

Information systems and their functionality in the optimization of business processes

Sistemas de información y su funcionalidad en la optimización de procesos empresariales

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ABSTRACT:

The observational, descriptive and exploratory nature assumed in the methodological development of this work reflects the purpose of establishing the factors responsible for process management failures. For bad decisions, analysis, information surveys and omissions that affect process optimization. Allowing those responsible for the proper decision making within organizations, control and act on the factors responsible for problems and failures in information management and process optimization.

Keywords: Information analysis, Information management, Decision-making, Knowledge, Business

RESUMEN:

La naturaleza observacional, descriptiva y exploratoria asumida en el desarrollo metodológico de este trabajo refleja el propósito de establecer los factores responsables de fracasos en la gestión de procesos debido a malas decisiones, análisis, levantamientos de información y omisiones que afectan la optimización de procesos. Conocer estos factores permite a los encargados la debida toma de decisiones al interior de las organizaciones, controlar y actuar sobre los factores responsables de problemas y fracasos en la gestión de información y optimización de procesos.

Palabras clave: Análisis de la información, Gestión de la información, Toma de decisiones, Conocimiento, Negocio

1. Introduction

Companies often have business losses, competitiveness problems and situations that put their stability and prospects at risk in the face of business generation and participation. This is due to frequent errors that have to do with the conceptualization, structure and management of information processes, and which are related to bad practices and uses of resource optimization with which a service is intended to be provided or a need met. Thus, the painful conclusion is reached that the failure was due to poor information management, the power of assertiveness and flexibility in selecting the best way to optimize resources in information management.

Nowadays, when organizations need to adapt quickly to changes and achieve competitive advantages, it is becoming a success factor to respond in a more agile and effective way in the market, through an appropriate design and management of business processes.

2. Literature review

2.1. Business processes

In Laudon & Laudon (2012), business processes refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business outcomes, and the unique way in which these activities are organized and coordinated. Developing a new product, generating and completing an order, creating a marketing plan and hiring an employee are examples of business processes. The ways in which organizations perform these procedures can be a source of competitive strength vis-à-vis their rivals from the unique and agile ways in which organizations coordinate the work, knowledge and information among stakeholders in business processes.

In this way, every company can be seen as a set of business processes, some of which are part of larger processes that encompass more activities and where some business processes are generally linked to a specific functional area, and others intersect with many different functional areas and require coordination between departments.

Information systems automate many of the steps in business processes that were previously performed manually. New technology can even change the flow of information, allowing many more people to access and share information, replacing sequential steps with tasks that can be done simultaneously and by eliminating delays in decision making. New information technology often changes the way a business operates and supports entirely new business models.

For the different managers, it is very important to have the proper use of information systems as a support, since it is the latter that must endure defeats, but they must always continue to move forward; beginning again to face the difficulties that these bring. However, if they have well-structured advantages based on their experience, when compared with others, they can lead to success or failure if they are not able to use this potential properly (Vargas T, Zartha S, & Bocanegra A, 2017) .

Managers must manage all risks in a coherent manner and remain in a dynamic of verifying latent changes in the market, envisioning the application of processes that lead their products or services to have added value focused in terms of innovation. This allows them to make the right decisions for the redesign of plans if necessary, according to the conditions shown (Vargas T, Zartha S, & Bocanegra A, 2017) .

For all of the above to be reflected in the result of success or failure, the main basis must be the involvement and empowerment of people in companies, making things happen. That is why a primary function of managers is to choose the right people in the different work teams of the organization and achieve the right results (Vargas T, Zartha S, & Bocanegra A, 2017) .

In the past, senior management defined the strategy, but did not always explain it clearly and directly to the employees so that they could comply with it in a clear and direct way, there was a certain obsession to measure results without finding synergy between what was measured and the results observed, often the action plans were not complied with, and the managers focused basically on short-term results (Vargas T, Zartha S, & Bocanegra A, 2017) .

The criticism of the collaborators was repressed without listening to ideas that could generate positive changes in the way the organization worked, they were more concerned about the explanations for the failure than the explanations for the results to be obtained according to the guidelines of the top manager (Vargas T, Zartha S, & Bocanegra A, 2017) .

