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Characterization of technology project management in small and medium-sized enterprises

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Abstract. The present study was carried out with the support of the IT Cluster of Norte de Santander, made up of thirty-one (31) companies from the technology industry seeking to describe relevant aspects of Project management practices. The research process of the collection of data supported by the survey carried out by the PMI institute, called “Pulse of the Profession” in which variables of interest are taken into account, such as: the existence of a Project office, level of application of standards and good practices applied, among others. Likewise, the analysis of the information is carried out by consolidating data taken from the selected simple, which in this case are the managers or professionals with experience in managing technology projects of the companies under study. Finally, the project concludes that a minimum number of IT companies comply with the three elements of success of the projects according to PMI: objectives and proposed bussiness scope, time and initial Budget, inadequate cost estimation, dependence on resources, lack of management practices and changes in the priorities of the organizations are the factors that most influenced Project success rates in SMEs.

1. Introduction

In 2015, the Standish Group [1] carried out the study “the chaos report”, on the state of the art of software development in the world to 50.000 projects of all types, sizes and continents and the results indicate that work should continue to be done to achieve the successful results of software development projects, since only 29% of the projects, since only 29% of the projects since 2011 are a success and the same percentage occurs in 2015, that is, they have been completed within the deadline, within the planned budget, and with satisfactory results.

Since 2006, the Project Management Institute (PMI) [2] has been carrying out the study “Pulse of the Profession” which demonstrates “Strategy implementation is related to the capacity of an organization to achieve success in its projects”.

In 2016, during the XIV IT Project Management Conference, the Colombian Association of System engineers [3] presented the current trends in the development of Colombian projects related to information technology.

According to Correa A [4], in 2017 thirty-three (33) companies legally incorporated in the Cúcuta chamber of commerce are linked to the software industry in San José de Cúcuta, generating contributions to the regional economy. According to the results of the characterization. 73% of the industry corresponds to micro-enterprises with a staff of between 5 and 10 employees, even though the study shows that the local company has insufficient resources for innovation and investment, the Norte de Santander IT cluster has been a favorable channel for business integration.



The study "Global Body of Project Management Knowledge and Standards" carried out by Crawford [5], allows to know "the justification, the reason for being and the importance of the standards in the Project Management, establishing the importance of the definition of knowledge areas, standards, training and certification processes in the recognition of project management as a profession, the need to identify the role and tasks of the Project Manager".

With the above and considering the lack of ownership of good Project management practices in small and médium enterprises in the technology sector in the city of San José de Cúcuta, the interest to characterize the management of IT projects is born.

2. Methodology

The research is descriptive and applied technological research. According to Toledo Diaz [6], descriptive research aims to describe and analyze what exists with respect to the variations or conditions of a situation. And applied technological research is established a Padrón G [7], in taking a problem situation, selecting a theory, examining the described situation by designing a prototype and finally testing the prototype.

The data collection instrument applied in this study is a survey conducted by the PMI Institute, called "Pulse of the Profession," most of the items of the survey correspond to the variables of interest in research: existence of a project office, application-level of project approaches and standards, practices for the management of applied projects, among others; since PMI provides the most internationally recognized standard, groups the largest number of members and has good influence in the region [8].

Consequently, a diagnosis is made and the aspects that may contribute to the research are examined, consolidating the relevant aspects of the data collection instrument, applied to managers or professionals with experience in technology management in the companies that make up the sample. The sampling carried out is of a non-probabilistic type, intended for convenience research purposes.

3. Characterization of technology project management in small and médium enterprises

The study allowed to have a reference of the characteristics of the projects and factors that companies face when planning or managing their technology projects.

3.1. Description of technology projects in SMEs

In the construction of the instrument based on the "Pulse of the Profession" survey, the dimensions of the size of the companies analyzed in the city of Cúcuta are included. The dimensions incorporated in the survey are detailed below to characterize the projects and so identify the factors influencing their success:

- Type of Project of greater focus.
- Company profiles: size, the sector of greatest focus and business sector.
- Role of the Project professional.
- The existence of PMO - Project Management Office.
- Level of application of good practices for project management.
- Application of good practices for project management.
- Type of process for the development of competencies.
- Success characteristics of completed projects.
- Failure factors for projects considered as a failure.
- Aspects of the organization that influence other projects.
- Effects of projects that went into crisis.
- Project management: maturity and alignment with strategic objectives.

