Impact of the adoption of corporate governance practices on the performance of information technology projects

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Abstract. This work illustrates the use of tools that allow linking project objectives with the vision and strategy of the organization, monitoring effectiveness and controlling the development of activities, to improve project results. One of these tools is precisely the balanced scorecard, which contemplates additional strategic dimensions to the traditional ones in the field of project management, known as the triple constraint (time, scope and cost). This research paper analyzes the impact of the use of the balanced scorecard in the management of information technology projects in Colombia. The results obtained are presented when comparing projects developed with different monitoring and control methodologies, for projects that have implemented the balanced scorecard including strategic measurement dimensions. The study involved 105 project managers. The results of the study provide empirical evidence that concludes that the balanced score card is a tool that improves the effectiveness and efficiency of project management. In addition, the results show that the balanced score card improves the effectively achieves alignment of the with the organization's strategy.

1. Introduction

Information technologies (IT) have been contributing significantly in organizations [1]. For systems audit and control association [2]. Information technologies play a fundamental role in the direction of companies, and in [3], it is shown how technology leaders vary according to the type of organization and its specific needs and contexts and are in accordance with these needs in organizations that must lead technological projects that support the strategic direction of companies.

Considering that in the IT industry there are a large number of organizations working on projects, the study of the impact of tools used in project management, contribute to the academic community and to the project management practitioners to improve the effectiveness of project results. This work shows the incorporation of more applicable standards in information technology project management and their respective integration to be able to manage projects that really meet the proposed goals, since in an economic season based on knowledge and value-added activities, the material assets are not the most important thing for organizations.

Index in Association for Computing Machinery (ACM) management of computing and information systems the researcher analyzed the business architecture and business process redesign by collecting data from in-depth interviews, from the executive level to the operation level of Thai industrial estate
(TIE). Aims are to understand the system/AS-IS process, analysis strengths, weaknesses, opportunities, and threats (SWOT) of the existing system, including, the problems of the existing system and develop more efficient IT-ecosystem of the organization.

Companies nowadays face operational overruns if they do not use technologies, but we also do not see how difficult it is to see the benefits of technological solutions, when no studies have been carried out, nor procedures to understand the contribution they make to them. business, hence the importance of business architecture [4]. In addition to the benefits in the operational part, it improves the alignment of the business with the IT, contributing to the fact that the processes are carried out more efficiently and effectively reducing production times [5].

A company is more competitive, insofar as it is able to adapt and be flexible in the face of changes, in which context is important business architectures that align technologies with business objectives, one of the ways to achieve such alignment is through of the application of models that allow to evaluate the maturity to move from the architecture of the current state to the desired state [6]. Business architecture policies must be integrated with other policies in all areas of government so that you can create a general effective resource management system with surveillance capability. As part of the program implementation team, you should be aware that the business architecture supports the decision making of IT business resources at the executive, administrative and personnel levels [7]. In this way, new tools or improvement processes must be permanently reviewed, updated and / or implemented for adequate decision making [8]; a good business architecture exercise, should consider business, information, information systems and technology as a whole [4].

In the business field, the recognition of the strategic importance of the projects has increased due to the strong conviction of the organizational leaders where aligning the management of their projects with the strategic planning contributes significantly towards the achievement of the long-term objectives, in the implementation of its strategies and finally in the increase of the strategic performance indices of the organization [9,10]. For this reason, project governance is aligned with corporate governance.

So much so, that it has been claimed that one of the problems in project-based organizations is that senior managers develop strategies, but these strategies do not have the expected effect at the operational level of the organization, for this reason the problem is compounded when senior managers cannot determine whether certain projects are in line with organizational strategies or not [11,12]. It seems then that "alignment" between corporate governance, business strategies and the selection and execution of projects is required, in order to facilitate the achievement of long-term objectives set by companies.

It is noteworthy that the alignment between organizational strategy and projects has also been considered within the concepts of generally accepted good project management practices of the project

Project Management Institute (PMI) [13]. In the project management body of knowledge ® guide, it is established that projects and programs are carried out in order to achieve the strategic objectives of the business, for which many organizations implement formal corporate governance processes that serve as a reference framework to establish project success criteria.

According to the PMI model, governance allows organizations to establish their strategic direction - mission, vision, objectives, goals, expectations and performance standards that will allow them to guide actions for the development of the business. However, organizations to respond to their competitive environment must modify their operations, products or systems through strategic business initiatives that are developed through the implementation of projects, for this reason projects are considered to contribute to the achievement of organizational objectives when they are aligned with the business strategy [13].

In this order of ideas, in [14] it is argued that in order to evaluate the success of the project, in addition to the fulfillment of the schedule, the budget and the scope of the project, a measurement that links the organization's strategy with the results of the project must be included draft. By having a measurable vision, organizations can improve the clarity of the objectives that the project team intends to carry out and increase the commitment of its members to their projects. The investigations of these authors reveal that many projects are perceived as unsuccessful due to the lack of a shared vision of the project objectives by the project team members or the lack of understanding of the significant impact that the
project results will have in the business. These perceptions allow to demonstrate the lack of alignment of corporate governance, the global objectives of some organizations with respect to the objectives of their individual projects.