2.2. Information systems

An Information System is understood as a set of interrelated components that collect (or retrieve), process, store and distribute information to support decision-making and control processes in an organization. In addition to supporting decision-making, coordination and control, information systems can also help managers and knowledge workers analyze problems, visualize complex issues and create new products (Laudon & Laudon, 2012).

Information systems contain information about people, places and things that are important within the organization, or in the surrounding environment. By information, we mean data that has been modeled in a meaningful and useful way for humans. Instead, data are flows of elements without a specific meaning that represent the events that occur in organizations or the physical environment before they are sorted and interpreted in a way that people can understand and use.

The general objectives of information systems are: (Cepade. Universidad Politécnica de Madrid., n.d.)

- To support the objectives and strategies of the organization.
- To provide information for the control of all the activities, being able to verify the fulfillment of the established goals in the organization.
- To facilitate, simplify or automatically carry out processes that were traditionally carried out manually.
- To adapt information needs to the evolution of the organization.

The creation of a new information system is a form of planned organizational change. The four types of changes related to technology are (a) automation, (b) rationalization of procedures, (c) redesign of business processes, and (d) paradigm shift (change management), where far-reaching changes carry the greatest risks but also enable the greatest benefits to be achieved. (Laudon & Laudon, 2012).

From this moment on, the information system is considered to be an effective instrument for solving problems. However, since organizations are of a socio-economic nature, they should not only be oriented

towards economic aspects, but should also give great importance to social relations within the organization, depending on the Human Resources and their contribution to the development and execution of the company's processes.

Many organizations use business process management to redesign workflows and business processes with the goal of achieving breakthroughs in productivity, resource optimization, time and cost reduction. Business process management is also useful for promotion, total quality management (TQM) and other initiatives for incremental process improvement.

For this purpose, it is necessary to carry out an initial analysis of the systems and its problems, along with the identification of the requirements for their solutions. System design provides the specifications of an information system solution that allows the integration of technical and organizational components together; based on structured methodologies to document, analyze and design information systems.

This refers to the commonly applied systematic technique, where each movement is based on the previous one. Therefore, structured methods are useful for modeling processes, but they do not manage the structure of the data well. In addition, they treat data and processes as separate entities in a logical way, while in the real world such separation will affect the project's objective of the information system aligned with the business strategy.

Information systems are essential to optimize results in terms of Research, Development and Innovation (R&D&I). Considering that it is currently important that companies, regardless of their size or the sector to which they belong, establish systems and procedures that allow them to manage the innovation activities carried out within the company, based on the creation and design of new products, services or processes that ensure the generation of value for their customers or users, the Colombian Technical Standard 5801 was created in Colombia in 2008. It sets out the general requirements for the establishment and management of R&D&I units and establishes the requirements for the R&D&I projects that make up the project portfolio. It should be noted that the majority of the standard is based on the UNE 166002:2006 standard (Gutierrez V, Zartha S, Vargas T, & Gomez G, 2017) .

The proper management and structuring of information systems leads to the development and strengthening of competitiveness and innovation issues, however, it is important that these are addressed in a coherent manner. It is evident that, in the manufacturing sector, especially in the city of Armenia, Quindío, these companies carry out innovation processes based on their own experience, since they are not structured under a method or a norm that can positively guide their efforts in this area (Vargas T & Ovalle, 2015) .

2.3. Project management

According to the project methodology of the Project Management Institute PMI (2017), a project is a temporary effort to create a unique product, service or result, which may be tangible or intangible.

Projects are used as a means of directly or indirectly achieving the objectives set out in an organization's strategic plan, and which are authorized as a result of a strategic consideration such as market demand, strategic opportunity, social or business need, environmental considerations, technological progress, legal requirements, etc.

Project Management, therefore, is the application of knowledge, skills, tools and techniques in project activities to meet project requirements, through the application of processes framed in the process groups of initiation, planning, execution, monitoring and control, and closure.

In order to identify the information systems projects that can offer the greatest business value, organizations need to develop an information system plan that supports their overall business plan and incorporates the systems into strategic planning. This plan serves as a map to indicate the direction of the systems development (the purpose of the plan), the rationale, the current systems situation, the new developments to be considered, the management strategy, the implementation plan and the budget.

The plan contains a statement of strategic objectives and specifies the type of support that information technology will provide to achieve them (specific systems projects), indicates key management decisions regarding hardware procurement, telecommunications, centralization/decentralization, software and data, and the required organizational change. Organizational changes, such as training requirements, resource hiring and changes in business processes, are also generally described.

