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Luiz Andre Megiolaro dos Santos; Elaine Cristina Lopes

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In general, organizational environment has faced major changes in its management processes, especially in what concerns investment in technology. According to Davenport and Prusak (1998), "organizations invest heavily in technology - computers, communications networks and software - because they believe that technology itself overcomes every challenge". However, information allied to technology can make a total difference in any company objective, whether for decision making or creating competitive advantage. Based on this, organizations are looking for technological tools to enhance their processes, among which are the integrated systems of enterprise management ERP (Enterprise Resource Planning), focus of the present work, which also aims to present the relevance of ERP business management systems, as well as its aspects from implementation to its current phase in the organization, advantages, disadvantages, and role in strategic information management.

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# Contribution of Information Management Systems Erp As A Subsidy for Decision-Making

Luiz Andre Megiolaro dos Santos, Elaine Cristina Lopes

Universidade Estadual do Paraná - Campus Paranaguá, Brazil

## Abstract

*In general, organizational environment has faced major changes in its management processes, especially in what concerns investment in technology. According to Davenport and Prusak (1998), "organizations invest heavily in technology - computers, communications networks and software - because they believe that technology itself overcomes every challenge". However, information allied to technology can make a total difference in any company objective, whether for decision making or creating competitive advantage. Based on this, organizations are looking for technological tools to enhance their processes, among which are the integrated systems of enterprise management ERP (Enterprise Resource Planning), focus of the present work, which also aims to present the relevance of ERP business management systems, as well as its aspects from implementation to its current phase in the organization, advantages, disadvantages, and role in strategic information management.*

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## 1. Introduction

The use of information as an input to the development of competitive advantage is increasing in the business world, especially in the strategic field, considering that heavy investment in technologies does not necessarily bring this advantage alone, that is, it is not enough that the company presents technological resources if it does not understand that its differences are rooted in the information internally generated and taken both by processes and by external audiences.

In order to support their participation in the transformations caused by development, there is a need to create models that enable the use of information and communication technologies (ICTs) as a tool for integration between organizations and their stakeholders. This integration occurs through the application of information technology with its systems capable of interconnecting all the operations of companies and their users in order to share information and foster the construction of knowledge. Information systems (IS), besides being responsible for this integration, are also in charge of the storage and organization of the data, changing them into useful information to be the basis for decision making.

Organizational processes are the result of integration of systems, data, information and knowledge, and this flow suggests that organizations need to think about their decision-making models by using these resources in an integrated manner. ERP (Enterprise Resource Planning), which is one of the focuses of this work, is an example of an information system that emerged in the early 1990s and can be defined as a

system capable of integrating relevant information that serves as a subsidy for managers. The ERP is made up of software packages that allow joining the information from all the Information Systems used by the company, which promotes the access in a timely manner by several strategic areas.

In what concerns decision-making, Lopes (2010, p.33) argues that "for this process, information is crucial because it allows the decision-maker to assess the weight and viability of different possibilities that present themselves for a given situation." For this process, the information comes precisely from the systems whose users must be previously well trained for the correct use and feeding with data. Different authors who discuss the impacts of this tool on organizations emphasize that it brings many benefits in the development of their activities in decision-making.

It is also important to highlight the relevance of the Strategic Information Management, considering that the lack of information management within organizational structures impact directly on the integration among its departments due to the excess of information and the difficulty of accessing them, leading the company's employees to work with a certain imprecision, which interferes in the process of knowledge construction (CANDIDO, 2005).

Thus, discussions such as herein presented on the relevance of systems and their role in the process of information management in the business environment are extremely important in the construction of management models.

