

Implanting IT Applications in Government Institutions: A Process Model Emerging from a Case Study in a Medium-Sized Municipality

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ABSTRACT

Organizations of any kind, including companies and government institutions, understand the need to incorporate information technologies (IT) to improve internal and external communication, faster access to information, modernize decision making and provide better service to their customers. Integrating IT into operations and management requires changes at various levels of the organization (services, processes, forms of work, technology and organizational structure) and brings up several challenges. Considering the level of maturity of existing IT solutions, the acquisition and implantation of ready-to-use software applications is, nowadays, a standard way of gaining access to IT solutions. However, there is a lack of models to guide this process. The objective of this article is to propose such a model. The proposed model is grounded on the findings of a case study carried out in medium size municipality that recently went through the implantation process of an ERP IT application. The study allowed to identify critical features in different facets of the implantation process. The study mainly involved interviews with key participants in the process. The model proposed in this article emerged during this study and accounts for the issues and concerns identified.

CCS CONCEPTS

• **Applied computing** → **Computers in other domains** → Computing in government → *E-government*

KEYWORDS

Model, digitalization, Odoo, government, integration, framework for implantation, implementation, municipality.

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1. INTRODUCTION

Organizations of any kind, including enterprises and government institutions, are repeatedly requested to pay attention to the way they use information technologies (IT). IT enables improving internal and external communication, obtain faster access to information, modernize decision-making and provide a better service to customers. Any time an organization achieves the expected benefits from a digitalization project, a new wave of concerns appears. Janowski describes such waves as stages of evolution [1] and characterizes the concerns that dominate each stage, distinguishing among digitization, transformation, engagement, and contextualization.

Introducing IT in organizations is a complex process that besides the implantation of IT applications implies changes at various levels, such as services, processes, forms of work, technology and organizational structure [2]. This involves a series of challenges that must be considered as the complexity of the existing work structure, the change of people in their way of working, lack of experience and skills in the implantation of IT applications, insufficient IT infrastructure, lack of technical support of consultants and inadequate budgets [3]. For this reason, to implant an IT application is not a minor problem, has its difficulties and demands specific competencies to be executed successfully, it is about bringing change to a stable environment,

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redefining work, social structures and altering the balance of power existing [4].

Also, in current times the key issue in introducing IT in organizations is not the development of IT applications. Nowadays, IT applications for most organizational needs are available as commercial-off-the-shelf products ready to be used. This ready-to-use doesn't exclude the need for installation and configuration. But it means that a traditional software development process is not at stake.

In this article, we use the term "software implantation" to refer to the activities that involve selecting an IT application and putting it at use in an organization. We do not use the term "implementation", because it is ambiguous, since it can also refer to the development or production of software. The term "implantation" is used inspired by the field of medicine.

In either case, dealing with the complexity of those processes can benefit from the existence of a reference model that can be used to guide the implantation of IT applications and all the related issues, such as change, success, leadership, etc.

These concerns can be presented as a set of research questions: Why to implant an IT application? What are the major phases, stages, areas of concern and activities of a process that aims at implanting an IT application? What are the main difficulties faced in an implantation process?

The objective of this article is to establish a model for the implantation of IT applications in organizations that should consider the aspects mentioned in those questions: the activities that must be carried out by those involved (organization and provider of the IT application); the pre-implantation, implantation and post-implantation phases with their respective stages; in addition to transversal areas of concern such as leadership, communication, change management and project management, which are very necessary for a successful implantation and often forgotten.

The article presents a model that might serve as a reference for local governments and providers of IT applications. The model was established based on a case study in a medium-sized municipality in Ecuador that got involved in a process of implanting a new ERP IT application.

This document has the following structure: it starts by defining the context of the research and the implantation of ERP IT application as a case study; subsequently the research methodology is proposed; next, the identified implantation model and the digital government stage according to the Janowski model are presented; finally, the discussion and conclusions are shown.

2. RESEARCH PLAN

2.1. Research context

The Decentralized Autonomous Government of San Miguel de Ibarra (Municipality) is the institution that administers the Ibarra canton, capital of the province of Imbabura belonging to Ecuador; It is located north of the capital - Quito and has a population of 181,175 inhabitants [5]. The organizational structure is shaped up of governing processes, advisory processes, value-adding

processes and support processes. Below, the main processes are shown based on the organization of the institution [6].

The governing processes are the Municipal Council, which is the highest authority that is made up of ten councilors and the mayor who presides over it; the consultancy processes are procurator, internal auditing, technical advice, communication, planning, citizen participation management, development management and the institutional management administrator; value-adding processes are cultural, environmental management, appraisals and cadasters, social inclusion, tourism development, citizen security, mobility, constructions, and development cooperation; the supports processes are administrative, financial, tax and information technology management. Also, there are several units, and companies attached to the local government.

