Chapter

8

Challenges faced by Micro and Small Organizations in Offering Products, Services and IT/IS Solutions for the Brazilian Federal Public Administration

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Abstract

Several initiatives have sought to improve software processes and services in recent years. Despite these initiatives, when the matter is related to the contracting process of the Brazilian Federal Public Administration (FPA), many obstacles are found, such as the complexity of the processes and the continuous monitoring of the control bodies. To minimize these obstacles, the Brazilian Court of Audit (TCU) recommended the establishment of the Instruction SLTI/ MPOG 04, containing guidelines for hiring IT/IS Solutions in Brazil. This chapter presents the challenges that micro and small Brazilian organizations face in providing products, services and solutions for the FPA according to these guidelines.

8.1.   Introduction

This chapter presents the challenges found during research involving academia and industry regarding the supply of Information Technology (IT) and Information Systems (IS) products, services and solutions to the Federal Public Administration (FPA) by Brazilian micro and small organizations (MSE). It also suggests ways to improve the contracting processes. Despite the proposals that involve various actions between industry, academia and government, the characterization of IT/IS organizations in Brazil intensifies the challenges in the contracting processes as these kinds of organizations tend to be immature and know little about FPA demands [SILVA 2013].

In this context, several assumptions were considered to reinforce the need for emerging

research in approaches for products, services and IT/IS solutions supply:

- The FPA has intensified improvements in the contracting IT/IS services and solutions process, however, the reports presented by TCU show that there are deficiencies on the part of the government agencies that make up the FPA in the use of the Normative Instruction IN/SLTI/MPOG 04 in its latest version 2014 [TCU 2015].

- The FPA has faced difficulties in using the contracting process. These difficulties demonstrate that the contracting agencies still face barriers and lack knowledge on the applicability and appropriate use of the Normative Instruction IN/SLTI/MPOG 04/2014 and the defined Hiring Process in Technology Service Management(ITSM) [TCU 2015], [SILVA 2013].

- The Brazilian IT/IS sector is largely made up of micro and small organizations (MSEs) - 94% of the sector, according to research by the Brazilian Association of Software Companies [(ABES, 2015]. These companies do not demonstrate the ability and maturity required by the processes of IN/SLTI/MPOG 04/2014. Research has shown the high degree of complexity in implementing the procurement processes for IT/IS solutions [CRUZ et al. 2011], [SILVA 2013].

- The proposal of IN/SLTI/MPOG 04 resulted from research designed to solve the common problems faced by government agencies in the hiring IT services and IS solution processes. However, these processes focus only on hiring, its phases, activities and required artifacts. Leaving aside organizations that offers these services or solutions to Brazilian (FPA) and its process.

- The processes described in the IN/SLTI/MPOG 04/2014 focus on purely technical activities. In addition, a contracting process involves agreements and/or contracts for supplying products, services and IT/IS solutions. However, commonly issues are found that go beyond technical skills and abilities and that require research and studies that support the relationship "win-win" [PMBOK 2013] for a healthy partnership to be established [SILVA 2013].

- The definition of hybrid processes to offer products and services on IT/IS to the FPA by micro and small organizations is crucial for the strengthening of Brazilian industry. Due to the representativeness of this kind of organization in the Brazilian market, research and government support is needed so that such companies can grow and build up on the market. The biggest challenge is strongly related to the fact that micro and small organizations need to adapt to the demands of the FPA so as to meet the legal requirements defined in the processes that comprise Brazilian legislation [TCU 2016].

Given this scenario, this chapter describes the challenges for micro and small Brazilian companies in providing services in IT/IS for the FPA. Besides this introductory section, this chapter is structured as follows: Section 8.2 describes the research context. Section 8.3 describes the necessary background related to research. Section 8.4 presents research challenges. Section 8.5 describes the research progress. Finally, Section 8.6 presents the conclusions.

8.2. Context

With the growing demand for Information Technology (IT) and Information Systems (IS) solutions, service providers struggle to keep up the high-quality standards required by customers [LIRA, ARAÚJO and BARROS 2008], [BRICKLEY 2001] and [BERGAMASCHI 2004].

In order to improve competitiveness and ability to deliver quality products, whether

at the national or international level, it is vital that IT/IS solution providers are aligned to process efficiency and effectiveness (SEI, 2010; ISO/IEC 2000, 2011).