2.4. Context

Companies often have business losses, competitiveness problems and situations that put their stability and prospects at risk in the face of business generation and participation. This is due to frequent errors that have to do with the conceptualization, structure and management of information processes, and which are related to bad practices and uses of resource optimization with which a service is intended to be provided or a need met. Thus, the painful conclusion is reached that the failure was due to poor information management, the power of assertiveness and flexibility in selecting the best way to optimize resources in information management.

A phenomenon that occurs in Colombia can be mentioned, thanks to the boom that has been taking place in tourism, especially in the region of the coffee axis, in which the need to have relevance and real management of the information in a clear and secure way is evident. As mentioned by García and Vargas 2016, in their book "*Visión estratégica del turismo en el Paisaje Cultural Cafetero*" [Strategic Vision of Tourism in the Coffee Cultural Landscape], it is evident that:

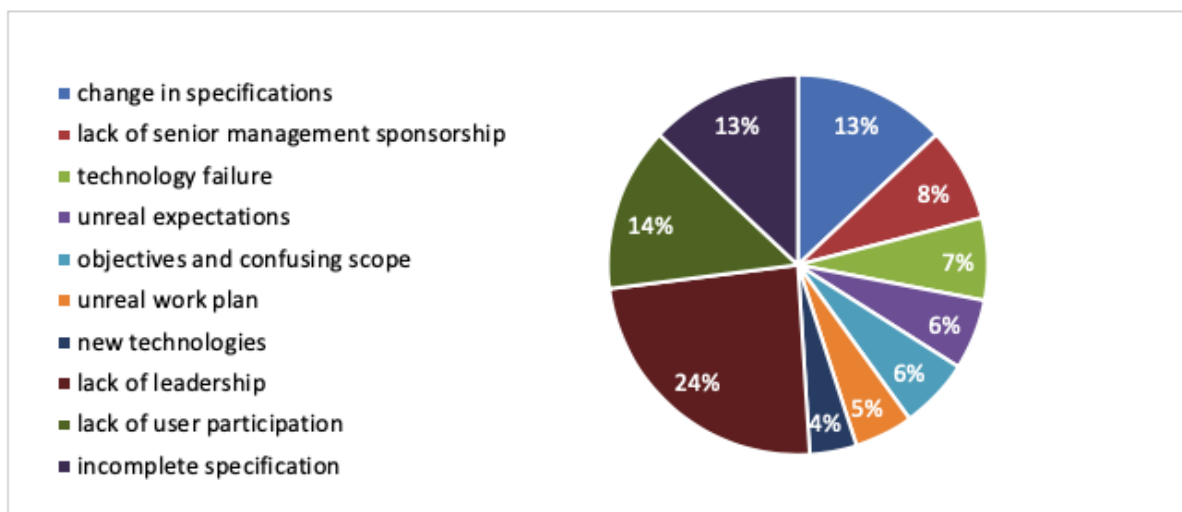
Another issue of great importance is the definition of differentiating aspects of the service and the inclusion of tourism that takes advantage of the competitive benefits associated with the declaration of the Cultural Heritage of the coffee landscape. Entrepreneurs associated with the sector mention in different spaces the need for relevant, reliable and timely information for decision-making. (Garcia L & Vargas T, 2016, pág. 71)

In the ERP Report of Panorama Consulting Group, where a case study of an ERP-CRM software renewal project is presented, we have the following reference data in view of the concern about what is happening with the projects of implementation of new processes and IT`s in the world. The following results were obtained, where there were shortcomings related to non-compliance with the expectations of business processes between 32% and 60%, in points c), e) and h):

- In 57% of the cases, the duration is longer than estimated.
- In 54% of the cases, costs are higher than planned.
- At the end of the exercise, 39% of employees and 32% of executives were dissatisfied with the tool.
- In 41% of the cases, more than 50 % of the expected benefits are not achieved.
- 40% of the times there are operational disruptions during live streaming.
- 53% of the companies that have recently implemented the program had low change management skills.
- 47% of them had a low level of communication.
- About 60% of the organizations suffered from low integration into their previous systems and low data visibility.