Besides, in September 2016 the Municipality of Ibarra issued an ordinance addressing eGovernment. This ordinance promotes the provision to citizens of local government services through web-based channels. It is associated to the implementation of a policy that encourages the "massive use of ICT", with the purpose of linking the municipality to the knowledge society [7].

2.2. Implantation of a new ERP at the Municipality of Ibarra

In 2016, the Municipality of Ibarra was confronted with the need of replacing their ERP application. The request came from the supplier of its existing ERP. The supplier was modernizing its IT solutions, evolving to web-based solutions. The new adopted solution was based on an open source ERP – Odoo – that includes standard modules such as financial management, human resources management, asset management, inventory management among others. The supplier adapted Odoo for operation in local governments and public institutions in Ecuador.

The Municipality of Ibarra accepted this request as the new ERP is based on technology that was perceived as facilitator of its eGovernment policy, namely in what concerns the integration between the ERP and other application that the municipality was running.

The municipality negotiated with the supplier to implant the modules of new ERP in three periods. Finance, accounting, budget and payment modules would be implanted in the first period. Inventories, fixed assets, attendance control, vacations, control of guarantees and travel expenses in the second period. And, in the third period, the modules of occupational safety and vehicle control.

The study describes the process since the supplier proposed the change to the new ERP until the moment the study was carried out. At this moment, the second period was being finished. Therefore, more emphasis is given to the administrative and financial management aspects of the institution.

2.3. Research design

For the development of this research, the case study method was used. The study involved interviewing personnel that participated in this project and the collection of documents generated during the implantation process. The study aimed at describing the

process of implantation of an IT application in a local government. Aspects to be covered include motivations, main problems, positive and negative aspects that occurred during the implantation. The case study covers an unique case, accepting that this is a representative case of IT implantation that would enable to capture the circumstances and conditions of a common situation [8].

The unit of analysis for this case is whole process that involved the implantation of an IT application (Odoo) in an organization (the Municipality of Ibarra).

The interviews had an average of fifty minutes each and the people consulted were: the IT director, the responsible for the software area, and one systems analyst, all belonging to the staff of the Municipality; an implantation technician from the provider. The interviews were carried out by tele-conference and, they were subsequently transcribed.

The documents collected were: Request for Proposals (RFP), work plans, weekly plans, follow-up reports, training reports, compliance reports, meeting minutes, delivery-reception report, among the main ones.

For the analysis of the interviews and of the collected documentation, the MaxQDA 2018 tool was used following the recommendations of Kuckartz [9]

After the case study, an analysis was made in order to determine in which stage of digital government the Municipality of Ibarra can be situated, according to the digital government evolution model [1].

3. IT-APPLICATION IMPLANTATION

The Municipality before the implantation used a client-server ERP with which it worked approximately twelve years, it started with some modules, and with time they were increasing more functionality to it, however, only some modules worked integrated.

For the implantation of Odoo in the municipality of Ibarra, the following people were involved: On behalf of the supplier, the general manager, two on-site Odoo implanters and support personnel from the company's headquarters were involved. Staff from the financial, accounting, administrative and human talent departments where the modules were installed were involved on the municipality side. Also, the entire implantation process was supported by IT Management personnel. Approximately forty people were involved in the project.

3.1. Motivations

One of the main motivations for migrating from ERP was that the provider updated its ERP application from a client-server to a web-based version and that in a short time the company would not provide technical support to the old version. In addition to the confidence gained by the provider for the work done with the previous ERP.

The motivations at the organizational level were the integration of the ERP modules and optimize the internal performance of their employees and improve the service to

citizens. The technological motivation was the ubiquity provided by a web application, that is, it can be accessed from any site that has an Internet connection.

3.2. Problems during implantation

The main problems that arose were that the previous ERP did not work in an integrated way, although if it had that functionality, which is why they had to adjust the processes of the institution and the coding used.

Another drawback is that the new ERP lost fluidity and ease of use, this due to the change of technology Client-server to Web, also, the new ERP at the beginning of the implantation had many problems that the provider did not quickly respond which produced a strong resistance of the users. However, the user's resistance was also for other reasons such as the lack of knowledge on the use of web technology, people do not want to change, accustomed to the old ERP, lack of commitment, fear of change, among others.

Due to this resistance, municipal officials led by departmental directors presented their dissatisfaction to the mayor, and the mayor, not knowing the technical and administrative details of the implantation process, authorized working with the old ERP.

