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IT governance in the Retail Banking: Behavior and Trends

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ABSTRACT

The corporate governance as IT governance are priorities for companies to sustain business operations and ensure necessary strategy implementations to expand activities in the future. The purpose of this research was to evaluate results and trends for IT governance requisites and frameworks in retail banks in Brazil. Data collection survey was used in this research. Three questionnaires were used as group 1 with questions about banks and interviewed persons, group 2 about requirements to attend IT governance and group 3 about frameworks implemented and to be implemented until 2017. Questionnaires were sent to more than 100 banks and 41 completed answers were received. It was used Likert scale in alternative options. Collected information was statistically analyzed by descriptive analysis, profile segmentation using cluster analysis. The achieved results indicate requisites and frameworks currently in use by the surveyed institutions; in which phase of Implementation the institutions searched are in the current scenario as well the implementation forecast for 2017. Additionally, the results regarding practice adhesion and main requirement benefits to attend IT governance.

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KEY-WORDS: Corporate governance. IT governance. IT governance frameworks. Brazilian banks. Cluster analysis.

Governança de TI nos Bancos de Varejo Brasileiros: Comportamento e Tendências

RESUMO

A governança corporativa assim como a governança de TI continuam sendo prioridades nas organizações para sustentar suas operações e assegurar que possam implementar as estratégias necessárias para expandir suas atividades no futuro. O objetivo desta pesquisa foi analisar os resultados e as tendências de requisitos e práticas de governança de TI nos bancos de varejo no Brasil. O método *survey* foi utilizado na pesquisa. Três questionários foram considerados, sendo o bloco 1 com perguntas sobre os bancos e respondentes, o bloco 2 sobre requisitos para atender à governança de TI e o bloco 3 sobre as práticas implementadas e a implantar até 2017. Os questionários foram enviados para mais de cem bancos e respondentes e houve 41 respostas completas. Foi utilizada a escala Likert nas opções das alternativas. As informações coletadas foram estatisticamente analisadas utilizando: 1) análise descritiva e 2) segmentação de perfis por meio da análise de *cluster*. Os resultados obtidos indicam quais requisitos e práticas estão sendo utilizados pelas instituições pesquisadas; em quais fases de implantação se encontram no cenário atual, bem como qual é a previsão para implantação em 2017. Também são avaliados os resultados sobre a adesão a essas práticas e principais benefícios dos requisitos para atender à governança de TI.

KEY-WORDS: Governança corporativa. Governança de TI. Práticas de governança de TI. Bancos brasileiros. Análise de *cluster.*

1 INTRODUCTION

It is important to know the concept on corporate governance to reach the relevance of IT governance. The corporate governance was discussed to a great extent, in mid-2002, when there were the financial scandals of Enron, Worldcom, and Tyco, among other companies. The financial impacts of these facts led to a greater concern in protecting the *stakeholders*, according to Weill and Ross (2004). Thus, the American government has created a new legislation requiring that executives from the companies attested personally the accuracy of their balance sheets and reported their results more quickly. For these reasons, companies began to have a greater focus on corporate governance (Weill & Ross, 2004).

Thus, IT governance, since 2002, was more directed to meet the regulatory requirements; later, it was found that the IT governance when well implemented, in addition to meeting the legal requirements, can increase the value of business (Weill & Ross, 2006).

Due to the importance of IT governance in organizations, in this article the research question is: Which requirements and practices of governance of the retail banks in Brazil adopted until 2014 and will continue adopting or implementing until 2017?

2 BIBLIOGRAPHIC REVIEW

2.1 INFORMATION ABOUT THE FINANCIAL SECTOR

The financial sector was chosen for this study due to the strong impact of the use of IT on operations of this sector several years ago and, even today, perhaps it is the most computerized banking industry of all. In this sector, it is observed and it is demonstrated that IT investments cause increasing profitability, generating cost reduction and, fundamentally, competitive advantage, as Meirelles (2004) states. The use of IT resources and services is critical for banks to have better competitive position in the marketplace (Cordenonsi, 2004).

In the report of the Ciab Febraban (2013) there are reports that the investment on technology continue to grow in Brazil, in recent years, totaling approximately $20 billion in 2012. Brazil is one of the major participants in the banking technology in the world, and the theme IT governance remains crucial to ensure growth and the operationalization of the business.

The financial sector has invested in a steadily increasing technology, and there is still much room for new investments in Information and Communication Technology (ICT), according to data from a survey conducted by Febraban (2013), in partnership with the Booz & Company, together with the main financial institutions in the country. In it is said that the financial sector is one of that invests the most in technology. In 2012, these companies spent more than $20 billion with it, making the leap of R$ 8 billion compared to 2008 The annual growth rate of spending with IT has been approximately 10%. This way, Brazil is one of the main markets of banking technology in the world, because, of all spent with technology in the country, 15% comes from financial segment.

In this sense, the issues corporate governance and IT governance are crucial for the development and growth of investiments safely and in an auditable way for the Brazilian banking sector. The research Ciab febraban (2013), also published the main*drivers* (*direcionadores*) for the banks. It can be noted in Table 1, the demonstration of the business drivers or technology and main themes, correspondents, who have focused on the growth in new markets, the expansion in existing markets, cost reduction and controls and the audit, since they demonstrate that corporate governance and IT governance continue in the list of priorities of the banks.

Business *Drivers*	*Drivers* of Technology	Main themes
Growth in new markets	Common scalable platforms	Platforms and scalable common solutions Interoperability Flexibility for changes
Expansion in existing markets	Increased accessibility and functionality of the channels	Accessibility Ease of use
Customers' Satisfaction	Single View of the Customer and knowledge/ Behavior Analysis	Focus on the customer
Costs reduction	*Sourcing* of TI to reduce costs Agility/automation of business processes to reduce costs	Efficiency and costs
Controlling and auditing	Controlling and risks management	Security and risks management Governance

Table 1: Main *drivers* of architecture in the banking sector

Source: adapted from Ciab febraban (2013)

2.2 IT GOVERNANCE

The IT governance, arm of corporate governance, according to the Brazilian Institute of Corporate Governance (IBGC), has the role to create controls so that IT works in such a way as transparent as possible towards the *stakeholders* (executives, board of directors, stockholders).