## **2. Literature review**

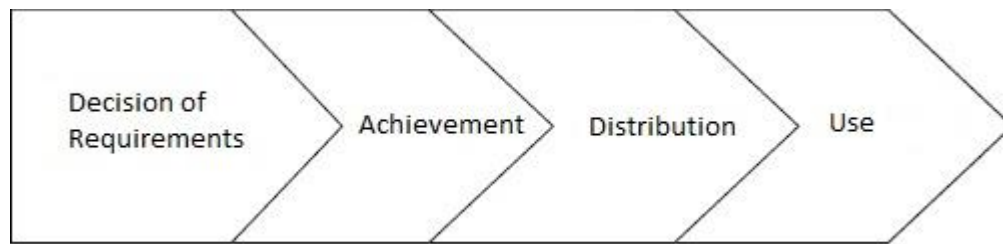
### ***2.1 Strategic information management***

Regardless of the sector, every company handles information during routine tasks. In this sense, it can be argued that information is a fundamental factor for the actions of a company, permeating productive processes, service delivery, strategy making, and decision making, naturally.

Information can be defined as a communication message generally presented in the form of a document involving an issuer and a receiver, and is intended to change the way the receiver understands a particular fact, or to have some impact on their judgments and attitudes (MORAES et al., 2004).

Aimed to guarantee competitive advantage and consequently survival in the market, companies now understand that it is increasingly necessary that they implement management practices of the information generated by their departments in order to facilitate the entire decision-making procedure. In this sense, Lopes (2010) describes information management as a set of processes whose objective is to assist in the management of organizations so that all the information produced by them is more useful and simple to obtain for the formation of business knowledge.

Davenport and Prusak (1998) support the above definition by portraying information management as a process composed of four steps thus represented:



**Figure 1: Stages of information flow management**

Source: Adapted from Davenport and Prusak, 1998

This perspective underlines that every company has an information flow, and Candido et al. (2005) add that strategic information management is non-linear due to the vulnerability of internal and external business environments that directly impact the informational elements of an organization, thus generating uncertainties about decision making, when useful and quality information makes the difference in pointing out the nature of possible problems and their solution in order to guarantee that the company's goals are achieved. According to Lopes (2010), this important information emerges with the implementation of management models to support all stages of the decision-making process.

Information management models in organizations must be directly related to the type of business of the company and also to its mission, vision and strategic objectives, since only then it is possible to define which management practices and working standards are necessary so different areas of the company work properly (CAIÇARA JUNIOR, 2012).

Moraes et al. (2004) state that such turbulence in the business environment encourages managers to try to understand what contributions information technology can make to strategic information management. In addition, it is also necessary to be aware that information is a requirement as important as human resources because, by means of it, managers and employees formulate strategies that can be successful or not according to the decisions made.

However, as for the information management technology, Davenport and Prusak (1998, p.11) argue that "all computers in the world will be of no use if their users are not interested in the information that such computers can generate [...] better computers and better communication networks do not necessarily lead to an improvement of information environments. "

Finally, strategic information management is basically using the information generated by the work units of the organizations by their management information systems in order to draw strategies that guarantee competitive advantage over competitors in the markets in which they operate.

## **2.2 Enterprise Resource Planning (ERP)**

Enterprise Resource Planning (ERP) emerged in the 1990s as an evolution of the Manufacturing Resources Planning (MRP II), and also of its predecessor, Material Requirement Planning (MRP). According to Vieira (2009), MRP emerged with the economic expansion and the greatest computational spread in the early 1970s, composed of packages of systems that communicated in order to enable the planning of the use of inputs. The main function of an MRP is to assist in the decision making of the total materials that meet the demand conditions and allow the companies to calculate the different types of raw

materials needed, and at what time to use, ensuring that they are provided on time, so they go through the manufacturing process as a basis in the order book and also in the commercial department sales estimate (LOPES et al., 2012).

Despite meeting the systematization needs of stock control and order point processes, in 1980, according to Lopes et al (2012, p. 5), "very frequent changes in sales estimates, improvements frequently required in production, and insufficient parameters set by the system led MRP to evolve into a MRP II concept." In this new concept, besides performing inventory and production planning functions, the system also addressed financial aspects, such as budgets and production costs, as well as productive capacity planning (NASCIMENTO et al., 2010). According to Barbastefano and Wank (1996, p. 1), "MRP II is a management philosophy that encompasses the whole organization, making its manufacturing and distribution processes more efficient and effective by reducing inventories, planning supply and demand analysis".