In this fourfold restriction, aspects related to project management are a shared responsibility between the project sponsor (the organization) and the project manager, while the three traditional elements become property of the team once the sponsor agrees and approves the project and as the project progresses to completion. In this sense, the balanced scorecard has become a valuable tool that can help organizations develop visions, objectives and strategic goals.

In the field of project management, the general model of application of the balanced scorecard (BSC) to projects, proposed by [15], is the most widely accepted. This model proposes that the specificity of each of the five process life cycle groups established in the PMBoK® Guide should be considered. The BSC has been used by organizations from different sectors to help manage their projects. For example, several successful implementations have been documented in IT projects. In these cases, it has been proven that the use of the BSC has managed to translate the vision and strategic planning of the organization into measurable objectives and has allowed to align these measurements with the results of the project and also has allowed to identify how these results of the project add value to the organization [14,15].

Despite the positive results of the implementation of the BSC as a tool for monitoring and controlling projects, and its benefits to achieve an effective alignment between the strategic objectives and the results of the projects, adjustments are required to ensure that the BSC become a tool capable of providing adequate supervision within the general project environment, so it has been suggested that some improvements should be developed to achieve greater adaptation of the BSC model to the particular characteristics of project management [16].

Taking into account the concepts, theories and models mentioned above, this research focuses on generating empirical evidence related to the implementation of the BSC and its usefulness in the control of the projects and their alignment with the organizational strategy, specifically in technology projects of the IT information, considering that IT is an important function for organizations working in innovation and for obtaining competitive advantages.

Although the projects are recognized as a basic piece for the formulation and implementation of the corporate strategy, it is common to find organizations where their management is not perceived as a business process, generating difficulties to effectively align the results of the projects with strategic planning, which generates waste of efforts and resources [17]. Understanding and achieving the alignment strategy project management, becomes a great challenge to face for the leaders who work to effectively, efficiently and effectively manage their projects. This study focuses on providing empirical evidence of a topic that has been little researched in the project management literature, such as the utility of the balanced scorecard as a systematic means to align the objectives of the projects undertaken by the organizations with their strategic planning.

2. Methodology
According to the classification of the types of research conducted by [18], this study is exploratory and uses a quantitative research approach. In order to define the study population, the above is considered by [18] where it must be made up of subjects that have specific characteristics, defined based on the general objective of the research. Consequently, the population is defined as IT projects developed in organizations of any sector of the Colombia economy and the sample unit is defined as IT project managers. Taking into account that the universe population of the study is assumed as infinite, because it is not possible to know the number of IT projects that are developed by the different organizations of the country, to determine the sample size, the Equation (1) developed [19] for infinite populations:

\[
n = \frac{Z^2 \cdot p \cdot q}{e^2}
\]
Where, the Z value corresponds to the value associated with 95% confidence, according to the normal probability distribution. The values of p and q are set at 50% to guarantee the maximum sample size. With a maximum permissible error of 8%, the sample size is 105 sample units.

The hypotheses of interest for statistical inference tests are related to determining whether for the same organization there is a significant difference in projects that include the BSC within its management elements and those that do not, with respect to the alignment between the project objectives and the organizational strategy, the results of the projects, the understanding that the project team has of the business strategy, as a critical point for leadership in project management and communication between the team members of the project team.

Therefore, the tests contemplate as a null hypothesis to reject, with a 95% confidence level, since the BSC has no significant impact on the results of project management and does not impact the performance of the project team. Sample statistics are calculated from the data collected through the application, by convenience sampling, to 105 IT project managers of the same instrument used [13].

The questionnaire consists of four sections that include: 1) Data related to the profile of the project manager and his organization. 2) Rating on a scale of one to five (where 1 is equivalent to a poor result and 5 to an excellent result) of the perception of the results of the projects managed without using the BSC and of the critical factors of project management under such circumstances. 3) Rating on a scale of one to five with respect to the perception of the results of IT projects executed in your organization after implementing the balanced scorecard and the critical success factors of project management under these conditions and 4) This section collects the intentions of project managers regarding continuing to use the BSC.

3. Results

Figure 1 shows the average comparative statistics, of the performance of the projects when implementing or not a follow-up based on the BSC: according to the responses obtained from the project managers, for each of the variables in the case of managed projects without using the BSC and projects that implemented the BSC. As you can see the descriptive statistical analysis indicates that the results obtained in projects where the BSC is used as a system to achieve the alignment of the project with the strategy, the understanding of the project goals by the team, the results of the project are favorable the triple restriction (time, budget and objectives), communication with other members of the organization, risk management and in general project management.