In Brazil, there has been a growth in the IT/IS industry despite its scarcity of resources and skilled labor [SOFTEX, 2015], [ABES, 2015]. The latest data released by the Brazilian Association of Software [ABES 2015] shows that Brazilian IT/IS Industry is positioned in 7th place in the world ranking, with investment of US $ 60 billion only in 2014. If only the Software Sector, Systems and IT services were considered, the amount totaled US $ 25.2 billion in the same year. The study also points out that Brazil is positioned in 1st place in the ranking of investment in IT/IS sector in Latin America, with 46% of the market, which in 2014 totaled US $ 128 billion in sales. Considering the software market separately, sales reached $ 11.2 billion. The IT/IS services market recorded in the order of US $ 14 billion in 2014 [ABES 2015].

In the national IT/IS market, it handled $ 60 billion in 2014, representing 2.6% of Brazil's GDP (Gross Domestic Product) and 3% of the total IT investment in the world, almost equal to the securities registered in the previous year. The Software sector grew by 12.8% over 2013. However, the services sector showed more modest growth, an increase of 7.3% over the previous year. Overall, software and services grew by 9.7%, above the clear majority of other sectors in the Brazilian economy and also above the country's GDP [ABES 2015].

Regarding Brazilian IT/IS Service Provision, the FPA is the largest consumer of goods and services [SOFTEX 2016]. It has constantly worked on developing initiatives and actions to improve IT solutions hiring processes. The Normative Instruction IN/ SLTI/MPOG 04/2014 publication was one of these initiatives, as well as the IT Solutions Hiring Guide (GCSTI). Despite this, the government's performance related to IT contract management has presented difficulties. Among these difficulties is the fact that Brazilian legislation to ensure efficient procurement processes is quite complex [TCU 2014]. Thus, problems are often encountered in contract execution, even though it follows the defined recommendations. Many of these problems are related to compliance with laws, rules and jurisprudence [CRUZ et al. 2011].

According to Silva (2013), the Brazilian software and IT/IS services industry base their processes on models, standards and methodologies such as CMMI [CHRISSIS et al. 2010], MR-MPS [SOFTEX 2015], ISO 9001 [NBR/ISO 9001 2015], ISO/IEC 33000 [ISO 33000 2015], NBR/ISO/IEC 12207 [ISO 12207 2008] and Six Sigma [TAYNTOR 2007]. These models and standards are sets of best practices for projects, products, services development and integration processes.

Regarding the average size of Brazilian companies, they are mostly classified as Micro and Small Organizations (MSEs), totaling about 94%. The MSEs were responsible for 16% of all the IT goods and services supplied in 2014. This amounted to R$ 153.0 million. Comparing the period from January to March 2014 with the same period of 2013, MSEs increased its stake in by 16% in IT sales to the Government Bodies [ABES 2015]. However, this could have been much

bigger as micro and small IT/IS businesses represent over 90%, as can be seen in Figure 8.1.
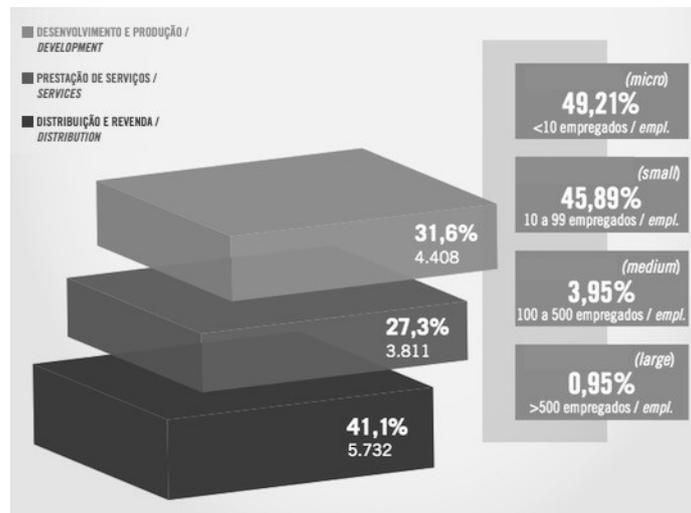
Figure 8.1. Size of IT / IS organizations in Brazil [ABES 2015]

In spite of the increased demand for initiatives to improve the software and IT service processes, the number of assessed and certified companies in CMMI models [SEI 2010] and MPS.BR [SOFTEX 2016] is low the Brazilian industry, less than 1% of certified companies with some maturity or capability level [STAPLES et al. 2007]. This is one of the biggest challenges in Brazil, since the IT industry depends on the government to remain in the market in which it operates [ABES 2015]. The Brazilian software and services market has faced difficulties in the supply of goods and services to the FPA [Cruz et al. 2011], [Silva 2013] due to the demands of compliance with legislation and regulations to provide IT/IS services and solutions.