In the mid-1990s, globalization and a growing need for integrated systems led to new packages added to the MRP II which included Finance, Purchase, Sales and Human Resources, as reported by Vieira (2009), leading us to a statement by Lopes et al (2012): "ERP is a system recognized as the most advanced stage of traditional systems called MRP II". ERP is a software basically aimed to integrate all departments of a company through modules that, when implemented, use the same database, allowing access to information in real time and assisting in internal business processes (NASCIMENTO et al., 2010, p.6).

Among the advantages presented by the suppliers of these applications, there are the integration of information that provides holistic organizational management, the updating of its technology park, and the possibility of access to the data in an online and real time, thus streamlining the decision making process.

According to Souza (2000), there is also the reduction of personnel costs, due to the cut of necessary workforce, since administrative processes are simplified by ERP, elimination of duplication of efforts and indicators to evaluate organizational performance.

In this sense, Laudon and Laudon (2004, p. 61) state that the major result of the implementation of these systems is that "managers have more precise and timely information available to coordinate the company's daily operations, and a broader vision business processes and information flows."

### **2.3. Decision-making process**

Decision-making is an attitude taken by any individual during life. It means to choose the best alternative of action, to take an opportunity or to seek a solution on a particular problem after analyzing it. On a daily basis, situations that depend on some attitude, whether important or not, are often presented. The simple fact of going to a restaurant, studying, or starting a business are actions characterized as the results of decision-making. (MORITZ; PEREIRA, 2006).

According to Maximiano (2009, p.58), every decision-making process takes place according to some necessity, so the author emphasizes that there is always "an objective to be reached and an obstacle is presented, or a condition whether there is a fact that requires some kind of action, or an opportunity to be seized."

In order to better understand decision making, it is necessary to know how it is performed. As well

as in the life of an individual, in an organization, in order to solve problems and seize opportunities in an organization, planning is necessary before taking any action, but in the companies, decision making has a different "weight" because the impacts positive or negative effects of an action impact their internal and external environment. The solution is to be aware of the entire path leading to the final action, which is called "decision-making process", and that, according to many authors, is characterized by phases in order to achieve the desired result.

The decision-making process begins by identifying the needs, what can be done to solve this problem, the information that is available and the communication necessary to be established. It is expected that these elements, ordered in a logical structure, result in the possibility of a better decision (PREVÉ; MORITZ; PEREIRA, 2010).

In this manner, it is argued that the decision-making process exists due to a need emerged, in many cases, from problems or search for alternatives to improve performance. In all cases, it is necessary for the company to have relevant information for effective decision making. It is argued that it presents itself as an important tool offered by information systems, since through it the flow of information becomes more efficient, as well as communication between the various sectors and organizational levels, from strategic to operational.

### **3. Results and Discussions**

#### **3.1 Materials and methods**

In order to meet the objectives proposed in the present research, we aimed to construct a framework for analysis based on the use of primary data obtained in interviews within a company that going through the process of implementing an ERP System in the city of Paranaguá, coast of the state of Paraná, Brazil. The interview had 21 open-ended questions, following the criteria of a semi-structured interview. As a method for qualitative analysis, we chose the use of the "Content Analysis" proposed by Bardin (1977), following the "Category Analysis" technique, whose procedures require that the different phases of the analysis are organized around 3 (three) stages, as defined by Bardin (1977). The first one, in which a pre-analysis is carried out, consists of the systematization of the initial concepts, so that later the research of the material is carried out aiming the direction of the work and, finally, the processing of the results, "inference and interpretation".

In order to support the content analysis of the interviews, Atlas Ti software was used, which is a qualitative data analysis tool capable of assisting in the process of theories construction. Following the concepts of the categorical analysis, as well as with the objective of constructing the necessary scope for use of the software, the construction of 3 categories was done, and they were based on the objectives proposed and supported by the theoretical reference that counted with important authors of the studied area. Thus, Table 1 illustrates the categories as well as their definitions according to authors used.



