contribute to a good

management of the design and implementation of costing system projects. Particularly, in complex organizations, with a high degree of uncertainty and different professional backgrounds, with a great complexity and diversity in their information systems that in many cases are not interconnected with each other.

A frequently used agile methodology is the Scrum (Cervone, 2011). The Scrum methodology was initially identified and defined by (Takeuchi & Nonaka, 1986) who analyzed how new products were developed in companies such as Canon, Honda, Epson among others. Although Takeuchi and Nonaka (1986) introduced the idea of scrum this was used as a structured methodology and presented only later by Ken Schwabe (1997).

Among the advantages of the Scrum methodology we may highlight: generates anticipated results, allows a regular management of customer expectations, high flexibility and adaptation, risk mitigation, productivity and quality, alignment between customer and project team and a motivated team.

With respect to the factors that affect the success in the design and implementation of a costing system, Fei and Isa (2010), Gosselin (2006) and Liu and Pan (2007) identified four groups of factors, described in the following paragraphs.

One of the groups is related to, technical factors related to the practical knowledge of the operation of an ABC system in an organization which includes the identification of cost objects, activity identification, resources, and cost drivers, which allows to calculate the cost of the products. on the other hand in another group they are, the existing information and communication systems to support ABC systems. in Another category they are, organizational factors namely, support from top management, organizational structure, training resources for implementation, organizational culture and competitive strategies. And finally, behavioral factors, namely the participation of users in the process of design and implementation of costing systems and the behavior of each of the users namely, resistance to change. Finally, other factors such as: competence, quality and relevance of cost information for management decision making, size of the organization, and incentives for the use of the costing system. Although, these factors are focused on the ABC system, which has been one of the most discussed costing methodology in recent decades, these factors can be applied to the design and implementation of any costing system.

The combination of these factors means that the design and implementation of a costing system can be considered a complex project for an organization. In this context, organizations are faced with two decisions, the first one is related to the use or not of project management methodologies to carry out the design and implementation of costing systems, and, and the second one is related to the degree of accuracy of the costing system appropriate to the organization.

The decision will depend on such factors as the use that will be given to the information and the cost of the implementation and the cost of keeping the system in operation, variables that must be balanced and taken into account. In the same line of reasoning, in the case of the projects of designing and implementing a costing system, once it is decided to use project management, the organizations must choose which approach will be better to be used to carry out the project.

USING THE SCRUM METHODOLOGY FOR THE DESIGN AND IMPLEMENTATION OF COSTING SYSTEMS

The Scrum methodology can be applied in a costing system project because in this type of projects (e.g., ABC) requirements often change during the project and there are unpredictable challenges that cannot be easily faced in a planned predictive way, as well as the costing system can be developed incrementally.

Firstly, it is important to define the project team and the stakeholders. The Scrum methodology define three roles in the project:

- the product owner, is the sole person responsible for managing the Product Backlog,
- the development team, who work to achieve a potential increase in the value of the product at the end of each sprint,
- The Scrum Master who is responsible for the Scrum Team to adhere to Scrum theory, practices and rules.

The definition of the project team and stakeholders can be performed in parallel with the product backlog definition. The Product Backlog is an ordered list of everything that might be needed in the product or service, but not necessarily all requirements of the products are placed because the requirements can be modified over time. Once the Product Backlog is defined, the next stage is defining the Sprint. The heart of Scrum is a Sprint, a time-box of one month or less during which is added value to the final product, and that value can be measured and tested by the customer. A new Sprint starts immediately after the conclusion of the previous Sprint. A Sprint contain: the Sprint Planning, Daily Scrums, the development work, the Sprint Review, and the Sprint Retrospective (K Schwaber & Sutherland, 2013).

Figure 1 provides a simple explanation of how the Scrum methodology works.

The three main elements presented in the Scrum methodology are the roles, artifacts and events.

In the case of “roles”, in the Scrum methodology, the Scrum teams have the ability to organize themselves and also perform various functions in the development of the project. In an organization, who will be the product owner will depend on the project. If the project is for the whole organization this person can be someone from the top management or someone appointed by the top

management to represent it. If the implementation is for a specific department or service the product owner may be the director of that service or someone designated by the service who has the ability to understand how the decisions are made, how the processes are performed and how the costing system can help to improve the decision-making process. The scrum master will be someone in charge of leading the project team either from the top management of the organization. With regard to the project team, it must include operational staff, information system personnel, production managers, people from the financial area, external staff, among others.