![Figure 1. Average values of the BSC impact responses in IT projects.](image-url)
Thus, with the purpose of generalizing the previous results, the responses obtained from IT project managers who evaluated the results of their managed projects in the same organization, without using the BSC and then evaluating the same results of projects managed with the BSC system, are analyzed by means of the Wilcoxon inferential statistical test (Mann-Whitney test). The usefulness of the Wilcoxon test is that no assumptions related to the distribution of the values that take the answers are required so that the test weights according to the range, each of the observations. In this case, the Wilcoxon test allows identifying if there are significant differences between the values obtained for the results of projects that did not use the balanced scorecard for their management with respect to the results of the projects that do use the BSC system, but not through of setting a parameter value but by comparing the significant differences for each observation.

For this statistical test, the hypothesis of interest is that there is no significant change in the response due to the treatment (which in this case is the use of the BSC) that is posed so that \( H_0: \theta = 0 \). The null hypothesis ensures that each of the distributions (not necessarily the same) for the differences (post-treatment minus pre-treatment) is symmetrically distributed around 0, which corresponds to the fact that there is no significant change due to the treatment.

The procedure consists in calculating the value of a statistician \( T^+ \), so that the absolute values of the differences (\( Z_i \)) of the values are ordered from least to greatest and the range is found (\( R_i \)), defining the indicator variables in the Equation (2).

\[
\Psi_i = \begin{cases} 
1 & Z_i > 0 \\
0 & Z_i < 0
\end{cases}
\]  

(2)

And the products are obtained \( R_i \Psi_i \) and the value of the Equation (3).

\[
T^+ = \sum_{i=1}^{n} R_i \Psi_i 
\]  

(3)

The results of the one-sided hypothesis test \( H_0: \theta = 0 \) vs. \( H_1: \theta > 0 \), with a level of significance \( \alpha \) (for this case it is set to 0.05), are shown in Table 1. For this study, the results are obtained using the Wilcoxon test.

| Null hypothesis (H0) - Factors                                                                 | P Value x Wilcoxon |
|---------------------------------------------------------------------------------------------|-------------------|
| The use of the BSC does not generate a significant effect on the timely delivery of the project. | 0.0340            |
| The use of the BSC does not generate a significant effect on budget compliance.               | 0.0021            |
| The use of the BSC does not generate a significant effect in achieving the strategic objectives of the project. | 0.0057            |
| The use of the BSC does not generate a significant effect on how the project team understood how the project fit into the company's strategy. | 0.0456            |
| The use of the BSC does not generate a significant effect on the understanding of the goals by all team members. | 0.0342            |
| The use of the BSC does not generate a significant effect on the fluidity of communication with other members of the organization. | 0.0587            |
| The use of the BSC does not generate a significant effect on the risk mitigation of the project. | 0.0261            |
| The use of BSC does not generate a significant effect on project management.                  | 0.0198            |

According to Table 1, the Wilcoxon rank test verifies that there is a perception of improvement under the implementation of the BSC system which is statistically corroborated, that is, the tests carried out allow us to affirm that the use of the balanced scorecard positively impacts management of time, cost,
risk and integration of IT projects, in addition the results obtained allow us to conclude that the BSC favors the alignment of the project objectives with the organizational strategy and that in this sense it allows to improve the understanding of the project goals by team members.

However, for the factors evaluated up to this point, the same statement regarding the factor related to the communication of the information derived from the project between the team members and other members of the organization is not conclusive, considering that the p-value of the test it is close to the region of acceptance of the null hypothesis. In general, it can be concluded that there is evidence that the implementation of the scorecard results in a positive perception regarding the effects on the organization's strategy and the management of IT projects.

4. Conclusions
This pilot study in IT projects suggests that the balanced scorecard, in addition to its proven effectiveness as a management system focused on determining and controlling critical strategic indicators of performance in organizations, its application in projects goes beyond the control of triple restriction of time, budget and scope achieving a positive impact on the overall success of the project and its alignment with the organizational strategy, which is consistent with the results of the aforementioned studies.

The results of this research also make it possible to argue that the use of the BSC has the advantage of generating greater understanding of the strategy at the operational level, to the extent that the members of the project team clearly understand how the project fits within the strategic guidelines of the project organization, which manifests itself as an added value to improve project management practices within companies. Therefore, it is suggested that the implementation of the BSC brings to any project reliability in the groups of project management processes established in the project management body of knowledge guide (PMBOK®) and ability to monitor and control all project results.

The empirical evidence allows to conclude that for the IT projects in Colombia taken as the object for this study, the BSC allows to establish and make strategic measures and clearer connections between the project and the organizational strategy, which can lead to a better internal performance of the team of the project in terms of timely delivery, budget compliance, quality and scope management, risk mitigation and other additional benefits.

However, a particular result draws attention because it was assumed that the BSC tool would facilitate the communication of project information with other members of the organization, but statistical evidence follows that there was no significant difference in this variable at comparing managed projects with the BSC and those that did not use it. Therefore, it is proposed that these findings require more attention and more studies to draw robust conclusions about the effectiveness of this framework. It is proposed that the BSC, with a demonstrated capacity to provoke a strong connection between the organizational strategy and the vision and objectives of the project through the understanding of the measures and indicators that guide the coordinated and planned activities at the project level be a valuable tool for project management professionals.

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