After this, the municipality tried to terminate the contract by mutual agreement, the implantation was blocked, and the contract fees were not deliberately paid. This problem was getting out of control, and the provider threatened to take the municipality to court for breach of contract since they proved that they had already delivered 80% of the project of the first phase. Given this difficulty, IT management had to stand firm for the continuity of the project.

Another problem that appeared is the lack of definition of internal processes, the organizational structure of the municipality is by departments, and officials find it difficult to understand that the activities they perform are part of a process, that is, the result of their work serves as an input for another official. This is sometimes aggravated by poor communication between officials, and some units have conflicting staff.

In the training stage, unexpected difficulties arise, such as officials ask for permits, there are few hours of training planned, users do not use the testing platform, they are trained with small examples that do not cover the whole process and, that the official wants have the technician by your side. All this change the planning and even the defined deadlines.

Another complication that arose is that the convenience of the new ERP in web platform was not analyzed carefully, it was assumed that being modern and new technology would work better. In reality, it did not happen because the previous system in some instances worked as an electronic sheet and allowed the entry and retrieval of information in blocks and the reports were generated immediately. There are even cases that the new system may take about twenty minutes more than the previous one.

3.3. A model for the implantation process

The emerging implantation model is shown in Figure 1. It considers three phases (pre-implantation, implantation and post-implantation) and four transversal areas of concern (leadership, communication, change management and project management).

Each phase considers several stages. The preimplantation phase can start from the municipality or the provider. The supplier prepares and presents the ERP proposal based on the characteristics of the organization. The municipality defines the needs and processes, for which it carries out an analysis with the interested parties and observer visits are made to other governments, subsequently, a technical analysis of the application and the proposal is made.

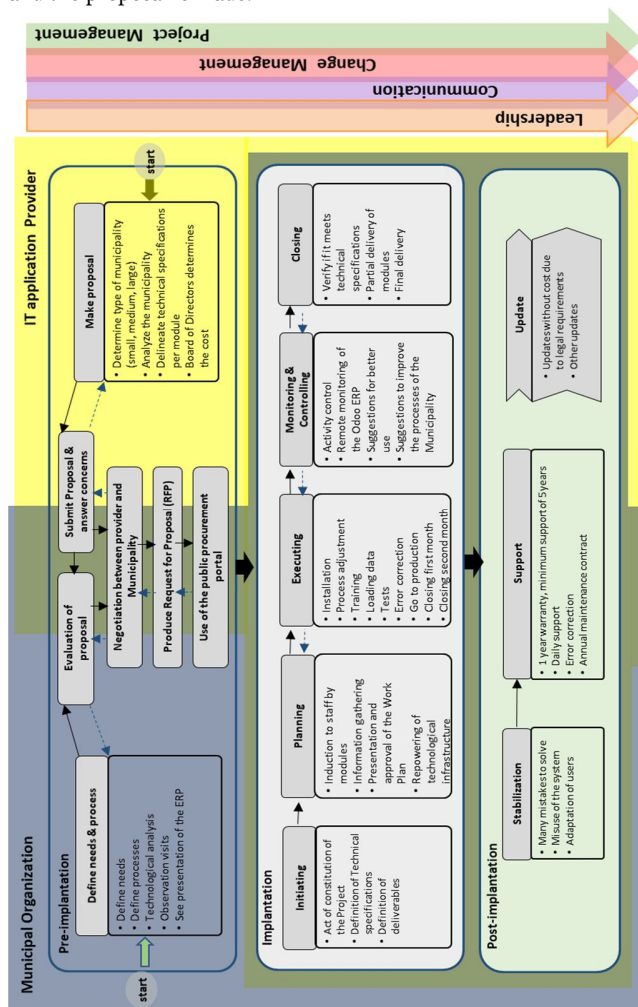


Figure 1: A model for the implantation process

With this analysis, the mayor is recommended to contract, for which, a negotiation stage is entered, where costs and implantation times are determined. With this decision, it proceeds to make the Request for Proposals (RFP) for use in the public procurement portal. In this portal, the legal aspects required by public institutions in contracting processes are determined.

The implantation phase is led by the supplier and supervised by IT department and is carried out in 5 stages: initiating, planning, executing, monitoring & controlling and closing, according to the PMI guidelines [10]. In this phase, the provider work with on-site implanters, who coordinate the work with personnel from the IT department for logistical issues. Besides, personnel from different departments are involved, according to the need of the organization. Also, the provider has staff that carries out support, monitoring and control of the implantation process from the central offices.