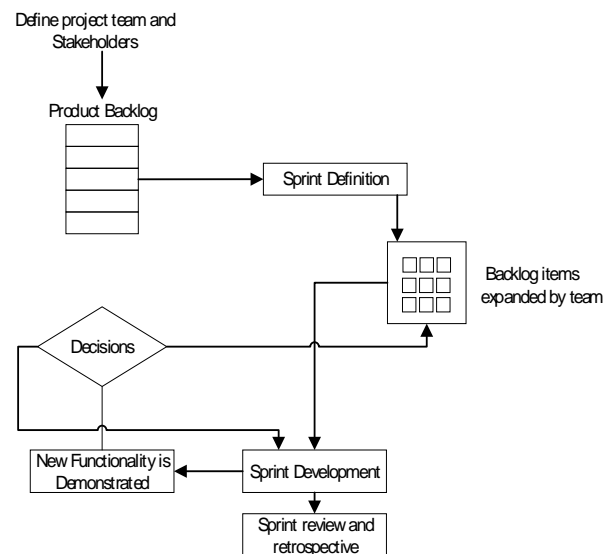


Figure 1: Scrum methodology. based on (Boehm & Turner, 2005)

The Scrum artifacts represent work or value to provide transparency and opportunities for revision and adaptation. Artifacts defined by Scrum are specifically designed to maximize transparency of key information so that everybody has the same understanding of the artifact (K Schwaber & Sutherland, 2013). Some artifacts are already defined in the Scrum framework, these are the product backlog (for example, determining the costing system that suits the structure of the organization or a department, creating a costing system for the organization, integrating the information of costs with computer systems) and sprint backlog which contains a number of items that are selected by the product owner and the development team from the backlog product (e.g., identification of the list of activities, information system to determine an average cost).

With respect to Scrum events these allow to create regularity and to minimize the need of meetings not defined. Here game rules should be established, as and when the iterations between the stakeholders are to be realized, this allows to have a notion of the time of the project and of the time that must be dedicated to a specific

sprint (Streule, Miserini, Bartlomé, Klippel, & De Soto, 2016).

A kick-off meeting should be conducted based on the customer's demands and at that meeting the product owner creates the product backlog of the product to meet that demand.

Once the product backlog is known, sprint planning is made, here the most important elements of the product backlog are divided into sprints, for example, if the product backlog contemplates creating a costing system, probably the sprints may be related to the analysis of the initial situation to determine if there is structure for an ABC system, analyze pros and cons of a gross costing system with respect to a microcosting system, perform an identification of cost objects (e.g., products, services), identification of activities (performed to produce the cost objects), identification of resources (e.g., labour, equipment) and identification of drivers (e.g., labour hours, use of machines, electricity consumption, among others) (K Schwaber & Sutherland, 2013; Streule et al., 2016).

Once the sprint is identified, tools such as the burndown chart are used to plan the elements, as well as the time and the amount of resources necessary to perform the sprint. For a sprint that demands a month's work the literature recommends 8 hours of planning, this can vary and depends on factors such as the availability of human resources, the complexity of the work and the difficulty to collect information.

Once planned, the team proceeds to execute the sprint, during the execution of the sprint no changes are allowed to the elements of the sprint unless the value or scope of the elements is increased, answering to a request of the product owner. At the end of each sprint, items that cannot be executed are brought back to the product backlog and will be taken into account in the next sprint planning (Streule et al., 2016).

For example, if the objective is to determine the cost of each service in a department, however, the cost of obtaining such information exceeds the benefits of obtaining more detailed information, one solution could be to group the different services and determine average costs.

Other important events are related to regular meetings between team members (whose timing will depend on the

size of the sprint and the availability of resources) to determine the state of progress of the sprint, the difficulties that have arisen in its development and how they are or can be overcome. On the other hand, meetings are also held with the product owner to know the new characteristics of the product resulting from the sprint and to determine the course of the project. **Error! Reference source not found.** shows a graphical representation of these elements and how their interactions would be along the design and implementation of a costing system.

Based on the elements presented in **Error! Reference source not found.** and all the elements mentioned above, we present below how the Scrum methodology can be adapted to the case of design and implementation of a costing system. For the design and implementation of a costing system we should define some key elements. Particularly, in the design stage, the organization has to develop the infrastructure needed to support the system. The next stage for the implementation is the product backlog. In the particular case of the costing system, the list includes the cost objects, a list of decisions that can be taken with cost information, requirements related to information systems, information transmission needs and reporting requirements, legislative requirements, among others.

Once the product backlog is defined, the next step is the definition of sprints. In the costing system design and implementation, the first sprint contains the definition of a detailed list of cost objects and their characteristics, this will help not only to determine the costs but also contributes to the principle of transparency, which is one of the pillars of Scrum. Once developed this sprint, interested parties should validate that the definition of cost objects is correct and the product owner must give approval. Another sprint must be related to an initial diagnosis of what would be the logic of the costing system (gross or micro), its pros, cons and its impacts for decision making. This diagnosis will depend on factors such as available resources and relevance of the decisions that can be taken with more or less detail, or with more or less accuracy.