With the emergence of the *Sarbanes Oxley Act* in 2004, IT had to get ready to generate information of systems controls and technologies. The CIOs (*Chief Information Officer*) needed to have planning and resources to meet these requirements, not only defining what technologies can help, but also developing plans to address the internal controls for the company. (Ruzbacki, 2004).

In order to deepen the understanding of the theme IT governance, in this work it was performed a bibliometric study to verify the scientific production of authors in books, Annals of congresses and journals that deal with IT governance.

Vanti (2002) indicates that the bibliometric is composed of a set of research methods used in the area of information Science that use quantitative analysis of data to delineate certain field of study and also to

analyze how the construction of knowledge is related to the behavior of the researchers.

Despite of allowing various analyzes how the geographical dispersion of knowledge production, the evolution of the importance of certain theme in function of time, this work used the bibliometric to identify the main exponents in IT governance to compose its theoretical framework.

As parameters to achieve this bibliometric study, the publications in books, Annals of congresses and journals, national and international, between the years of 2000 and 2015 were considered.

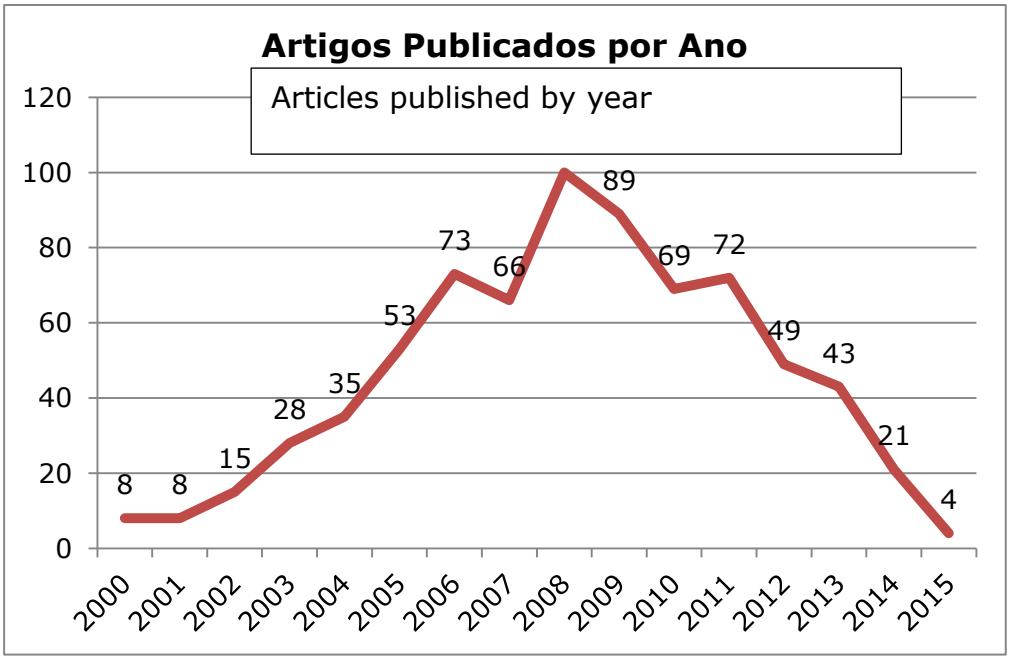
It was the used as the primary basis of research *Google Scholar*, but it was also accessed the bases *Web of Science* and *Scopus*, through the tools *Publish or Perish*, de Harzing (2007).

It was used the following expressions of search in subject fields, key words and abstract, in English with their respective translation to Portuguese:

- *IT Governance* / Governança de TI;
- *Information Technology Governance* / Governança da Tecnologia da Informação

Being applied all the parameters presented, 760 unique results were identified, which passed through an exploratory refinement to discard those that do not belong to the subject researched, reaching 735 unique relevant results.

In Graph 1 below, it is shown the annual evolution of the number of publications between the years 2000 and 2015



Graphic 1: Annual production of books, articles, and Annals of congress on IT governance

Source: the authors

It is possible to observe that there has been a considerable increase of publications since 2000, which reflects in part the problems presented in the introduction of this work.

It was also carried out an analysis of the absolute quantity of citations of each article, seeking to identify the most relevant to the subject. In Table 2, it is presented the five documents most often mentioned, sorted in descending order.

Quantity of citations	Publication year	Author	Title
1851	2004	P. Weill, & J. W. Ross	IT governance: How top performers manage IT decision rights for superior results
958	2004	J. Luftman	Assessing business-IT alignment maturity
823	2006	J. Luftman, R. Kempaiah, & E. Nash	Key issues for IT executives 2005.
527	2004	P. Weill	Don't just lead, govern: how top-performing firms govern IT

511	2003	J. N. Luftman	Competing in the information age: align in the sand

Table 2: Documents with higher absolute amount of citations

Source: The authors

The most quoted, "IT governance: How top performers manage IT decision rights for superior results", by Weill and Ross (2004), can be considered one of the most relevant to the field and has more quotes than the next two works combined. It was a milestone to formalize the IT governance allying the theories to empirical surveys and verifying how companies that achieve good results have deployed the concepts of IT governance. This work is used as the main reference throughout this study.

The next work from the list, "Assessing Business-IT alignment maturity" (Luftman, 2000), discusses how IT governance helps the company to align strategically the actions of IT and business to achieve its objective. This finding is also present in the work of Weill and Ross (2004), reinforcing the hypothesis that this alignment is not only beneficial to the result of the company but it is also a goal to be achieved.

Still by Luftman et al. (2006), the work "Key issues for IT executives 2005" presents the results of research conducted with 105 corporate executives, that has identified these are the biggest concerns of CIOs in 2005: (i) The alignment between IT and business; (ii) attraction, development and retention of IT professionals; iii) security and privacy; iv) Strategic Planning of IT; and v) reengineering of business processes. This is a recurring research that, in one of its recent editions, kept the "strategic alignment between IT and business" as an ongoing concern among CIOs.