8.3. Background

This section describes the concepts and the necessary references for understanding the proposed research challenge.

8.3.1. The Brazilian Federal Public Administration

In order to hire goods and services from the private sector, the Brazilian FPA established Decree Law Nº 200/67. This states that to improve compliance with the planning, coordination, supervision and control, the Brazilian FPA should be exempt from task execution, using, where possible, indirect execution by establishing a contract with a third party. Since procurement is required, the planning of this important administrative act becomes mandatory to meet the public interest, in order to minimize waste and the diversion of resources by using them more effectively. According to Cruz (2008), contracting is one of the most frequently used administrative acts.

The Ministry of Planning, Budget and Management (MPOG), through the Department of Information Technology Logistics (SLTI) is the government body responsible for IT/IS Solutions hiring. The SLTI uses agencies and Entities members of the System for the Management of Information and Informatics Resources (SISP) of the Federal Executive Branch [BRAZIL 2008].

To define and institutionalize IT Hiring processes encompasses complex actions involving technical and behavioral issues [BRAGA 2009], [WEILL et al. 2006]. These complexities pose a

risk to the parties involved and as a result the occurrence of serious conflicts involving contractor and contracted is common [WRIGH 2004].

8.3.2. Normative Instruction IN 04/2014

The IN/SLTI/MOG04/2014 [SLTI 2015] structure provides governance mechanisms for contracting services and IT solutions, as shown in Figure 8.2.
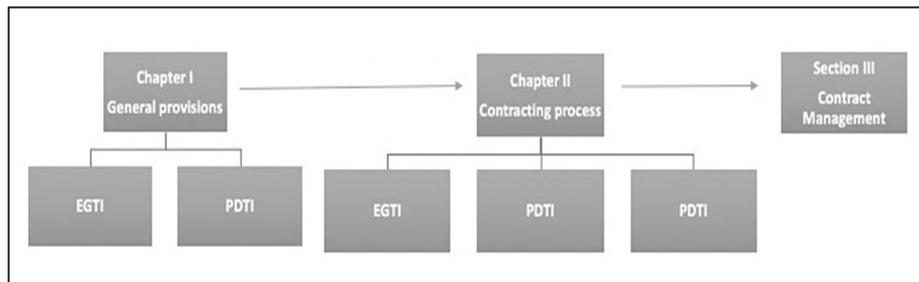
Figure 8.2. Structure of IN/SLTI/MPOG 04/2014 [SLTI 2014]

Chapter I - General Provisions - discuss the General Information Technology Strategy (EGTI), created by SISP, established by Decree 1,048 / 1994 [BRAZIL 1994]. The EGTI is reviewed annually and provides general guidelines for the FPA agencies and IT entities. Furthermore, the elaboration of a Master Plan for Information Technology (PDTI) by each agency or entity member of SISP is mandatory. The PDTI is a diagnostic tool, planning and management of resources and IT processes, which attempts to meet the information and technological needs for each agency or entity for a certain period. This document presents the evaluation and diagnosis of IT resources, the information needs identified by the government body. Moreover, it specifies the planning of investment, human resources and training, equipment procurement and IT/IS solutions hiring.

Chapter II – Contracting Process - describes the IT solutions contracting process, involving procurement planning stages, supplier selection and contract management.

Chapter III – Contracting Management - contains the elements and structure of the IN/SLTI/MPOG 04/2014.

8.3.3. FPA IT/IS Solution Hiring Guide
Public procurement related to IT solutions is guided by the IN/SLTI/MPOG 04/2014 and by the IT/IS Solutions Hiring guide [BRAZIL 2014], based on the phases and processes described in the Normative Instruction IN/SLTI/MPOG 04/2014 [CAVALCANTI 2015].