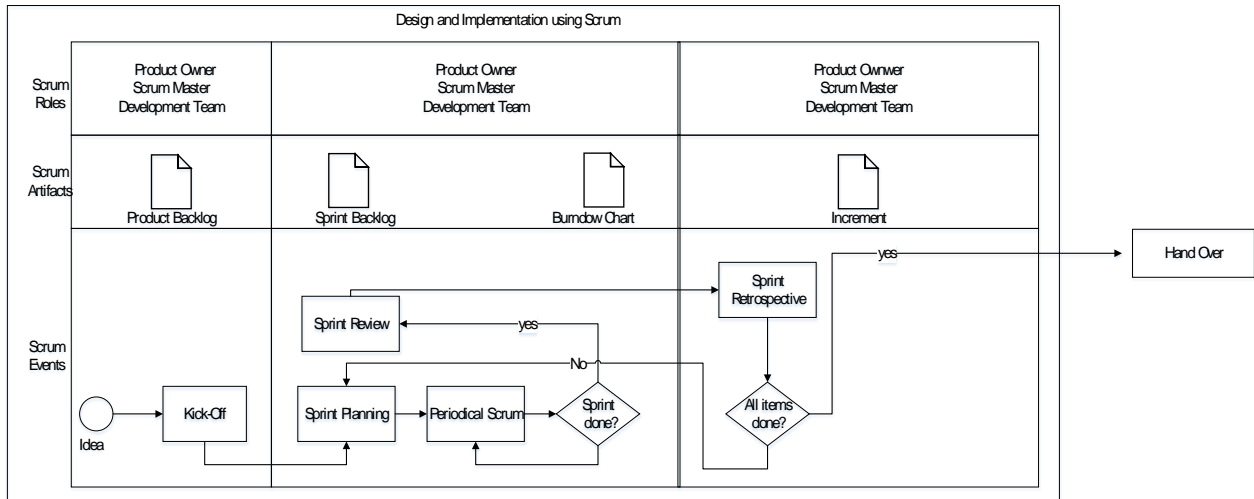


Figure 2: Elements of the Scrum Life Cycle Source: adapted from Streule et al. (2016)

This will depend on the type of decisions that can be made with the information on costs and that both these decisions affect the financial stability or provision of services in the organization. In addition to the structure created to support the costing system (human and computer resources) and the culture developed within the organization related to the importance of cost management at all levels of the organization.

In the logical of a costing system project, the sprint to follow are related to: the process analysis, the definition of the activities, resources, cost drivers, the computation of costs, the systematization and automatization of the costing system.

During the development process it is important to define the process as each sprint will be reviewed, as should be included adjustments, when a sprint is approved and at what point can proceed to the next sprint, this in order to meet two of the three pillars of the scrum: inspection and adaptation. Table 1 shows the fundamental elements of the Scrum methodology and how these were adapted for the design and implementation of a costing system, named ABC Scrum. It should be noted that each project can present different characteristics so the methodology must be adapted to each reality.

Table 1: ABC Scrum for Design and Implementation of Costing Systems

Scrum Roles	
Project Team and Stakeholders	Product Owner: Manager director, Administrator, Leader, etc. Team: Development team and scrum master
Scrum Artifacts	
Product Backlog	Identification of cost objects Model for cost determination Report for decision making
Sprint definitions and development	Initial diagnostic Cost determination (gross or micro) Identification cost objects

	Activities, resources and cost drivers identification Cost determination and creation of the structure of the costing system
Scrum Events	
Rules for acceptance, review and retrospective	Periodical meetings Verification of cost models for approval.

One of the advantages of the Scrum methodology is that when the artifacts (i.e. the identification of cost object, the development to the model for cost determination, among others) are verified they must be functional, which for a costing system is very important because it can be the case that to obtain a marginal level of detail, the marginal cost of obtaining it exceeds the benefit and the project must stop, however at that moment the costing system may already provide useful and enough information for decision making. In other words, the project can be completed when the stakeholders are satisfied or the level of detail achieved with the costing system is viable.

CONCLUSIONS AND FURTHER RESEARCH

This article shows how to increase the success of costing systems implementation, using an agile project management approach, based on the adoption of the Scrum methodology. Although the Scrum methodology has been used mainly in software development, it is evidenced that can be used in other project typologies. Applying the Scrum methodology for the design and implementation of costing systems allows the active participation of stakeholders, which increases the degree of acceptance of the system by the operating personnel related to the processes.

In addition, the developed ABC Scrum allows the costing system to be adapted to the needs of the organization and allows the early identification of problems that, in a traditional costing system, are only perceived at the end

of the implementation. The use of ABC Scrum highlights the importance of having a technique for determining the cost of information systems and organizational culture on the importance of cost management, cost conscious, which are factors that contribute to the success of a costing system (Gosselin, 2006).

The definition of the product backlog and the several sprints allowed to have an idea of what should be the final result, and the iterative process allowed to build a costing system that reflects the reality of the products or services provided, among other relevant cost objects (e.g., processes, clients). Among the problems in applying the proposed ABC Scrum methodology we highlight the need of regular meetings to give and receive feedback. The methodology suggests meetings daily but in practice it is difficult to accomplish and more when project members are working in other projects. Other difficulty is related to the automation of information, this problem is related to the lack of information for some activities, and also with the variety of information systems.

Finally, the steps related to the evaluation and communication of the proposed ABC Scrum methodology, can be discussed through a case study research approach.

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