The next work most often mentioned by Weill (2004) and Luftman (2003) keep the focus on strategic alignment, allowing us to conclude that IT Governance is definitely connected to this topic.

To obtain a more practice view on the subject, it was found that the overall report *Global Status Report on the Governance of IT* (GEIT) – from *Information Technology Governance Institute – Information Systems Audit and Control Association* (ITGI – ISACA, 2011) – that is a survey conducted with 834 IT executives in 21 countries, in ten business sectors in small and large companies, were presented some important results for the theme IT

governance, such as: i) IT investments create value for the business; (ii) the importance of the role of the IT managers in organizations; focus of governance for it to be aligned to the Business objectives; (iii) rise in *outsourcing,* especially in large companies to achieve business strategies; iv) increased use of *cloud computing*; v) IT expenses to be visible; vi) Reduction of suppliers, permanent *staff* , infrastructure consolidation and use of social networks by employees.

2.3 REQUIREMENTS FOR IT GOVERNANCE

The works from the Massachusetts Information Technology (MIT) on IT governance are important references on this topic in the world scene.

Weill and Ross (2006) describe the results of researches conducted in 256 companies from all over the world in 32 case studies in various sectors, in companies with and without profit, on the subject IT governance. It is highlighted that Peter Weill is the director of *Center for Information Systems Research* (CISR) and researcher senior scientist from the Sloan School of Management at the Massachusetts Institute (MIT Sloan). Whereas Jeanne W. Ross is the main researcher of the CISR.

The research performed by these authors indicates that companies with good governance can reach up to 20% of profitability, which represents the percentage higher than the current one.

Weill and Ross (2004) state that the IT value of business results from a good IT governance, concerning the allocation of responsibilities and decision-making rights. The authors present the *framework* of MIT-CISR, which is very applicable in projects for implementation of IT governance.

Weill and Ross (2004) mention that every company needs to define five decisions inter-related on the area of information technology:

- IT principles – are high-level declarations on how IT is used in business;
- IT architecture – refer to the organization of information, investiments and infrastructure, defined from policies, relationships and different techniques for standardization and integration within IT;

- IT infrastructure – coordinated services of IT, shared and referring to IT capability;
- needs of business investiments - are developed internally or by external partners;
- investments and prioritization of projects and IT activities, i.e., decisions about in what to invest and how much to invest, using explanations and technical approvals.

Whereas Peterson (2004b) mentions that there is concern regarding the relationship between investments and technologies and how they have been managed. These facts have forced that both executives of technology and business recognize that the success of it, currently, is not in the technology itself, but in how it is governed.

The IT strategic alignment should be focused in the strategies and organizational objectives, as suggested by Luftman (2000). The degree of maturity of this alignment provides a compromise between IT and the business areas, to adopt strategies together and in an integrated manner.

An area of IT governance or the definition of responsibilities that ensure IT governance provide the strategic alignment of IT.

According to Van Grembergen, De Haes and Guldentops (2004), the IT governance is characterized by a combination of different practices associated to the structure, processes and mechanisms of the relationship.

The mechanisms of IT governance deal with processes related to monitoring, planning and strategic decisions. In such mechanisms are not only the practices linked to the control of technology, as well as the definition of processes, procedures, and policies that allow the company to measure, monitor and evaluate its situation by following some factors, criteria and best practice settings. (Webb, Pollard & Ridley, 2006).

In Table 3, it is possible to observe a summary of the mechanisms related to good IT governance.

Structures	Procedures	Relationships mechanisms
- Roles and responsibilities	- Indicators of IR performance	- -Main Stakeholders' active participation
- IT Strategy commission	- Strategic planning of Information Systems	- Incentives and rewards
- IT Direct Committee	- COBIT	- IT and businesses placement
- IT Organizational structure	- ITIL	- Shared understanding o the Business and IT objectives
- CIO at the Board of Directors	- Service Level Agreements	- Active resolution of Conflicts
- IT Projects Committee	- Evaluation methods of Investiment Return	- Interfunctional training between IT and Businesses
- Projects office	- Ex Post Evaluation	- Tasks rotation of IT and Business

Table 3: Structures, processes and mechanisms of relationship in IT Governance

Source: Peterson (2004a)

According to Lunardi (2008), the mechanisms and practices designed to facilitate the deployment of models of IT governance, considering the structure that involves the decisions for IT, the processes and the relationship skills to manage the activities related to planning, organizing and IT controlling.

Albertin and Albertin (2010) also present important factors for the decision-making process, such as: participation of senior management; participation of the organization with shared responsibility between IT and business; strategic alignment; influences of IT in decisions; rules and procedures to monitor strategic decisions on investments; centralization, risk and quality of services; knowledge management.

2.4 PRACTICES OF IT GOVERNANCE

There are several suggested practices for good governance that are addressed along this article. The theme safety has increasingly highlight in all business segments and fundamentally in the banking sector. For this reason, this article focuses on this theme.

2.4.1 NBR ISO/IEC 17799 and NBR ISO/IEC 27001– 27002

ISO/IEC 27001 is a standard for *sistema de gestão da segurança da informação* (*Information Security Management System* ISMS), published in October 2005 by the *International Organization for Standardization* (ISO) and by *International Electro technical Commission* (IEC). The standard ISO/IEC 27001:2005 means: Information technology security techniques systems of information management, requirements better known as ISO 27001.

Subsequently, the ISO 27002 (known before as ISO 17799), which is an international standard containing controls for Information Security. This ISO considers the triad: Confidentiality – ensuring that information is accessible only to authorized persons; integrity – ensuring the accuracy and integrity of information and processing methods; availability– ensuring that authorized users have access to information and associated assets when necessary (ABNT, 2005).

Whereas ISO/IEC 37011 provides the following concept in Note of item 2.2.: "The responsibility for specific aspects of IT can be delegated to the managers of the organization. However, the responsibility for the use and acceptable, effective and efficient IT delivery by the organization remains with the leaders and cannot be delegated".

ISO 31000:2009, *Risk management principles and guidelines* sets out principles, structure and a process of risk management. This regulation can help organizations increase the probability of achieving goals, improving the identification of opportunities and threats and allocate and use resources for the treatment of risks.