The IT Solutions Hiring Guide (GSTI – from the *Portuguese Guia de Contratação de Soluções de TI*) is a set of processes, activities and tasks for procurement of IT solutions for the FPA, which implement the definitions provided in the IN/SLTI/MPOG 04/2014 through phases that unfold throughout the process of hiring IT solutions [CAVALCANTI 2015]. The Guide, as well as the IN/SLTI/MPOG 04/2014 has three phases: (i) Planning IT Solutions Hiring (ii) IT Solution Supplier Selection and (iii) IT Solution Contracting Management, as shown in Figure 8.3.
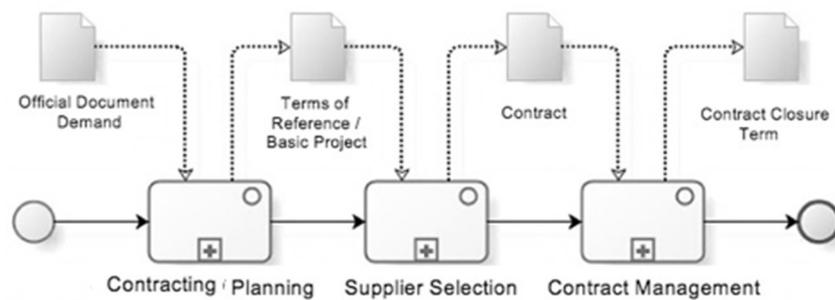
Figure 8.3. IT Solutions Hiring Guide [SLTI 2014] (Own translation)

8.3.4. Capability Maturity Models for Capability and Maturity Processes

CMMI models (Capability Maturity Model Integration) are a collection of several maturity models and a process evaluation method maintained by the CMMI Institute [GALLAGHER et al. 2010], [CHRISSIS et al. 2010, [FORRESTER et al. 2010]. The CMMI model components are grouped into constellations. Each constellation covers an area of interest, such as the acquisition (ACQ), Development (DEV) and Services (SVC) [GALLAGHER et al. 2010], [CHRISSIS et al. 2010], [FORRESTER et al. 2010].

CMMI constellations emerged from version 1.2, released in 2006, when a new architecture was introduced in the models, allowing the creation of CMMI variables that were relevant for process improvement in specific areas [SEI 2010].

A constellation is defined as a set of CMMI components that are used to build models, training materials and evaluation documents [GALLAGHER et al. 2010], [CHRISSIS et al. 2010] and [FORRESTER et al. 2010]. Among the CMMI constellations, the latest released was the CMMI for Services (CMMI-SVC) in February 2009, which extended the CMMI for Development (CMMI-DEV) and the CMMI for Acquisition (CMMI-ACQ) for the practices needed by organizations that provide services as their core business.

8.4. The Challenges

This section presents the key research challenges identified regarding the IT/IS services and solution contracting in Brazil. The challenges are related to the ability of Brazilian companies to offer IT/IS solutions to the FPA.

The challenges description format was inspired by the standard for the definition of process improvements [SOMMERVILLE and SAWYER 1997], and adapted in a format used to describe software standards [BRAGA et al. 2001]. The challenges were divided into 4 categories: i) Process definition and standardization ii) IN/SLTI/MPOG 04/2014 Structure iii) The Implementation of Good Industry Practices for software and IT/IS services and, iv) The maturity of Brazilian organizations. In addition, the challenges have been structured with the following information: Identification, Description, Classification, Related Processes in IN/SLTI/MPOG 04/2014 and Future Works. The challenges of research in IT/IS are presented in the next sections through Table 8.1 to 8.7 to facilitate understanding.

8.4.1. Process definition and standardization

This section describes the challenges related to the standardization process, which is designed to reduce process variability without sacrificing flexibility, i.e. the proper process execution considering the service provision setting and context. Therefore, flexibility is possible, making it more appropriate to the need for procurement and services provision.

Table 8.1. Challenge 1: Establishing process tailoring criteria

Identification: Establishing process tailoring criteria
Description: The IN/SLTI/MPOG 04/2014 is extensive, complex and applicable to any type of IT/IS solution procurement. The possibility to process tailoring, with criteria definition and guidelines for the adaptation according to the contract type, assists the process implementation, considering the individual needs of each contract and its context. In addition, process tailoring enables companies of all sizes to compete, without favoring companies based on their size and/or structure.
Classification: Critical
IN/SLTI/MPG 04/2014 related processes
The entire Normative Instruction with an emphasis on the phase of "Hiring Planning", in which the instruments necessary to execute the contracts are defined.
Future works: Definition of systems solution, based on project aspects, provider size and IN/SLTI/MPOG 04/2014 criteria. The solution would suggest tailoring of the process or practices necessary to support it.