As shown in *Figure 1: Reasons for project failure*, referred to by Gartner, 46% of the causes refer to drawbacks in the definition of the established scope, whether due to lack of user participation, confusing scopes, incomplete scopes or changes in specification compared to the initial scope.

Figure 1
Reasons for project failure

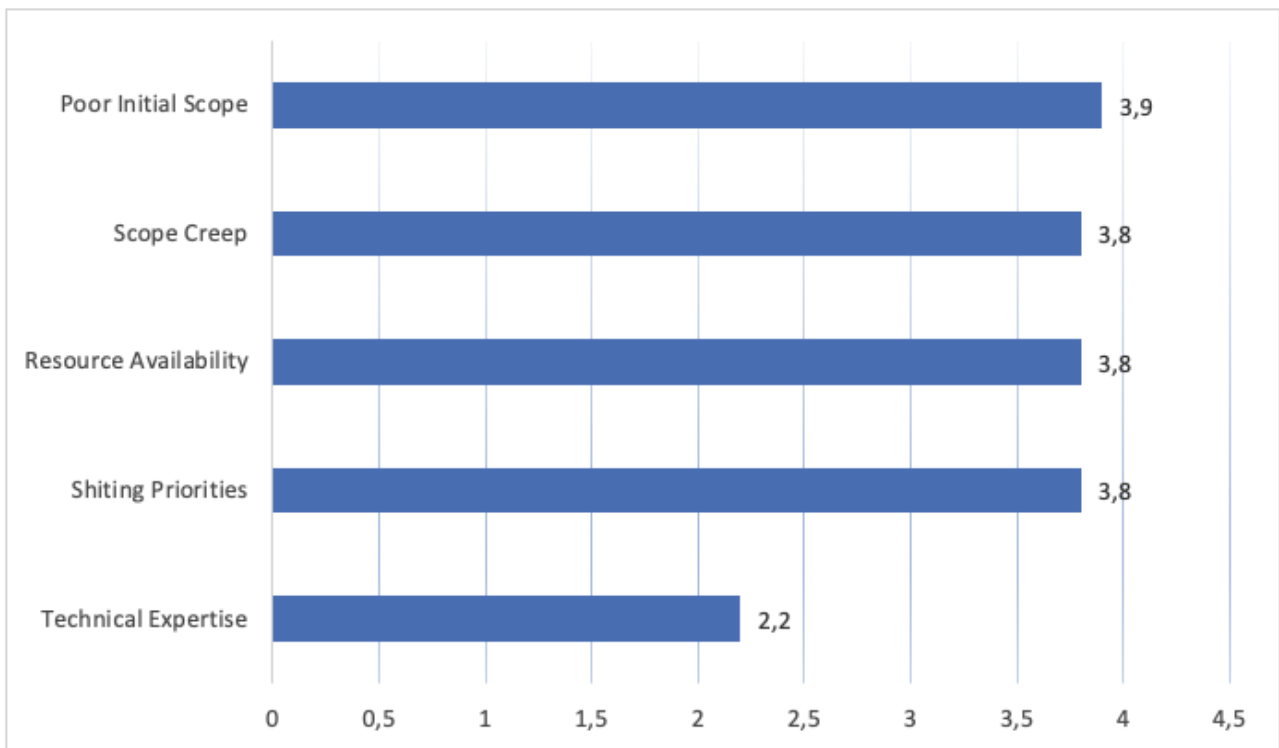


Source: Gartner Group based

Lack of leadership: 24%, Lack of user participation: 14%, Incomplete specification: 13%, Change in specification: 13%, Lack of senior management sponsorship: 8%, Technology failure: 7%, Unrealistic expectations: 6%, Confusing objectives and scope: 6%, Unrealistic work plan: 5%, New technologies: 4%.

Complementarily in Gartner (2016), in the metric on significant factors in projects that are delayed or require more budget, to the question: How important is each problem in projects that are delayed or over-budgeted? (Figure 2), the *Poor Initial Scope* was the most significant factor with a score of 3.9, followed by *Scope Creep* in the range rated 3.8, while *Technical Expertise* was the least significant factor, measured on a scale of 1 to 5, where 1 = Not Significant and 5 = Very Significant.