2.4.2 PMI and PMBoK

PMI (*Project Management Institute*), which has more than 500,000 members in 185 countries, is a great professional association in Project Management. Its Associates are individuals who practice and study project management in several areas.

In the site of PMI, "Chapter São Paulo Brazil" (2013), the main document of PMI, *A Guide to the Project Management Body of Knowledge* (*PMBoK Guide*), is a standard globally recognized for Project Management in today's markets.

2.4.3 COBIT

According to the ITGI (2012), the Control Objectives for Information and Related Technology (COBIT) provides practice using a model of domains and processes and activities structured in manageable ways. They are more focused on control than in execution. These practices aim to optimize investments, ensure the delivery of services and generate metrics to keep track of the activities.

The main components of COBIT 4.0 are organized into four areas and 34 IT processes. The four domains of the COBIT 4.0 are: Planning and organizing (PO), acquiring and deploying (AI), Delivering and Supporting (DS) and monitoring and evaluating (ME).

COBIT 5 is based on five principles, which are: to meet the expectations of stakeholders, separate governance from management, enable a holistic vision, integrated *framework* and cover the business as a whole.

2.4.4 ITIL (*Information Technology Infrastructure Library*)

Information Technology Service Management Forum (itSMF, 2013) defines the ITIL as "one of the best examples of best practices, the library infrastructure in IT has the form of a collection of books, in that there are decades of experience of companies in IT service management."

The ItSMF is an entity created and maintained jointly by industry, by users and by professionals in the field, who have worked for the development and dissemination of ITIL since 1991. The management of the ITIL is handled by the partnership between the itSMF and the *Office of Government Commerce* (OGC), an organ that succeeded the Central *Computer and Telecommunication Agency* (CCTA) (ITSMF, 2013).

The practices of ITIL Version 3, are detailed in five publications which provide an approach for the management of IT services, allowing companies to provide adequate services and ensure that these services meet the business objectives and provide benefits.

These five publications correspond to the five phases in the life cycle of ITIL Service: Strategies for services; Service Architecture; Transition Services; operation of services; and Continuous improvements of Services.

2.4.5 CMMI (*Capability Maturity Model Integration*)

The *Capability Maturity Model Integration* (CMMI) is a reference model that contains general or specific practices" necessary for maturity in specific subjects: Systems Engineering *(SE)*, Software Engineering *(SW)*, Integrated Product and Process Development *(IPPD)*, Supplier Sourcing *(SS)*. This model was developed by the *Software Engineering Institute* (SEI) from Carnegie Mellon University, located in Pittsburgh, in the state of Pennsylvania. The CMMI is an evolution of the CMM (Capability Maturity Model) and seeks to establish a unique model for the business process improvement, integrating different models and subjects. It emerged in the 1980s as a model for risk assessment in the hiring of software companies' *software* by the United States Department of Defense, which together with Carnegie Mellon University made up the SEI, responsible for the evolution of the family CMM, and also performs several other studies in software engineering *software* (CMMI, 2013).

The processes of improvement were born from studies conducted by Deming, Juran Crosbye, whose main aim is to improve the capacity of the processes, that is, the skill with which they achieve the desired outcome (CMMI, 2013).

The process includes three disciplines: systems engineering, software engineering *software* and Engineering of *hardware*.

3 METHODOLOGY

In this work, it is used a descriptive and bibliographic research on the subject. In descriptive research, as the name itself defines, the object of research is described, seeking to find the frequency with which a phenomenon occurs, its nature, characteristics, causes, relationships and connections with other phenomena. In this type of research there is not the interference of the researcher (Barros & Lehfeld, 2007, p. 84). The bibliographical research provides the theoretical foundation necessary to the subject, supporting in the search for variables for greater completeness on the subject researched.

The research approach is quantiqualitative, i.e., it encompasses both quantitative and qualitative research. The quantitative research is "a type of research in which the predetermined variables are measured and expressed numerically (...). Qualitative research is a type of research in which data are collected through social interactions and analyzed subjectively by the researcher." (Appolinário, 2011, p. 149-150).

For the composition of the study, it was used a population of approximately 100 banks and respondents, considering the concept of population, according to Bussab and Morettin (2002), not only as a set of elements or outcomes investigated, as well as a sample, as being a subset of the population.

The hundred banks and respondents to the survey are categorized by type, origin, nationality and size of retail banks in Brazil, following: (a) list published by the magazine *Valor Econômico* (2013), in the report the title "Valor 1000", the 100 largest banks in Brazil; b) list of institutions in operation from the Central Bank of Brazil (CBB, 2014); c) list of the Brazilian Federation of Banks (FEBRABAN, 2013b).

- Type: Multiple, commercial, caixa, investment, *leasing* and financial.
- Origin: private and public.
- Nationality: national, national with foreign participation, national with foreign control, foreign, state and federal.
- Size: the size of the banks follows the classification from the Banco Nacional de Desenvolvimento Social (BNDES, 2014) applicable in all

sectors: large, medium to large, medium, small and micro company, as shown in Table 4.

Classification	Gross operating revenue annually
Micro company	Less than or equal to R$ 2.4 million
Small company	Greater than R$ 2.4 million and less than or equal to
Medium	Greater than R$ 16 million and less than or equal to
Medium-large	Greater than R$ 90 million and less than or equal to
Large company	More than R$ 300 million

Table 4: Classification of sizes of companies by gross operating revenue annually

Source: BNDES (2013)

For data collection, it was used *levantamento survey*, which consists of a systematic method of collecting information of entities (a sample), with the aim of building a summary of characteristics of the attributes of a population more broadly, of which the entities are members (Groves et al., 2004). It was chosen *survey* to gather information in order to understand how IT governance is being implemented in the banking sector. For that, questionnaires were carried out whose answers have become the sources of evidence, in the same way that the statistics of the sector and the information of banks surveyed were used.

The questionnaires were made available by e-mail, it was used the *link* from *Survey Monkey* (management platform for *online* questionnaires) and social networks(*Linkedin, Facebook*) for more than one hundred retailing banks and respondents. The questionnaires were sent to directors, managers and analysts of IT areas, Security, Risk Management and Auditing, among other areas, in accordance with the organization of the structures of banks surveyed to meet IT governance in institutions.