The post-implantation phase was carried out by the supplier at the request of the municipality and is carried out in three stages: stabilization, support and updating. It should be mentioned that the stabilization stage is very important, since this is where the problems occurred during implantation are resolved. This stage must be carried out by the established processes. For example, the acquisition process starts with the requirement, passes through several subprocesses and ends with the receipt and payment of the required product or service. Finally, the support and update stages are identified.

Also, this model identifies four transversal areas of concern: leadership, communication, change management and project management; these allow to balance and control the process of implantation of the IT application and that if they are not appropriately conducted can cause severe setbacks to the implantation team and all the members of the organization involved in the project.

3.4. Positive and negative aspects

A positive aspect of the implantation of the new ERP is that the provider demonstrated professionalism throughout the process (that was a reason to re-hire with this provider) in the sense that the company is mature, has different forms for the lifting and delivery of information in each stage. Also, the company showed flexibility in the different stages of the project such as training, stabilization and support, among others, which shows that the company was committed to the success of the implantation. This is due to the fact that the municipality is one of the first migrations that are being carried out and the company is very interested in maturing its product.

Another factor that influenced the successful implantation of the IT application is the leadership of the project exercised by the IT department, from where various activities were coordinated such as: planning tasks to be performed and providing logistical support to the provider; also perform the monitoring and control of the activities carried out by the provider as well as the municipal officials.

It is also necessary to highlight that despite having very complicated initial problems, these have been overcome in the course of implantation, this is due to the adequate professionalism of the provider and the support of the different departments of the municipality.

After the first and second phases of the implantation have been completed, it can be mentioned that the municipality is already functioning in an integrated manner, that is, transversal information flows are already being handled throughout the

institution, but to reach this point it has been necessary to modify and improve processes and, in some cases, re-encode determined parameters.

This project was assumed to be technological, and for that reason it was delegated to the IT department its administration, this generated an administrative burden on IT and difficulties in the municipality, since this department does not have the authority to make decisions that affect other departments and the entire organization itself, in addition, it must be mentioned that the main changes were made in the financial direction.

In this case, the change was not properly managed and, together with the weaknesses of a web application about a client-server and the high response time on the part of the provider in solving the problems, caused a strong resistance of the users that even put the project at risk.

On the other hand, the provider of this tool must worry about improving the performance and usability of the IT application to increase user satisfaction.

4. EVOLUTION OF DIGITAL GOVERNMENT IN IBARRA MUNICIPALITY

As mentioned in the introduction, Janowski proposes a model that consists of four stages (digitization, transformation, engagement and contextualization) and three characterization variables (Internal government transformation, Transformation affects external relationships and Transformation is context specific) which allows identifying in which stage of evolution of digital government an institution is located.

Based on this model it can be determined that after having implanted Odoo-ERP, the Municipality of Ibarra is still in the digitization stage, since according to Janowski, this stage in principle does not imply redesigning, improving or changing in any way the existing processes, services or practices, but merely digitize and automate what already exists and make the results available to interested parties [1].

The Municipality in the period from the first implantation of its ERP to its updating has always been incorporating small improvements to its way of working. However, this does not mean that they are on the way to becoming an electronic government, since for they need to make political and strategic decisions from the Municipal Council and unfortunately, they are always being postponed.

Note: Although process improvements are identified, these are not so deep as to mention that they are moving to a transformation stage, the improvements are oriented towards the control, integration and teamwork of the institution.

5. DISCUSSION AND CONCLUSIONS

The proposed model is presented as the result of a single case study, from which we have tried to identify the phases, stages, areas of concern and most relevant activities. This model can serve as a reference for local governments and providers of this type of applications.

This model for government institutions differs from commercial models [11]–[13], since these do not cover the stages that the institution performs such as: definition of needs, production of RFP, evaluation-selection, negotiation and intervention of the public procurement portal.

This model can serve as a reference for the implementation of IT applications in public institutions, but it should be considered that the Public Procurement Portal can influence the selection process. The way to use the portal may vary according to the policies of each institution, especially when it comes to contracting software since there are many subjective factors that must be analyzed.

In this model, the stage of execution in the second phase is the one that concentrates the greatest responsibility in the implantation process, and this is because it is based on the PMI recommendations.

Before starting a project of this nature, it is advisable to analyze and improve the internal processes of the institution in order to make the most of the new computer tool. It is also necessary to estimate the limits of the tool and have an idea of how the IT application will be integrated with the other existing applications in the municipality.

Another significant factor to consider is to manage the change correctly, it must be considered that resistance to change is typical of human nature, but that well managed can significantly decrease.

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