**Table1 – Theoretical definition of analysis categories**

Category	Constitutive Definition
<b>ERP benefits</b>	By means of the ERP system, the information flow becomes more efficient due to the integration among the company sectors, the speed in obtaining information, and the elimination of repetition of tasks (RODRIGUES, 2010).
<b>User Competences</b>	The engagement and commitment of users, from the strategic to the operational level, is of vital importance for the proper functioning of the system in the organization (SOUZA, 2000).
<b>Assignments and allowances for decision-making</b>	Decision-making has been one of the best contributions of ERP, because availability and information basis enables the decision-making process to occur in a safer manner. (VIEIRA, 2009).

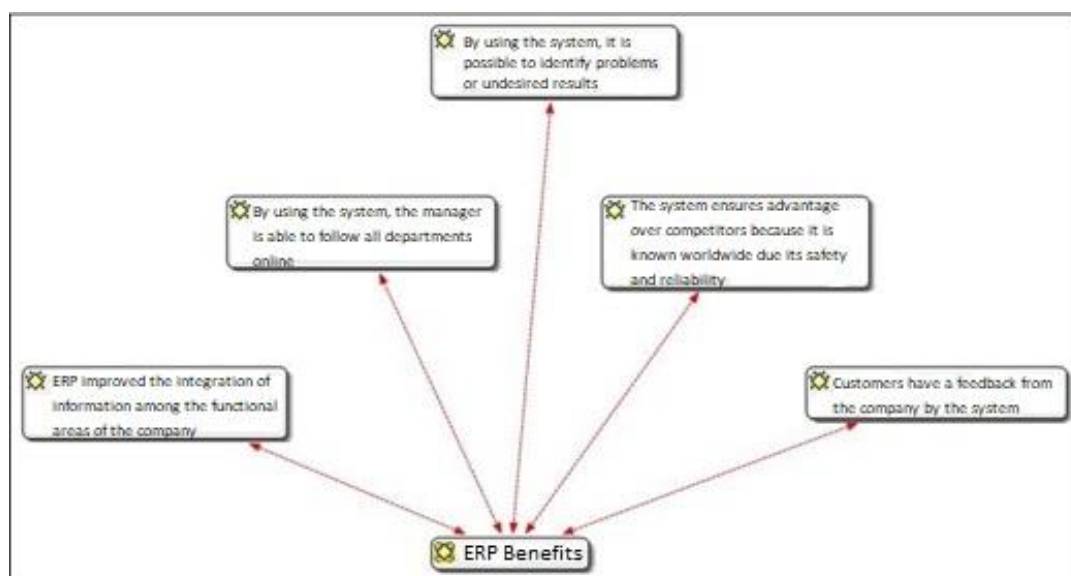
Source: elaborated by the authors

### 3.2 Presentation of results and discussions

#### 3.2.1 Category: ERP benefits

Enterprise Resource Planning (ERP) systems are integrated information systems obtained by companies in the form of commercial software packages according to the characteristics of the company's business segment, in order to support a large part of this company's activities, or to a specific section such as production, sales, purchasing, or logistics. They are divided into modules that communicate and update the same central database (SOUZA, 2000). The process automation and integration's main objective is the improvement in the processes, the performance of the activities, the speed in the process of transmission of information, and development of knowledge in the individuals.

In this manner, it is argued that the benefits of an ERP system should be analyzed and considered in the scope of this research, represented in Figure 2, which shows the classification and development of codes to be discussed.

**Figure 2 – Category: ERP benefits**

**Source: Research data generated by Atlas Ti**

**Elaborated by the authors**

Among the benefits the SAP R/3 system provided to the organization, respondents pointed to the integration of information from all functional units into a single database, improving information flow and thus streamlining administrative processes and corroborates Turban et al. (2007), who describe ERP systems as software that, by a global database, aims to improve and complement the process of communication among all the areas of an organization.