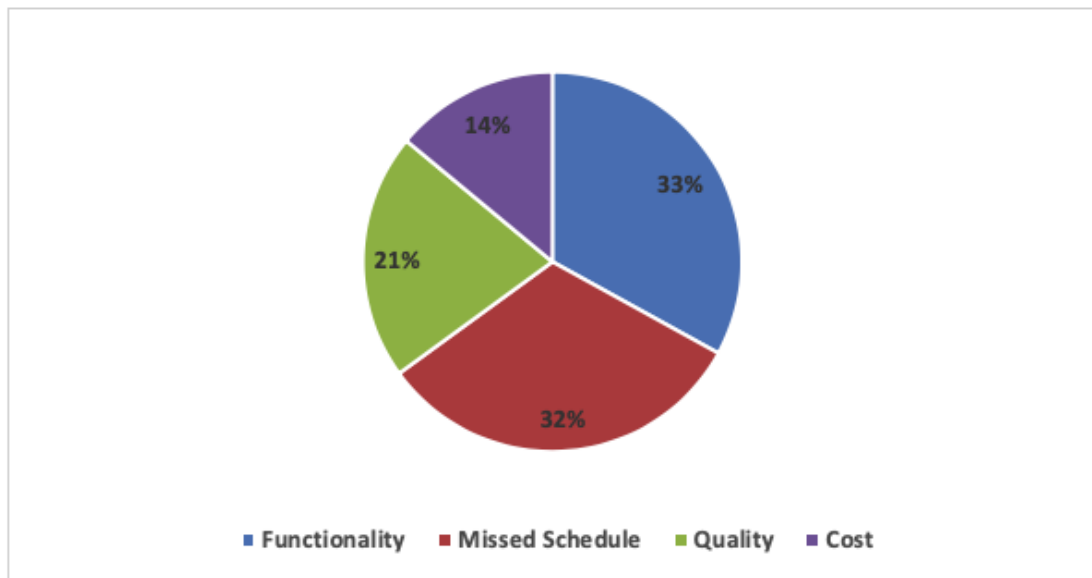
Figure 2
Significant factors in projects with delays or cost overruns



Source: Gartner based (2016)

Another metric in Gartner (2016) is the one associated with the reasons for projects being less than successful (Figure 3), where the two most important reasons given for unsuccessful projects were *Functionality* and *Missed Schedule*, measured on a scale of 1 to 5, where 1 is poor and 5 is excellent, and where the average score was 3.7.

Figure 3
Reasons why projects are less than successful



Source: Gartner based (2016)

In this way, Panorama Consulting Group in 2016, proposes the following premises associated with this problem:

- This type of technology project does not fail because of the technology itself. They fail because of organizational weaknesses.
- A mistake that often happens is that mature technology is implemented to implement processes that are not yet mature.
- Change Management accounts for more than 50% of the success of such a project.
- Technology is an enabler, it is a consequence, a response to organizational needs and not the other way around.
- The technology to be implemented must become an ENABLER of the organization's business strategy.

Other reasons for failure listed by "Evaluando ERP" (ERP, 2013) are:

- Consultancy analysis contracts with reference to the implementation of the information system, by inexperienced companies that do not adequately carry out the research and give as results too general works with little information and no supporting documentation.
- There is no clear communication channel between the contractor and the client, each one sees from his own expectation what he wants, leaving open the possibility for the failure of the correct and adequate implementation of the system.
- Lack of maturity and lack of management by the organization's managers, no responsibility and supervision as an authority.
- When an organization takes the initiative to implement the information system, they must carry out an assessment of their capabilities and what they wish to project, from their internal resources and with the expert staff, in order to have a clear understanding of the risks that can be encountered.
- System integrators and consulting firms need to be clearer in explaining the pitfalls of a project and the factors of success to potential clients. Some consultants depict an overly positive scenario during the sales process. Such superficial comments must be avoided.

2.5. Overview

According to Dorsey, P (Dorsey, 2005), information systems projects often fail. Depending on the academic study, the failure rate of large projects is reported to be between 50% and 80%.

Based on experiences, when undertaking a large and complex project, the realistic expectation is that the project will fail. In particular, business process reengineering (BPR) projects have an even higher failure rate due to their expanded scope. Hiring a large established consulting firm is not a guarantee of success; neither is there a guarantee by purchasing packaged software and running it.