This report includes the perspectives of 81% of professionals with responsibility in the áreas of project management. As well as the most important reflections of the interviews conducted with business leaders from various sectors: energy, ceramics, dairy, real estate, mining, and government.

3.2. Characteristics of the projects

According to the condition that defines SMEs under Colombian law, the number of employees and the total assets of the company according to this classification were considered to be the highest number of companies classified as “Micro”, (less than ten (10) workers) and the second largest group are “Small companies” (between 11 and 50 workers) and finally, the sample did not include médium-sized companies.

According to the analysis of the data during the study, less than half of the types of projects in which the companies studied have a greater focus are software development, in the same way in 2016 of the survey conducted by the Colombia Association of Systems Engineers [3] where software projects were 44%, the other projects of SMEs are for the implementation of technology services and infrastructure. Less than half of these software development companies in SMEs employ project management practices, including agile practices, specifically Scrum in its largest proportion because it is one of the best know agile practices for software project management. Scrum allows the work of incremental deliveries of a product, it is used to work in enviroments of uncertainty and instability of requirements [9]. Uncertainty and poor definition of requirements is a predominant feature of software projects for SMEs.

The ICT cluster has a great opportunity in the public sector for the implementation of IT projects, every 10 out of 12 projects correspond to the private sector.

In the last year, more than half of the companies consider that the projects are 80% compliant with the business objectives and scope proposed at the beginning and only 33% of these companies that do not modify the initial objectives complete their process within the time and acceptable initial Budget. According to PMI, the success of a project is determined by the fulfillment of the 3 constants of the classic triangle formed by the deadline, the Budget, and the scope. Considering the above, the companies in the cluster that are complying with the three elements to be successful represent 33% with success rates ranging from 80% [10]. The majority of the companies analyzed in the study are classified as “Micro”, the predominant profile in this ICT industry, surely the probability of success of the projects is feasible, according to the size of the companies due to their limited number of employees and financial assets. The results also show that 56% of the professionals are functional executives who do projects and the projects directors and directors of PMO are 12% less, probably due to their nature as micro-companies where the same role of the functional ones is closely related to the management projects. These professionals do not have exclusive functions over the projects, since in an organization of this type, the line of power is shared between the functional managers and the project coordinators, but in this case the dedication of time may be partial or total, the project manager shares with the functional managers the responsibility of assigning the priorities and directing the work of the people assigned to the project [8]. SMEs have the matrix structures that are not entirely project-oriented but are combined with the functional structure, this becomes an environmental factor of the company that can affect the availability of resources and influences the way in which projects are managed as stated in PMI's PMBOK.

In the project teams of matrix organizations, “temporary staff are assigned by the different functional managers for the duration of the project”. This is largely due to the fact that only 44% of companies have organized a PMO that structures and standardizes project-related governance processes and makes it easier to share resources, tools, and techniques. On the other hand, 50% of these organizations that have a PMO show that they have evolved into an EPMO that is characterized by its value contribution to the organization. In these SMEs EPMOs that align with the strategy and focus on delivering value, the projects meet the original business objectives of the project, however, they did not finish on time and within the agreed Budget and therefore do not meet the three requirements to be classified as successful projects.

In all SME projects, only 26% of them have actively committed sponsors. This low trend in sponsor support is observed for 33% of successful projects with a level of 11%, however, despite these findings, more than half of the organizations give high priority to developing the skills needed for sponsors to connect with the strategy and créate a culture in the organization that values them.

Statistics also show that on average 9% of projects are failing in SMEs and represent monetary losses for the organizations. These results are favorable compared to the figures reflected in the 2015 Chaos Report where 19% of projects are considered a failure.

As shown in Figure 1, 44 % of SMEs that focus on the three skill sets; good business practices, technical expertise and personal project management skills, more than 80% of their projects meet the original business objectives, then it is necessary for companies to focus on developing project and program managers with skills and experience.