Table 8.2. Challenge 2: Establishing Common knowledge base

Identification: Establishing a Common knowledge base for IT/IS services providers
Description: The IN/SLTI/MPOG 04/2014 defines document creation for services provision still at the planning stages. Documents are defined according to the needs and characteristics of each organization, reflecting their learning and organizational culture. Changing these documents demands training and adapting the work routine. Moreover, change takes time to learn and rework. A good practice is to consider the knowledge of companies providing IT/IS services because the knowledge base contains the active processes used in companies. In order to do this, it would be necessary to create such a knowledge base and demand its updating.
Classification: Intermediate
IN/SLTI/MPG 04/2014 related processes
The entire Normative Instruction with an emphasis in the phase of "Plan Contract", in which the instruments necessary to execute the contracts are defined.
Future works: Definition of a common knowledge base for providers that could help promote the lessons learned. This database must be managed by the government in order to make sure that it is maintained.

8.4.2. Structure of IN/SLTI/MPOG/04/2014

This section describes the challenges related to the Structure of IN/SLTI/MPOG 2014. It points out which demands are related to the process definition and activities at each stage for IT/IS solution procurement.

Table 8.3. Challenge 3: Simplifying procurement planning phase

Identification: Simplifying procurement planning phase
Description: The planning phase for IT solutions procurement requires a high effort and cost. One way to simplify this phase is to define what is necessary and/or required in the context of hiring elements. The requirement level from the contracting phase directly affects how the service is performed. Therefore, it is crucial that the hiring planning phase is aligned with best practices that define which items are needed for the service to be delivered according to quality criteria.
Classification: Critical
IN/SLTI/MPG 04/2014 related processes
Processes related to the IT/IS Solutions planning phase defined in IN/SLTI/MPOG 04/2014.
Future works: Designing different process profiles for the Planning Phase based on the contract size, identifying a simpler and focused way to add value to the phase goal, process profile.

Table 8.4. Challenge 4: Setting an approach to IT/IS service delivery considering the size of Brazilian companies

Identification: Setting an approach to IT/IS service delivery considering the size of Brazilian companies
Description: As already mentioned, Brazilian IT/IS companies represent around 94% of the sector. These companies mostly depend, directly or indirectly, on the government to stay in the market in which they operate. On the one hand the Brazilian Federal Government takes steps to improve the growth and strengthening of Micro and Small Organizations, while on the other, the same government requires high maturity and capability process from these companies, which is only found in IT organizations of medium to large size in Brazil. Therefore, there are gaps between industry and government that favor the emergence of conflicts.
Classification: Critical
IN/SLTI/MPG 04/2014 related processes
The entire Normative Instruction, "the tools needed to plan are defined", "execute and terminate contracts".
Future works: Designing different profiles and approaches in order to empower micro and small organizations to provide systems solutions and services for the government.

8.4.3. Implementation of Software Industry, Good Practices and IT/IS Services

This section describes the challenges related to the process definition and implementation based on good practices disseminated in industry as a way to fulfill the processes described in IN / SLTI / MPOG 04/ 2014.

Table 8.5. Challenge 5: Creating process areas for IN/SLTI/ MPOG 04/2014

Identification: Creating process areas for IN/SLTI/ MPOG 04/2014
Description: The IN/SLTI/ MPOG 04/2014 lists processes and activities that meet the various quality model practices such as CMMI model. However, CMMI models are structured in process areas that are associated with development phases. A challenge to overcome this would be the definition of process areas to relate the processes and activities in the IN/SLTI/MPOG 04/2014 to facilitate the implementation of processes in the context of provision of IT/IS services contracts.
Classification: Critical
IN/SLTI/MPG 04/2014 related processes
The entire Normative Instruction, "the tools needed to plan are defined", "execute and terminate contracts".
Future works: Defining approaches that facilitate the identification of processes that are present in the IN / SLTI / MPOG 04/2014 and the assignment of these processes to areas of common processes, as in models and norms of maturity and capacity.

Table 8.6. Challenge 6: Restructuring IN/SLTI/MPOG 04/2014 considering the Hiring Process Life Cycle

Identification: Restructuring IN/SLTI/MPOG 04/2014 considering the Hiring Process Life Cycle
Description: IN/SLTI/MOG 04/2014 has activities related to the Acquisition process of IT/IS solutions. However, this process is not oriented to the life cycle of the contract objects, disregarding the acquisition results, which are usually aligned with the strategic needs of the contractor and the service provider. Moreover, as the life cycle only focuses on the hiring process, the results can lead to incompatibility between the contract objects and the activities of the provider.
Classification: Critical
IN/SLTI/MPG 04/2014 Related Processes
The entire Normative Instruction, "the tools needed to plan are defined", "execute and terminate contracts".
Future works: Designing project life cycle and solutions that would facilitate the understanding of what should be asked and delivered at each step of the life cycle, also considering the hiring process.