During the construction of a project, every step must be tested and inspected. In software projects, if you do not start writing code in three months, you mistakenly think something must be wrong. We need to identify the lack of sense in moving forward without a careful plan. As an example, in a project the project manager started with the technology documentation team to start writing the training manuals before the user interface was stable. This is as smart as bringing in the painters before the walls are built.

Then, what really causes these systems projects to fail? Is it a technical secret that most system engineers do not know about? Are software projects so drastically complex that only the most talented teams are successful? Because it is not recognized that good engineering principles should be applied to software projects not only with methodology but also with the application of common sense for the good development of the project.

A misconception of software is that it is just an interface, and all you need to know is where to click on the tool. If the use of the tool is not made by understanding and correlating the process that surrounds it, this action is a simple task isolated from the process. Similarly, it is wrongly believed that the only real contribution to an information systems project is to write code. What about the processes?

2.6. Three keys to project success

For Dorsey, P. (Dorsey, 2005), three general factors that all successful projects have in common are identified. Each of these factors is key to the success of any project:

- Support from Senior Management.
- A solid methodology.
- Solid technical leadership by someone who has successfully completed a similar project.

If these factors are not implemented comprehensively, there will be a higher chance that the project fail. These factors are described below according to the study conducted by Dorsey, P. (Dorsey, 2005)

2.7. Support from higher management

In various studies of the success or failure of information systems projects or in general any project, the support of the higher management has been identified as a critical success factor. Without the full commitment of senior management, when problems arise in a project (as they inevitably do), the project will collapse. The management of any organization that undertakes a systems project must be aware that the project will face serious setbacks. They will have to be prepared to remain visible behind the project, despite these setbacks or the project may stagnate or fail.

2.8. Development methodology

Many systems are built without methodology or with incomplete methodological implementations which are even worse. As soon as the team meets and begin to carry out activities, the information is obtained and development or hiring begins. This lack of attention to the process can generate failures in the system. It is easy to see the result of a lack of attention to the process after a system fails.

2.9. Technical leadership

Just like a building needs an architect, a software system needs technical leadership. To be successful, the architect or technician must be the one who controls the "architecture" or structure of the project, that is, the data model and the design of the application. This level of control must be recognized by all those involved in the project. Otherwise, each part of the system can be independently built by one part of the equipment and the parts won't fit at the end.

2.10. Interdependent factors in the success of the project

In any systems project, there are four interdependent factors:

- Cost - Quality - Time - Risks

The two most important factors are risk and quality. The system must work and successfully satisfy the user's requirements. This allows speed (time) and cost (money) to adjust accordingly. If you insist on rapid development time or low cost, then quality and risk will change accordingly. There are arguments with project managers about this principle. You can insist on low risk and high quality, recognizing that time and money must be adjusted to achieve these goals.

2.11. Data migration and implementation

Two additional factors to determine the success or failure of a project that are often forgotten are data migration and the implementation of the information system. Data migration must be planned from the beginning in any project. Data migration should be considered as a separate project due to its relevance and possible complexity.

Likewise, even a well-designed, well-documented and carefully designed system can still fail 10 to 20% of the time because the implementation is not handled correctly. This may be due to inadequate user training, a bad transition from the old to the new system and the lack of user support for the new system. (Change knowledge and management).

2.12. Other references

On the factors that mark success, we find data similar to the ones in the Project Management Institute PMI (PMI, 2013), which indicate that within the aspects of maturity in project management for projects to meet commercial objectives and purposes (figure 4). Are in the first instance having mature processes for the realization of benefits with 79%, followed by mature practices in the management of portfolios with 76% and a high organizational agility with 74%. The last one is closely related to business processes and their degree of optimization.

Figure 4
Projects that meet the objectives
and commercial purposes



Source: PMI based (2013)

On the other hand, the PMI also points out that in the most representative factors in high performance organizations have had an impact on the success of complex projects, there are effective communications with 38% (figure 5), a sponsor that supports the project with 25 %, the link between the project and the organization's strategy with 16%.

Figure 5
Factors that affect the success
of complex projects



Fuente: PMI based (2013)

3. Research methodology

This will be a non-experimental, observational, descriptive, exploratory study with secondary sources of information. This study is not experimental in nature because it does not generate the definition and manipulation of an independent variable to see the effects of its application.

It is observational in nature, since the authors will attempt to look at, synthesize and organize the factors found in the documentation as responsible for failures in the information management processes implemented in business processes.