Another benefit pointed out by the respondents is that the information is available online for all departments as soon as they are inserted into the system, in agreement with Souza (2000), who described this possibility as an obstacle to feeding repeated information in the database, thus avoiding redundancies.

As for possible problems or undesired results, the research indicated that the SAP R/3 assists in the analysis of the problems and generates the necessary knowledge for a prompt decision making, in agreement with Moritz and Pereira (2009), who confirm that the systems of information are part of the technological tools that make it possible to identify problems and enable the search for solution..

Throughout the survey, respondents reported believing that because R/3 is a management information system globally recognized for the security of their information, it gives them an advantage over their commercial competitors, since at the moment the organization offers their customers handling and stocking of goods, it is expressed that the software is used in order to show they concern for the integrity of their information and of their users. However, Davenport and Prusak (1998) prevent that companies with the best IT systems can actually take advantage, although it may be brief because the decreasing hardware and software costs and the latest technology today can be purchased at a lower price by your competitors tomorrow.

Respondents reported that the integration provided by the ERP is also present in the organization-customer relationship by means of an SAP module named EDI (Electronic Data Interchange) that allows feedbacks to be given to customers when their products arrive at the warehouse organization or when these goods are suitable to export.

### 3.2.2 Category: Assignments and allowances for decision-making

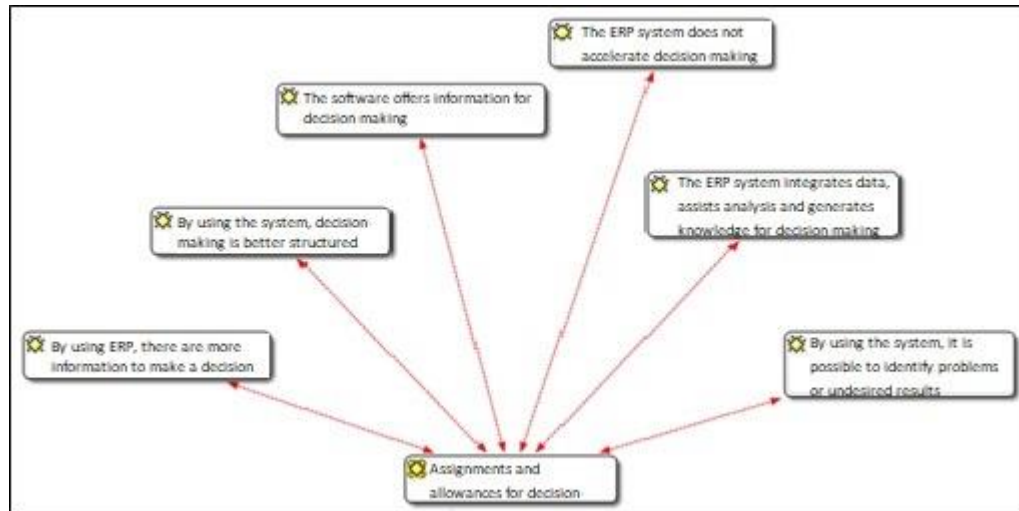
Decision-making is essential to the management of an organization because all of its planning and strategies are performed by means of it. Each individual is a decision maker, and the organization is seen as a system of decisions, where each action taken can generate both positive and negative impacts in its internal and its external environments.

According to Maximiano (2009), decision-making is characterized as the search for problem solving, use of opportunities and achievement of objectives. In order to help companies and enables the decision-making processes more effectively, technological tools have been developed to contribute to the identification of problems and the search for alternative solutions.

ERP system is a tool aimed to enable the search for alternatives of solutions for the decision makers of a company, and this is due to one of its major advantages, which is to allow a holistic view of the



organization, obtaining information of each sector in real time (VIEIRA, 2009). Next, represented in Figure 3, see the category: Assignments and allowances for decision making by means of the ERP system in the company.