Table 8.7. Challenge 7: Establishing a process standard for IT/IS service delivery focused on Brazilian industry based on maturity levels

Identification: Establishing a process standard for IT/IS service delivery focused on Brazilian industry based on maturity levels
Description: Defining a Process standard for IT/IS service delivery, considering the Brazilian industry context and in accordance with FPA demands. It enables companies of different sizes to gradually increase their capacity in process execution and management, according to maturity levels. The achieved maturity level is an elevated degree for a set of key processes, thus favoring the growth of these companies [SEI 2010].
Classification: Critical
IN/SLTI/MPG 04/2014 Related Processes
The entire Normative Instruction, the tools needed to plan, execute and terminate contracts are defined.
Future works: maturity models proposals, based on knowledge based capacities for delivering IT/IS service.

To accomplish the work, the design of goals and indicators to monitor the number of small and micro organizations providing services for the government is also necessary. Moreover, an indicator should analyze the trends in IT/IS service providers according to the organization's size. In the next section, many initiatives that address research actions to overcome and/or decrease the challenges posed are presented. It is noteworthy that the identified gaps are part of an even bigger set of challenges, prioritized in this work context.

8.5.   Progress Evaluation

There has been much discussion among the FPA and TCU regarding the sustainability of actions in the IN/SLTI/MPOG. Among them, its applicability and effectiveness in supporting public procurement. Such discussion suggests a partnership between Industry, Academia and Government, so that the problems identified can be solved or reduced. Even before the creation of norms and regulations to support the effectiveness of public procurement, it is clear that this relationship lacks actions to address not only the processes and regulations of the FPA, but also the capacity of the Brazilian industry to implement the procedures presented by contracting bodies and regulatory agencies.

Although the government attempts to strengthen micro and small companies for greater competitiveness and market performance, their processes and regulations are complex and create barriers and obstacles in the provision of IT/IS services by micro and small businesses. It is important to identify the perceptions, feelings, difficulties and challenges that Brazilian companies face when providing IT/IS services to the FPA. Considering specifically SMEs and their maturity and ability, the contracting processes for IT/IS solutions in Brazil, which affect how these companies work, are a major challenge to be overcome. Therefore, research into the convergence of the IT/IS supplier-consumer relationship between SME and FPA is crucial for the growth and sustainability of the sector in Brazil.

Research carried out by Silva (2013) to map the degree of adherence of IN/SLTI/MPOG 04/2014 and CMMI models showed a strong adherence to Maturity Level 3 (ML3). In ML3, companies need to define standard processes and organizational assets. This reinforces the idea of high complexity required by FPA in the execution of procurement procedures, which is a concern for IT/IS industry. IN/SLTI/MPOG 04/2014 defines processes that are present in so-called "intermediate processes" in CMMI models. Table 8.8 presents mapping results between the IN/SLTI/MPOG/2014 and CMMI models. The mapping depicts the Normative Instruction requirements adherence to the process areas of the CMM-ACQ, CMMI-DEV and CMMI-SVC models. The adherence is expressed in the coverage degree measured in percentage (%).

Table 8.8. Requirements of IN/SLTI/MPOG 04/2014 and CMMI models

Process Areas	(%) CMMI ACQ	(%) CMMI DEV	(%) CMMI SVC
PP	100%	100%	
WP			100%
PMC	100%	100%	
WMC			100%
CM	85.71%	85.71%	85.71%
PPQA	100%	100%	100%
MA	68.75%	68.75/%	68.75/%
SAM		100%	100%
REQM	80%	80%	80%
SD			100%
OPF	11.11%	11.11%	11.11%
OPD	50%	50%	50%
DAR	100%	100%	100%
OT	28.57%	28.57%	28.57
IPM	70%	70%	
IWM			70%
RSKM	85.71%	85.71%	85.71%
ARD	100%		
AM	100%		
AVER	87.50%		
AVAL	100%		
SSAD	100%		
ATM	100%		
RD		100%	
TS		100%	
PI		100%	
VER		87.50	
VAL		100%	
CAM			16.67%
IRP			50%
SSD			91.67%
SCON			75%
SST			60%
STSM			50%

The CMMI models common areas have the same percentage of adherence due to the similarity among the specific practices in each process area.