Both in the e-mails and in discussion groups and *link web Survey Monkey*, a letter of introduction was sent to the institutions and respondents, stating the purpose of the research. Similarly, there was the support from ISACA(Information Systems Audit and Control Association) in sending e-mails to their members, requesting participation in the survey.

The questionnaires were prepared based on the construction of the Likert scale, also known as scaling a Likert Scale, a method developed by Rensis Likert in 1932 (Bertran, 2009).

For the construction of the questionnaires the following steps were adopted:

I) a survey of several blocks of information that are considered important in the study and described in the theoretical foundation

II) the development of questionnaires focusing on the respondents;

III) the use of the score from 0 to 10 points;

IV) the final sum of the score, to select the points that indicate the trends with more and less adhesion considered by most of the respondents.

For data analysis of the scale, it was opted for the sum of individual score and ranges that indicate the attitude of the respondent with respect to the statements presented. The Likert Scale of this work was built on two questions.

Regarding the "Requirements for IT governance", it was used, on a scale from 0 to 10, the following scores: 0= I do not know, 1, 2 to 9= Very rare; 10= very used. Current scenario (0 to 10) / scenario for 2017 (0 to 10).

For "*Status* / practice of IT governance", on a scale from 0 to 10, the following points were used: 0= I do not know, 1, 2 to 9= inexistent; 10= fully deployed. Current scenario (0 to 10) / scenario for 2017 (0 to 10).

It should be emphasized that the results statistical *software Statistical Package for the Social Science* (SPSS) used in the research, in the case of "no choice of the *status* by the respondent", implies automatic exclusion from the table.

The questionnaires for the survey were produced in three blocks.

- **Block 1** – Information about banks and the respondents, for better understanding of the answers provided.
- **Block 2** – Questions about requirements to meet the IT governance effectively, according to renowned authors in IT governance and referenced in the theoretical foundation. The questions from 7 to 21 were made as follows:

Question 7 - Is there an area with functions and clear responsibilities for IT governance (ensure strategic alignment of IT and visibility for the Board on the subject)? (ITGI, 2003; Luftman, 2000; Cordenonsi, 2004).

Question 8- Are there controls for *compliance* and risks (plans, systems and processes with tests of controls applied to IT, internal and external audits, protection of IT assets, confidentiality, business continuity plan and evaluation of competition)? (ITGI, 2003; D´Andrea, 2004).

Question 9 - Are the decisions taken in a shared basis and the governance processes and alignment are suitable (IT and business participate of executive committees, Does the Committee of architecture participate in business affairs, it there communication between IT and business either analysts for relationship or others, are there projects offices)? (Venkatraman, 1994; Luftman, 2000; Peterson, 2004b; ITGI, 2005; Weill & Ross, 2006; Albertin & Albertin, 2010).

Question 10 - Does IT governance create value for the business (cost/benefit, growth, asset utilization, business flexibility, others)? (Venkatraman, 1994; Weill & Broadbent, 1998).

Question 11 - Does IT governance meet legal requirements for business (Basel, Sarbanes Oxley, COSO, COSO 2, others)? (Ruzbacki, 2004; Fitzpatrick, 2005; Fernandes & Abreu, 2010).

Question 12 - Are the principles defined and clear in the company (operational model, IT role, desirable behaviors for IT, IT cost, strategic plan for IT)? (Peterson, 2004a; Weill & Ross, 2006).

Question 13 - Is the IT architecture defined and appropriate (how do the main processes and information interrelate, standardization and technological options)? (Weill & Ross, 2006).

Question 14 - Are the needs of business investiments prioritized to be made or purchased in IT properly (opportunities, innovations or are processes achieved in new investiments, and are technical validations and acceptance of the requirements by users executed, Is there management of internal development or external, Are there methodologies of

development, are the measures of success and post-implementation ratings followed up by the people responsible for that)? (Peterson, 2004a; Weill & Ross, 2006.

Question 15 - Does the infrastructure meet the needs of the business (more critical services, data, communications, networking, security, electronic channels), Are there plans to *hardware* upgrades and outsourcing Are the quantities appropriate)? (Venkatraman, 1994; Weill & Ross, 2006).

Question 16 - Are Investment and prioritizations for IT made properly (criteria for prioritization (control of costs/benefits, growth, asset utilization, flexibility for business, profit, including VPL, ROI, IRR, ROE, ROA, etc.), Do Portfolios meet the strategic objectives of the company, monitoring and measuring results generated during the projects and allocate costs for used or shared services)? (Van Grembergen et al., 2004; Weill & Ross, 2006).

Question 17 - Are there indicators for monitoring of services, the activities and projects for the company (*Service Level Agreement* (SLA), availability, capacity, reuse, efficiency, rate of delivery, customer satisfaction, sustainability, among others)? (Peterson, 2004a; Van Grembergen et al., 2004; ITGI, 2005; Kaplan & Norton, 2006).

Question 18 - Are there plans for training of human resources for IT and business in terms of the design activities and operations (skills and competencies), as well as training for rotation of activities between IT and business and amount of appropriate resources? (Peterson, 2004a; Van Grembergen et al., 2004).

Question 19 - Are the approaches of communication appropriate (performance indicators of IT, notices from IT to upper management, project management office or governance, knowledge management, portals or intranets newsletters for all the company)? (Peterson, 2004a; Van Grembergen et al., 2004; Weill & Ross, 2004).

Question 20 - Is the management of projects and services adequate (catalog of services, settings, deliveries on time and quality expected, treatment of incidents and problem management, change management, third parties and contracts, as well as rewards and

incentives for teams)? (Weill & Ross, 2004; OGC, 2008 (ITIL)).

Question 21 - Is there a *framework*/methodology that meets the IT governance in a more complete and integrated way into the company, including integration with customers and suppliers? (ITGI, 2005 (COBIT); OGC, 2008 (ITIL).