The exploratory nature of this work has to do with the situation regarding the actions of researchers and their search for information in databases for the collection and synthesis of the same in order to establish the factors responsible for failures in the management of processes due to bad decisions, bad analysis, bad information gathering and omissions that affect the optimization of processes.

The descriptive elements of this process have to do with establishing the frequency, weighting and narration of the panorama of factors mentioned in the related documentation, leading to the use of descriptive statistics using frequency measures.

It is understood that this is a study of secondary sources, since the elements that will be taken to establish the most important factors in the failure of the management of information processes in the definition of processes will come from articles that have compiled information on the subject. These articles are consulted to establish the frequency with which certain factors are reported as absent from the failures in the management of processes due to an inadequate use of resources.

4. Formulation of the problem

Companies and organizations are dynamic and changing living structures, which require having an adequate and rapid formulation and structure of function in the organization of processes that allow them to clearly establish routes for the timing management of information that facilitates processes and internal decision making.

Relying on an adequate and rational use of elements that can be optimized for the success of the processes.

Unfortunately, the reality is that there are often companies that see their activities fail due to errors in the management of processes that implicitly have bad practices in the optimization of resources, without being frequent in the documentation, finding studies that from a review, synthesize and establish the frequency of the main problems that can be evidenced in the management of information processes and the poor optimization of resources with which people work in information management.

The lack of studies with the aforementioned characteristics will mean that companies, due to the lack of a synthesis, the frequency of problems, in the organization of processes and poor optimization of resources, have failures that lead them to lose opportunities.

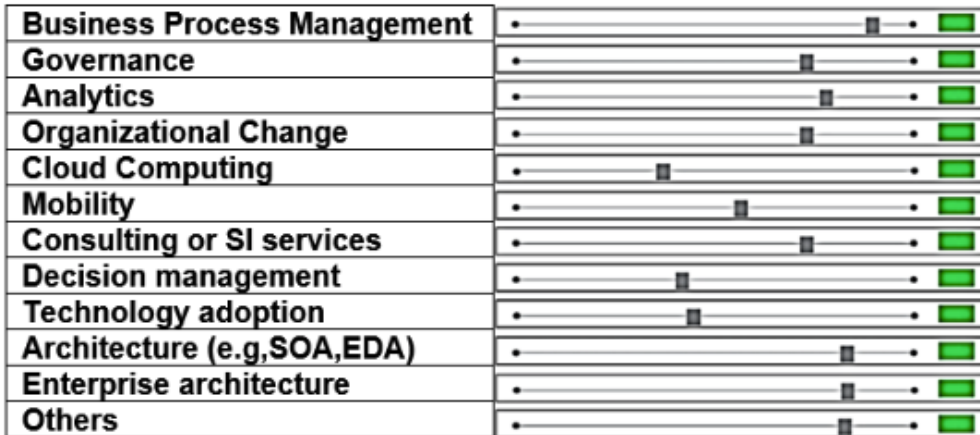
of business, income of lost resources of the positioning and loss of prestige in its differentiating values before other competitors of the sector

5. Descriptive analysis of the situation

In this day and age, where organizations need to adapt quickly to changes and achieve competitive advantages, it begins to be a success factor to respond in a more agile and forceful way in the market, through an adequate design and administration of the processes of deal.