At Maturity Level 2, the Project Planning Process Areas (PP)/Work Planning (WP), Project Monitoring and Control (PMC)/Monitoring and Control of Work (WMC) and Process and Product Quality Assurance (PPQA) achieved 100% coverage. Therefore, activities and processes in IN/SLTI/MPOG 04/2014 serve 100% of these areas specific practices. Although the Configuration Management (CM) obtained 85.71%, it lacks configuration items identification activities. Besides, the creation of baseline contracts is not defined. The Requirements Management process area (REQM) got 80%. It was not fully met due to the lack of requirement traceability for changing requirement impact analysis. Finally, the Measurement and Analysis (MA) obtained the lowest percentage of coverage, with only 68.75% due to the lack of specification of measures for monitoring and control. In addition, the IN/SLTI/MPOG 04/2014

does not define procedures for collection, storage and analysis of the measurements, which compromises the measurement system.

At Maturity Level 2, Decision Analysis and Resolution (DAR) obtained 100% of coverage. Other Process Areas obtained differentiated percentage, namely: Risk Management (RSKM), with 85.71%; Integrated Project Management (IPM) / Integrated Work Management (IWM), with 70%; Organizational Process Definition (OPD), 50%; Organizational Training (OT) with 28.57%; and Organizational Process Focus (OPF), with 11.11%. The Risk Management Area (RSKM) was not fully met due to the lack of specification of risk sources and risk categories, making it difficult to identify risks in contracts. The Integrated Project Management (IPM) / Integrated Work Management (IWM) present a lack of adaptation to process assets to guide the contribution to process assets of the organizations, which leads to the loss of knowledge generated from experiences and lessons learned from the contracting process.

The Organizational Process Definition Area (OPD) is defective in some points, such as the lack of description to guide the organization in the implementation of the procurement process. Furthermore, there is a lack of definition of an organizational measurement repository containing the organization indicators; and a lack of a standard to define work environments and training teams, in the context of the organization. Organizational Training (OT) process area does not define the strategic training needs. In addition, there are no training records, consequently, there is no evaluation of the effectiveness, which compromises the management of the organization's training area. Finally, Organizational Process Focus (OPF) presents several problems in defining the needs of the processes, identifying improvements, implementation and monitoring processes, as well as the incorporation of lessons learned in the process.

The Specific Areas of CMMI-ACQ: Acquisition Requirements Development (ARD), Acquisition Management (AM), Acquisition Validation (AVAL), Solicitation and Supplier Agreement Development (SSAD) and Acquisition Technical Management (ATM) achieved 100% compliance. The Acquisition Verification Process Area (AVER) obtained 87.50%; since this area does not define a method of peer review for verification and analysis of the acquisition process artifacts.

The Specific Areas of CMMI-DEV: Requirements Development (RD); Technical Solution (TS); Product Integration (PI); and Validation (VAL) were the areas that showed a higher percentage of compliance, with 100% coverage of specific practices. The Verification Process Area (VER) obtained 87.50%, which, as well as verification Area Acquisition of CMMI-ACQ model, does not define a peer review method for artifacts check.

The Specific Areas of CMMI-SVC: Service Delivery (SD) was 100%. Other areas had a percentage of compliance, as follows: Development Service System (SSD) with 91.67%; Service Continuity (SCON), with 75.00%; Transition Service System (TSS), with 60%; Incident Prevention and resolution of incidents (IRP), 50%; Strategy Service Management (STSM), 50%; and Capacity and Availability Management (CAM), with 16.67% coverage.

In the Brazilian context, research has advanced in relation to the procurement processes of IT/IS solutions by FPA. Several studies have led to the MR-MPS-SW, MR-MPS-SV models [SOFTEX 2015], [SOFTEX 2016], as initiatives in process improvement. In addition to the MR-MPS models, CERTICS [CERTICS 2013] was created supported by the Brazilian Federal Government to encourage public procurement of software products developed in Brazil. Despite significant advances, such initiatives address different contexts of the proposed reported challenge in this research. The provision of IT/IS services to the FPA in the context of MSEs is an emerging need, given the representativeness of these companies in the Brazilian scenario and the need for business growth.

Among all the ongoing effort, an approach to Challenges 3, 4 and 7 is being developed as a PHD thesis on CIn (Informatics Center, at the Federal University of Pernambuco).

8.6. Conclusion

The major challenge for research related to public contracts in the Brazilian Federal context involves the creation of mechanisms that both the contractor and the provider are aligned in terms of objectives, goals and direction. This challenge requires a joint effort among stakeholders, especially efforts that require researchers to understand what the processes are that affect the relationships of acquisition and delivery of IT/IS services FPA. As a result, actions can be taken to reduce the increasingly present gaps that favor both sides. Such challenges, once solved, must reduce the difficulties faced by micro and small businesses that depend on the government to remain competitive in the provision of IT/IS services.