**Figure 3 – Category: assignments and allowances for decision making**

**Source: Research data generated by Atlas Ti**

**Elaborated by the authors**

Respondents declared that with the use of the ERP system, there is more information to make decisions, and this is due to the fact that the system provides information of all departments of the company in real time. This is in line with what Vieira (2009) points out that ERP system offers integration among the different departments of the company, and it is possible to obtain information from each sector by it.

Also according to the respondents, the decisions made are better supported, that is, the information inserted in the system gives more security to the decision maker to approach some problem. ERP system avoids redundancy and inconsistencies of information, supporting the decision maker with faster and safer information compared to the system previously used by the company. Therefore, the software is seen not only as a system aimed only to store data, but rather as a tool for solving problems and enabling management because it has more subsidies for such decisions and it is less time consuming to analyze, guaranteeing safer action for users.

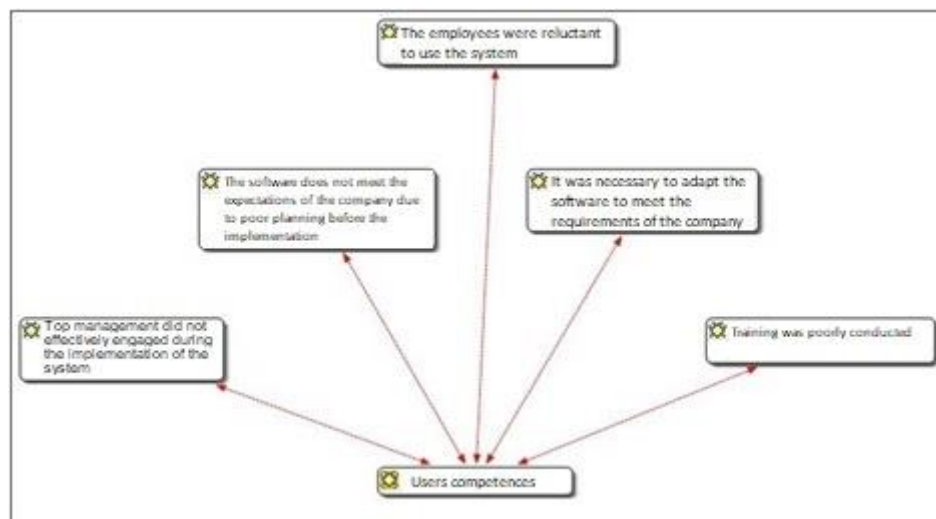
There was a divergence between the respondents' arguments and what is found in the literature about a decision process occurring more quickly through the system. For several authors, the ERP system accelerates the decision-making process due to its speed in providing real-time information about each department, offering the users some comprehensibility. However, respondents assert that the system does not accelerate the decision-making process, and that the fact that the ERP provides information in real time does not mean a prompt decision-making process. Respondents stated that the decision maker does not always have a ready response to address a problem, and so the system does not assure that decision-making occurs more quickly.

Respondents agree that the information provided by the ERP is more reliable. They state that it actually generates knowledge for users by analyzing the information available, and that the system is a high spot since it provides information about staff, processes, and supplies involved.

### 3.2.3 Category: users competences

User's competence is reflected in the attitudes they adopt regarding the implementation and use of the ERP system. Rodrigues (2009) states that organizations need to give close attention to the human factor operated in them, so that they can seize the advantages provided by the MIS. The author also reports that when innovating by opting for the use of an integrated system such as the SAP R/3, the organization will face unavoidable changes in its business processes, thus affecting the organizational culture and consequently impacting on the behavior of the employees.

As follows, Figure 4 represents the category: Users Competence and the respective codes to be analyzed for the subsequent inference.



**Figure 4 – Category: Users informational competence**

**Source: Research data generated by Atlas Ti**

**Elaborated by the authors**

In the interviews, the respondents were asked about the participation of the strategic level of the organization in the process of implementing the ERP system. Vieira (2009) considers that senior management involvement and commitment are key if the potential conflicts caused by switching from "isolated" systems to a single "integrated" software are managed with no delays in schedule and budget overruns.