Figure 6
Business agility levels

Business agility levers

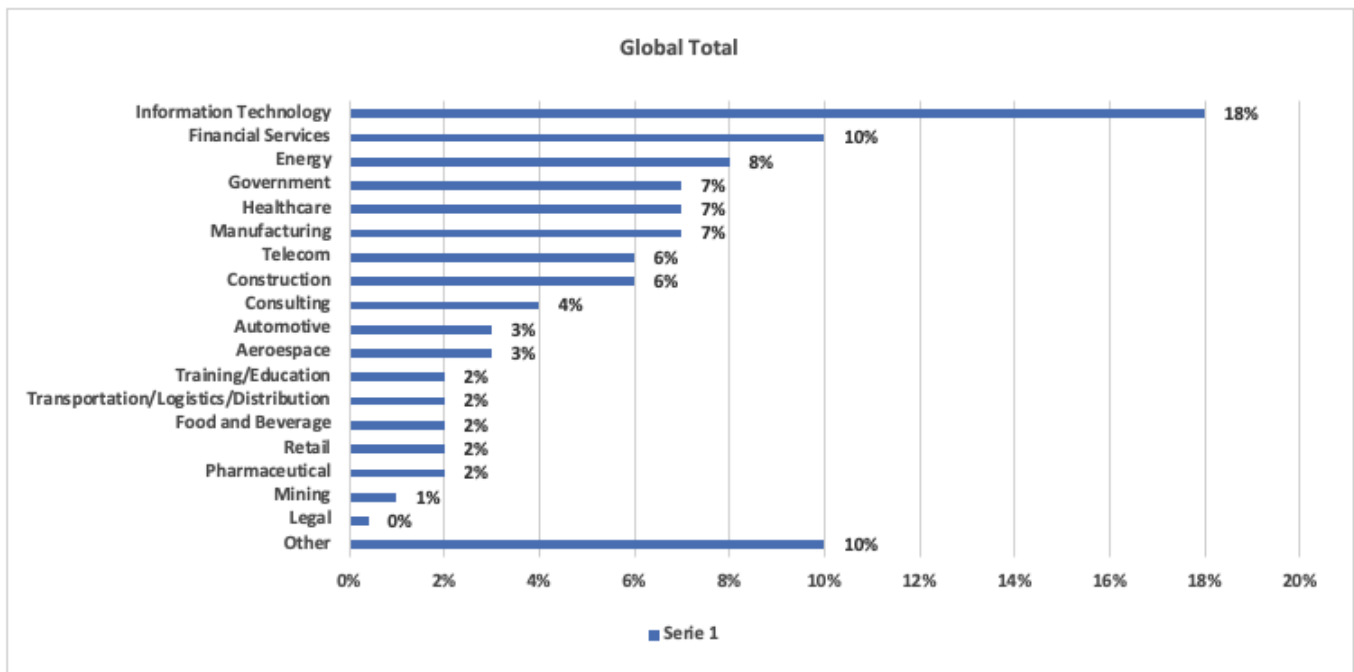


Fuente: IBM based (Holley, y otros, 2012)

The factors that influence the performance and agility of businesses, tend to be under the control of the businesses and supported by IT. However, some of these factors can be observed and tracked by IT with the correct tools and a good interpretation of the events.

This is evidenced in PMI (2017), where in front of the question about the term (s) that best describes the primary focus of the organization, it turns out to be Information Technologies in the first place, a situation that is understandable if one considers that an asset strategic of any organization is your information, which must be treated, managed, guarded with the support of information technologies.

Figure 7
Term that best describes the primary focus in the organization



Source: PMI based (2017)

The Information Systems are structured based on the requirements and scope that are determined by the business processes.

6. Discussion & conclusions

Any situation that needs to be analyzed must be approached from a particular point of view such as the approach of a problem in order to define its causalities, internal and / or external reasons that generate them, and on these to determine possible solutions.

This requires a methodological planning that facilitates the discovery of new knowledge focused on the aspect to be analyzed and / or resolved.

The analysis and research requires reliable and concise sources of information that do not change the direction of what is required to analyze, or that generate errors of information or understanding in front of the research work.

The collection of information in an investigation must generate new information that generates value and new knowledge object of application in different social, cultural and business scenarios.

The importance of Information Systems lies in their nature of strategic support for the organization and to obtain competitive advantages, all framed in an alignment with the goals and objectives of the business, which implies having in context the business processes as object thereof.

- According to the methodologies and best practices, the projects must consider an integral vision of the business requirements and define the project plan to be carried out, understanding the associated processes, and considering them as a source to ensure the expected final result.

They are critical success factors:

1. Apply methodologies combined with best practices for the management of projects in the implementation of information systems, aligned with the business strategy.
2. Define control and measurement programs in each of the main deliverables ensures accuracy and timely corrections if required.
3. Carefully supervise the support and accompaniment of senior management for the project, with a correct communication process so that managers are constantly informed of the progress of the team and the project.
4. To form a good technical team, understood as the technology and functional resources to support all the stages of the project, defining a support program during its continuity.
5. Insist in keeping costs low and accelerating the project, undermines quality, increasing the level of risk of failure, regardless of how well the project is managed. To advance processes of change management and training, focused on the organizational transformation as a whole, both at the level of processes and new associated technologies to ensure increasing returns.

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