Moreover, steps to promote free competition between companies and which are aligned with Brazilian constitutional principles should be taken. In the present scenario, given the legal requirements in services and IT/IS solutions, only large companies which are few in the Brazilian market, namely 7% (ABES 2015), can support the processes that guide the contracts with FPA. As the FPA and the TCU have sought solutions in hybrid processes of contracting services and IT/IS solutions, this effort could also be applied to the context of the definition of hybrid processes in the supply of IT/IS services and products. Such action requires joint efforts, even in the long-term, to support the maturing of micro and small organizations.

The challenges cited in Section 8.3 are critical given the fact that the Brazilian software industry and IT/IS services, as well as the global industry, works in accordance with norms, standards and best practices to develop software, systems, services and IT solutions. However, the FPA processes are based on Brazilian law, specifically Law 8.666/93 which was the basis for the development of IN/SLTI/MPOG 04/2014.

References

ABES - Brazilian Association of Software Companies. Available at: <http://www.abes.org.br/>. Accessed on :08/10/2016.

ANDRADE, E. L. P., FIGUEIREDO, R. M. C. PCSSCEG - Software Contracting Process and Related Services to Government Entities. IN: Workshop Annual do MPS, 6., Campinas, SP, 2010. Anais do VI WAMPS 2010, 264p, p. 36-45., Campinas, SP: Association of Brazilian Software Excellence Promotion - SOFTEX, 2010. ISBN 978-85-99334-19-5. 2010a.

BERGAMASCHI, S. Management models of information technology outsourcing: an exploratory study. 4. Thesis (PhD) - Faculty of Economics, Management and Accounting, University of São Paulo, São Paulo, 2004.

CERTICS. CTI Renato Archer. 2013. Reference Model for Evaluation - Detail Document. Campinas: Technology Center of Information Renato Archer, 2013. Version 1.1.

CHRISSIS, M. D., KONRAD, M. E SHRUM S. "CMMI: guidelines for process integration and product improvement". Addison-Wesley. 2010.

CMMI INSTITUTE, Publicação de Resultados de Avaliações CMMI. Available at: https://sas.cmmiinstitute.com/pars/pars.aspx. Accessed on: 15/11/2016.

CRUZ, C. S. IT Governance and Legal Compliance in the Public Sector: A Framework Reference Normative for IT Service Contracts. Thesis (MA). University of Brasilia. 2008

FORRESTER, E., BUTEAU, B., SHRUM, S. CMMI: Guidelines for Superior Service. Addison-Wesley. 2010.

GALLAGHER, B., PHILLIPS, M., RICHTER, K., SHRUM, S. CMMI: Guidelines for Improving the Acquisition of Products and Services. Addison-Wesley. 2010.

ISO/IEC 33000. "ISO/IEC 15504 - Information Technology - Process Assessment, International Standard(IS)". 2015.

LIRA, W. S.; CÂNDIDO, G. A.; ARAÚJO, G. M. & BARROS, M. A. The search and the use of information in organizations. Perspectives in Information Science. Vol. 13, n. 1, Belo Horizonte.

SEI, 2010b Software Engineering Institute. CMMI for Services, Version1.3, Technical Report CMU/SEI-2010- TR-034. Pittsburgh, PA: Software Engineering Institute, Carnegie Mellon University, 2010.

SILVA, L. S. P. Model of IT Solutions Hiring: A Comparative Analysis to Identify the maturity and adherence to Models CMMI-ACQ, CMMI-DEV e CMMI-SVC. 2013. Thesis (MA)- Informatics Center - Federal University of Pernambuco, Recife, Pernambuco, 2013.

SLTI, Good Practice Guide on Hiring Information Technology Solutions. Version 2.0, Brasília: SLTI, 2014. Available at: <http://www.governoeletronico.gov.br/sisp-conteudo/nucleo-de-contratacoes-de-ti/modelo-de-contratacoes-normativos-e-documentos-de-referencia/guia-de-boas-praticas-em- contratacao-de-solucoes-de-ti>. Accessed on: 15/09/2016.

SOFTEX, 2015 - Association for the Promotion of the Excellence of the Brazilian Software - SOFTEX. MPS.BR - General MPS Services Guide: 2015, January 2016. Available at www.softex.br. Accessed on 01/05/2017.

SOFTEX, 2016 - Association for the Promotion of the Excellence of the Brazilian Software - SOFTEX. MPS.BR - General MPS Guide of Software: 2016, January 2016. Available at www.softex.br. Accessed on 01/05/2017.

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