• **Block 3** – Addresses the main practices of IT governances currently implemented and to be implemented until 2017, included in the theoretical basis and with prioritization of the most relevant according to research data. The questions from 22 to 29 were made as follows:

Question 22 – COBIT 4.1

Question 23 – COBIT 5

Question 24 – ITIL v.2 e v.3

Question 25 – PMBoK

Question 26 – NBR ISO/IEC 17799/27001/27002

Question 27 – NBR ISO/IEC 31000

Question 28 – NBR ISO/IEC 38500

Question 29 – CMM/CMMI

Another (specify)

The survey data were obtained by the *software Survey Monkey* and integrated by Excel to SPSS system for statistical treatment.

The data collected were statistically analyzed by means of descriptive analysis, segmentation of profiles using the *cluster* analysis (Dendogram, confidence intervals, Bonferroni correction - precision logarithmic and the Pearson correlation (Figueiredo Son & Silva, 2009).

The descriptive analysis was carried out considering:

1) Relative frequency (percentage) for each value of X.

$$Rf_j = \left(\frac{f_j}{W'}\right) \times 100$$

Where:

(sum of all categories including those declared as missing values)

2) A frequency set (percentage):

$$W' = \sum_{i=1}^{NV} f_i \times 100$$

Where:

$$W = \sum_{i=1}^{NV} f_i k_i$$

(sum of all categories not missing)

and

$$k_i = \begin{cases} 0 \\ 1 \end{cases}$$

0, If Xi was declared as missing, and 1 other cases.

For all Xj declared as missing, a frequency set is not applied.

3) Cumulative frequency (percentage)

$$Cf_j = \sum_{i=1}^{j} f_i$$

Average

$$\overline{X} = \frac{\sum_{j=1}^{NV} f_j X_j}{W}$$

In some situations, the average is calculated as:

$$M_j = \sum_{i=1}^{NV} f_i \left(X_i - \overline{X}\right)^j \qquad j = 2, 3, 4$$

$$\text{EUCLID}(x, y) = \sqrt{\sum_i (x_i - y_i)^2}$$

whereby the formula means the distance between two items, x and y, is the square root of the sum of the square of the differences between the values of the items.

The canonical correlation analysis is a statistical model multivariate model that facilitates the study of inter-relationships between sets of multiple dependent variables and multiple independent variables (Hair Jr., Black, Babin, Anderson & Tatham, 2005).

Following are the results obtained in the survey, as well as discussion of these results.

4 PRESENTATION AND DATA ANALYSIS

In this topic the results obtained during the development of the *survey* are presented and analyzed in all phases, as well as suggestions and improvements submitted by respondents. It was obtained 55 answers, 41 of them complete.

4.1 TABULATION OF BLOCK 1 - CHARACTERISTICS OF BANKS AND RESPONDENTS

In Table 1, it is observed that 58.5% of the respondents worked in Information Technology; 31.7% in IT Governance; 17.1% in Information Security; 14.6% in Strategic Planning; 9.8 %in Internal Audit; 7.3% in internal controls; 7.3% in risks; 4.9% in *Compliance* and 4.9% in Processes.

Table 1: Area of operation of the respondents

Area of operation:		
Options of answers:	**Percentage**	**Respondents**
Internal auditing	9.8%	4
Compliance	4.9%	2
Internal controls	7.3%	3
IT Governance	31.7%	13
Strategical Planning	14.6%	6
Processes	4.9%	2

Risks	7.3%	3
Information Security	17.1%	7
Information Technology	58.5%	24
Another (specify)		3
Questionnaires answered		**41**

In Table 2, it is observed that 34.1% of the respondents are managers/administrators; 24.4% Analysts; 17.1% "(*Chief Information Office*); 9.8% Superintendents; 9.8 Supervisors/Coordinators; and 4.9% Directors. At the option "Others", referring to the mentioned areas, are: Project Management and *Customer Experience*. In this option "Others", there is no percentage, since this is not generated by the *software*, but it can be included in the survey, since it is provided in the file for the integration of the tool.

Table 2: Respondents' positions

Position:		
Options of answers:	**Percentage**	**Respondents**
CEO	0.0%	0
Vice-President	0.0%	0
Superintendent	9.8%	4
CIO	17.1%	7
CFO	0.0%	0
CSO	0.0%	0
Director	4.9%	2
Manager/Administrator	34.1%	14
Supervisor / Coordinator	9.8%	4
Analyst	24.4%	10
Another (specify)		5
Questionnaires answered		**41**

It is observed that 80% of respondents are managers of areas.

In Table 3, it is observed that appear the following types of banks: Multiple (46.3%), commercial (17.4%), investment (17.1%), financial (17.1%) and caixa (2.4%).

Table 3: Type of Financial Institutions

Type:

Options of answers:	Percentage	Respondents
Multiple	46.3%	19
Commercial	17.1%	7
Caixa	2.4%	1
Investment	17.1%	7
Leasing	0.0%	0
Financial	17.1%	7
Questionnaires answered		**41**

It is observed that in Table 4, 82.9% of Banks are private and 17.1% public.

Table 4: Origin of the financial institutions

Origin		
Options of answers:	**Percentage**	**Respondents**
Private	82.9%	34
Public	17.1%	7
Questionnaires answered		**41**

In Table 5, it is observed that 46.3% of Banks are national, 26.8% foreigner, 12.2% national with foreign control, 7.3 % state and 7.3% Federal.

Table 5: Nationality of the financial institutions

Nationality		
Options of answers:	**Percentage**	**Respondents**
National	46.3%	19
National with foreign participation	12.2%	5
National with foreign control	0.0%	0
Foreign	26.8%	11
State	7.3%	3
Federal	7.3%	3
Questionnaires answered		**41**

In Table 6, it is presented the size of the banks in large (61%), medium-large (22%) and medium (17.1%).