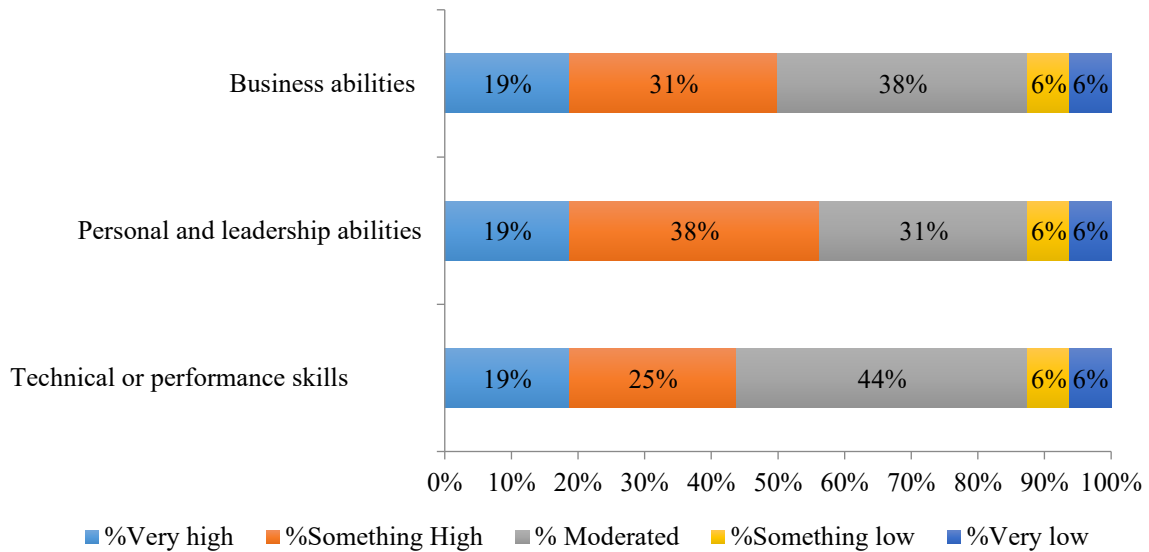


Figure 1. Development of project management skills.

Organizations know and apply the standardized project management practices. However, these are not implemented throughout the company, as shown in Figure 2.

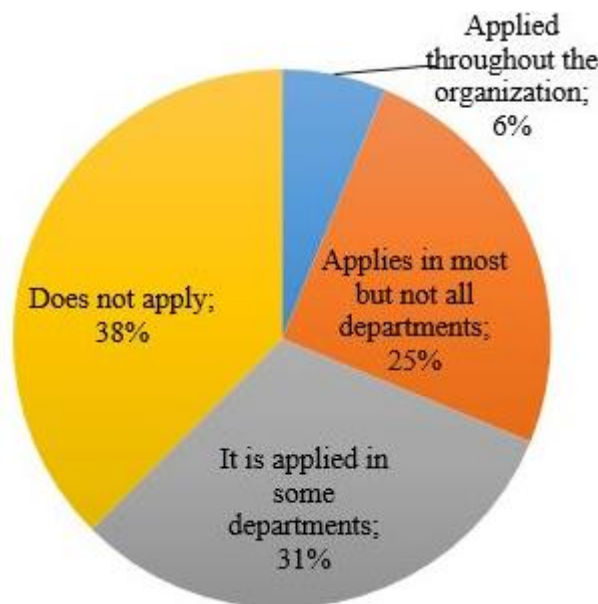


Figure 2. Implementation of standardized project management practices.

On the other hand, more than 50% of the organizations use project performance indicator, direct the allocation of resources, manage programs and portfolios and five out of ten manage risks. As for the approach to project management, more than half of the companies use agile methods and some use their own methodologies.

In most organizations, projects are not aligned with the organizational strategy because of their level of maturity, given that the percentage of organizations with a high level of maturity in project management is low. Few organizations conduct training of project management tools, skills development, and a defined career path. As shown in Figure 3. Only three out of ten organizations report having a formal knowledge transfer process.

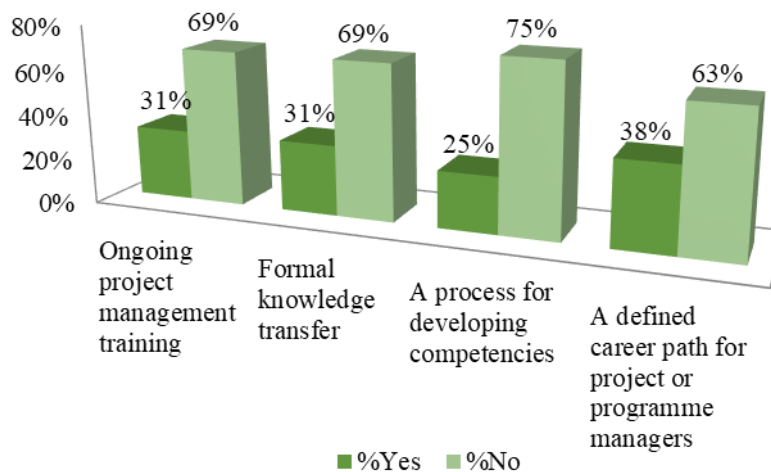


Figure 3. Level of training, development of competencies and defined professional trajectory.