The interviews demonstrated that the engagement of the board of directors of the organization researched was not effective during the implementation of the software, and that the development of the process was handled by the consulting company, which was later replaced due to delays in the completion of the entire installation. These obstacles had their consequences, such as the fact that the respondents reported that the training given was insufficient because the market practice that defines a minimum workload of 30 hours of training was not adopted, leading to a direct impact on the activities of the

organization.

The adaptation of a program is defined as the process by which the ERP is prepared for use in a particular company (SANTOS, 2000). Lucas (1985) argues that such customization is necessary because standard software is not likely to readily meet the requirements of the organization. These changes were also made so that the R/3 software could meet the needs of the corporation object of the present case study.

The second consequence of the problems of the lack of engagement of the senior management of the organization in the process of ERP implementation lies in the fact that, according to the respondents, the first consulting company made unnecessary adaptations in SAP R/3, which had to be corrected by the second company, thus increasing the total cost of the project.

This process of implementing an ERP system requires a transformation in the organizational behavior, as previously mentioned, because departments that once worked with their unique systems and keeping the information for themselves now work in an integrated way and share their data with the other work units, so that if incorrect information is inserted into the system by a certain area of the company, this may harm all other sectors that depend on it, giving them a responsibility that was previously non-existent and generating some resistance on the part of employees (APPLETON, 1997). This situation was also present in the environment of the researched organization, but according to the respondents, the reason for the resistance was based on the employees' adjustment to the old system, that is, they believed that the previous technological tool was better than the new one because they were used to it.

Another point underlined by the respondents is that the system does not fully meet the expectations of the company due to all the poor planning that preceded the implementation of the software, including the lack of IT infrastructure to guarantee full functionality.

## 4. Conclusion

The present study aimed to identify the benefits and contributions to the decision-making process that the implementation of an ERP management information system can provide to an organization. It was possible to observe the importance of information technology and its tools, which aim to help organizations in their processes, planning, communication and decision making.

It is comprehended that organizations should not only consider technological tools as necessary, but rather as a strength and competitive advantage to build customer loyalty by offering security and agility of information, having ERP systems as one of these technological tools, aimed at the management of organizations and considered the most modern at present (MORITZ; PEREIRA, 2006). However, technology alone is not enough, and it requires an information management process coupled with technological models.

By analyzing the results obtained in the research, it was possible to observe that among the benefits provided by the implementation of SAP R/3 system is the integration of the information of all departments of the organization into a single database, which enables the management of the information flow, corroborating with Nascimento et al (2010) that ERP business management systems are tools that facilitate integration and improve the flow of information of the companies that adopt them. Another benefit pointed out by the respondents is that information is available online for all departments as soon as they are inserted

into the system.

It was verified that the systems have increasingly contributed to the decision-making process due to the availability of information from each sector of the company, offering managers a greater control and monitoring of any problems or failures that occur in the daily life of the company. Regarding the decision-making processes, it was observed that this one receives important subsidy due to the security and quality of the information inserted, besides the timeliness in access, which generates knowledge to the decision makers for the solution of problems and preparation for the opportunities. However, it is important to emphasize that the system did not provide a faster decision-making, but the users had faster information flows of the organization and communication among sectors.

As for the negative points, it was evidenced that the lack of planning was a predominant factor because the system did not meet the expectations of the company, which is largely due to the lack of commitment of the top management of the organization that left the entire software deployment process to be handled by consulting firms, and it increased the project costs as they developed adaptations to the system, and due to the lack of strategic level follow-up, these adaptations ultimately did not meet the needs of the organization and had to be reprogrammed.

Therefore, in spite of the obstacles faced by the company during the introduction of the ERP, it has been efficient and contributed in several operations of the company, providing greater agility in the flow and quality of information and security, allowing a more comprehensive vision within of the company, and helping to identify possible problems in the decision processes.

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