Table 6: Size of financial institutions

Size (BNDES): Classification by gross operating revenue annual Micro company- Less than or equal to R$ 2.4 million small business - Greater than R$ 2.4 million and less than or equal to R$ 16 million Medium Business - Greater than R$ 16 million and less than or equal to R$ 90 million medium-large - larger than R$ 90 million and less than or equal to R$ 300 million large company - Greater than R$ 300 million		
Option of answer	**Percentage**	**Respondents**
Small (Micro company)	0.0%	0
Small Medium (Small Company)	0.0%	0
Medium	17.1%	7
Medium Large	22.0%	9
Large	61.0%	25
Questionnaires answered		**41**

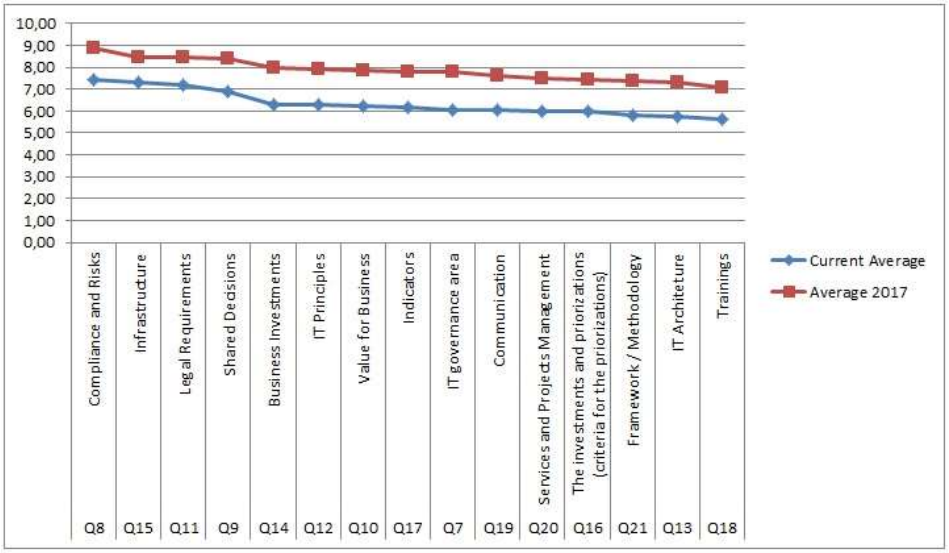
Source: BNDES (2014)

4.2 RESULTS OF THE TABULATION OF BLOCK 2 - QUESTIONS ABOUT REQUIREMENTS TO MEET IT GOVERNANCE BY HIGHER AVERAGES

In order to obtain the results of the tabulation of Block 2; were adopted the following indicators:

- more adhesion: values of the largest arithmetic averages of requirements with scores (0 to 10): I do not know - 0; rare - 1, 2 to 9; and much used - 10.
- less adhesion: values of the smallest arithmetic averages of requirements with scores (0 to 10): I do not know - 0; rare - 1, 2 to 9; and much used - 10.

In the Graph 2, it is shown the results of Block 2, requirements for IT Governance More and less adhesion to the current scenarios and 2017.



Graphic 2: Results of the requirements for IT governance more and less adhesion to the current scenarios and 2017

The Group of the most adhesion to the current scenario: *compliance* and risks (8), infrastructure (15), legal requirements (11) and decisions shared (9).

The Groups of the least adhesion to the current scenario: Training (18), architecture (13), framework /methodology (21) and investments and prioritizations (16).

The Group of the most adhesion to 2017: *compliance* and risk (8), shared decisions (9), infrastructure (15) and legal requirements (11).

The Groups of the least adhesion to 2017: training (18), *framework/* methodology (21), (19) and architecture (13).

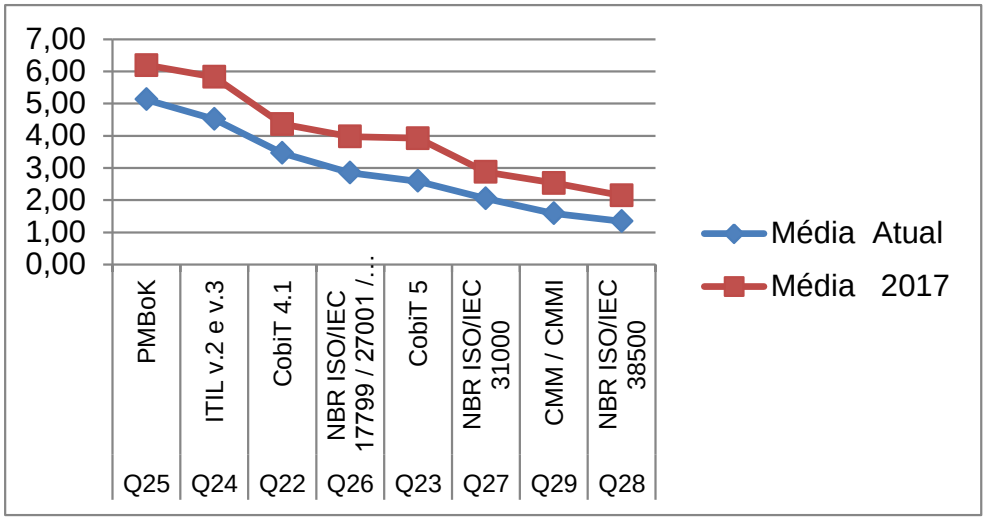
All the averages of requirements for IT governance are growing from the current scenario to the scenario 2017.

4.3 RESULTS OF TABULATION BLOCK 3 - QUESTIONS ABOUT MAIN PRACTICES OF IT GOVERNANCE

In order to obtain the results of the tabulation of Block 3 the following indicators were adopted:

- more adhesion: values of the largest arithmetic averages of the practices with scores (0 to 10): I do not know - 0; inexistent - 1, 2 to 9; and totally deployed - 10.
- less adhesion: values of the largest arithmetic averages of the practices with scores (0 to 10): I do not know - 0; inexistent - 1, 2 to 9; and totally deployed - 10.

In Graph 3 it is shown the results of the averages of groups of practices more and less adhesion to the Block 3, for the current scenarios and 2017.



Graphic 3: Results of the main practices for IT governance more and less adhesion to the current scenarios and 2017

The Group of the most adhesion to the current scenario is made up of: PMBoK (25), ITIL v2 and v3 (24), COBIT 4.1 (22).