More than 50% of SMEs consider that specific processes, procedures and knowledge bases are environmental factors that have a high degree of influence on the way projects are carried out, rather than other factors that have a high degree of influence on the way projects are carried out, rather than other factors consulted, such as the culture and style of communication, which is why companies align their activities towards the creation of a culture that recognizes the importance of project management as a driver of better performance and organizational change. The study shows that four out of five companies in the Technology Cluster fully understand the value of project management. According to the data, organizations that give high priority to the creation of this culture report that 71% of the projects meet the original business objectives.

The findings show that one in four organizations with high financial performance have implemented proven project management practices and manage programs and portfolios. Of great importance to business leaders and organizational success is the performance of their organizations in formulating strategy, prioritizing and financing projects, implementing strategic projects and identifying lessons learned.

3.3. Assessment of factors influencing the success of SMEs

Below are the findings of the study on the most influential and scored factors for project success according to the research “the chaos report” 2015 [1].

3.3.1. Executive support. Projects that are actively sponsored are generally successful. The findings of the study show that the support of committed sponsors is low, but companies give high priority to developing project management and governance skills.

3.3.2. Emotional maturity. Refers to the basic behaviors of how people work together. The results obtained during the study show that technical skills are not enough to respond to the current challenges of SMEs' clients and that personal skills need to be strengthened.

3.3.3. User participation. The study carried out shows that SMEs manage good communications with business users.

3.3.4. Optimización. The study found that four out of five technology companies fully understand the value of project management to optimize resources.

3.3.5. Qualified resources. They are people who understand both business and technology and to the study, organizations consider it essential the development of human talent.

Business leaders said in the survey that the most influential factors influencing project failure in the last 12 months, in order of greatest influence, were:

- 56% Inaccurate cost estimate.
- 44% Resource dependence.
- 38% Deferral by team members.
- 35% lack of management practices.
- 31% Change in organizational priorities.
- 25% Inadequate or deficient communications.

Aspects related to human resource management influence and restrict projects in the companies under study. Ratifying that the most influential factors in the projects that failed are: the dependence on human resources, the delays caused by team members and lack of management practices.

With regard to the intention to improve the skills of project management personnel, it is recommended that a business preparation plan be established for SMEs, aiming at certification in project management methodologies and also incorporating good software development practices (PMP SCRUM, PMP, CAPM, SCRUM DEVELOPER or ITIL, among the best-ranked certifications in Colombia).

At the same time, to improve the business skills of the cluster's project leaders in order to connect them with the strategy and to improve the level of maturity in the project management. The plan should undoubtedly include the improvement of personal skills to achieve projects with a high level of emotional maturity, as well as the linking of experienced human resources.

Once business skills are strengthened, SME leaders can establish projects through strategic alliances at the regional and national levels that allow them to expand their product offerings. It is also proposed that EPMOs be created by companies.

4. Conclusions

In the last year, the projects of the SMEs are meeting the objectives and scope of the original businesses by 70%. More than half of the projects are being completed within the agreed time and the initial Budget. 9% of projects are failing in SMEs and represent monetary losses for your organization.

It is necessary to strengthen essential capacities to improve project success rates and risk management.

The size of the organizations analyzed, and their financial capacity is not a strength for the applications of the methodological framework of project management, Likewise, their matrix orientation requires that work teams be formed with skills in tools and techniques for the management of the projects of companies in the región and take advantage of this strengthening of skills must be improved.

The SMEs in San José de Cúcuta have fundamental technical skills for project and program management, but the level of maturity in project management, their capacities, and leadership skills must be improved.

Leverage the Project Management Office to facilitate the achievement of strategic objectives and involve to EPMO.

The SMEs studied focus their importance on project management as a strategic driver since without this alignment with the organizational strategy would not be achieved.

Train in project management frameworks and methodologies to enable leadership training in the organizations associated with the Norte de Santander IT cluster.

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