The Group of the least adhesion to the current scenario is made up of: NBR ISO/IEC 38500 (28), CMM/CMMI (29) and NBR ISO/IEC 310000 (27).

The Group of the most adhesion to 2017 is made up of: PMBoK (25), ITIL v2 and v3 (24) and COBIT 5 (22).

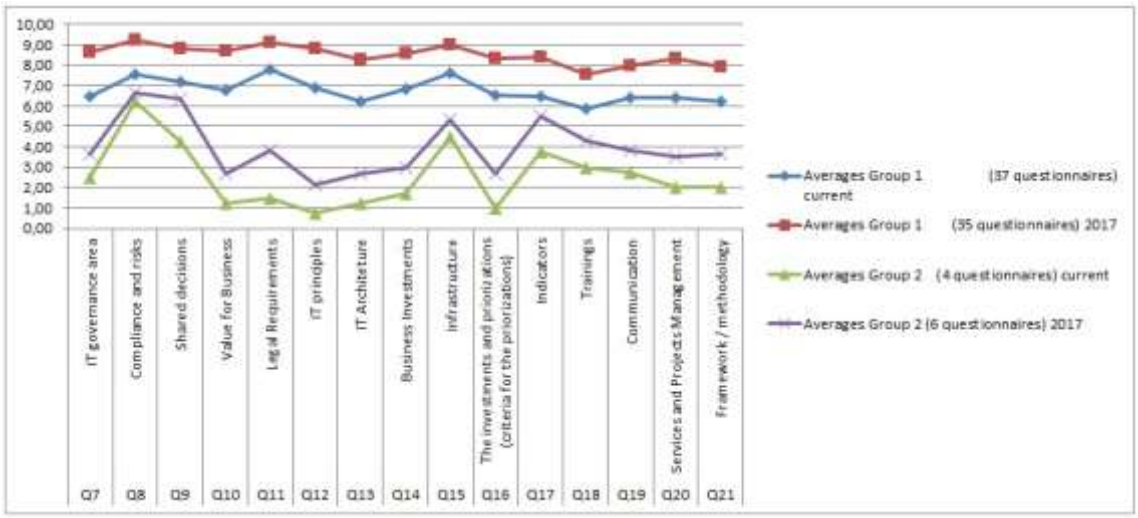
The Group of the least adhesion to 2017 is made up of: NBR ISO/IEC 38500 (28), CMM/CMMI (29) and NBR ISO/IEC 310000 (27).

All the averages of practices for IT governance are growing from the current scenario to the scenario 2017.

4.4 DESCRIPTIVE ANALYSIS - DEFINITION O*CLUSTERS*

The statistical analysis was done on the System *Statistical Package for the Social Science* (SPSS). The data collected were statistically analyzed by means of descriptive analysis, profiles segmentation, and also *cluster* analysis, which aims to group the data into sets, whose elements are the most similar between themselves or the most different between themselves.

In Graph 4, it is presented the results of the *clusters* from Block 2 - Requirements for IT Governance - Group 1 (Strong in requirements for IT Governance) and Group 2 (weak groups in requirements for IT Governance) in current scenarios and 2017.



Graphic 4: Results of the *clusters* from Block 2 -Requirements for IT Governance - Group 1 (Strong in requirements for IT Governance) and Group 2 (weak groups in requirements for IT Governance) in current scenarios and 2017.

The *clusters* from Group1 represent 37 questionnaires (90%) out of 41 valid of the research. Whereas for the scenario 2017, the *clusters* from Group1 represent 35 questionnaires (85%). These *clusters* considered the highest averages and other internal variables for the formation of this group1.

The *clusters* from Group 2 represent four questionnaires (10%) out of 41 valid of the research. Whereas for the scenario 2017, the *clusters*

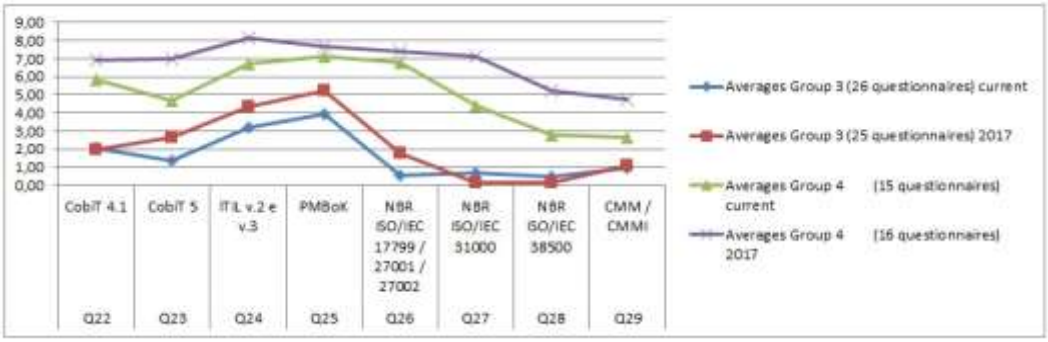
from Group2 represent six of the questionnaires (15%). These *clusters* considered the lowest averages and other internal variables for the formation of this group 2.

All requirements for IT governance have growth in averages of the Groups 1 and 2 of the current scenarios for the scenarios to 2017. Such indicators suggest trends that the financial institutions continue to invest increasingly on the requirements for IT governance.

The requirements of *compliance* and risks (Q8), shared decisions (Q9) and infrastructure (Q15) have an average higher than all other requirements from Grupo2 in the current scenario and 2017. Such criteria were also prioritized at the greatest averages of requirements for the current scenario and the 2017.

All requirements for IT governance have growth in averages of the Groups 1 and 2 of the current scenarios for the scenarios to 2017. Such fact suggests the trend that the financial institutions continue to invest increasingly on the requirements for IT governance.

In Graph 5, it is presented the results of the *clusters* from Block 3 - Practices for IT Governance - Group 3 (weak groups in Practices for IT Governance) and Group 4 (Strong in practices for IT Governance) in current scenarios and 2017.



NÃO SEI
Cenário Atual
Cenário 2017

COBIT 4.0	36,6%	39%
COBIT 5	39%	36,6%
ITIL v.2 e v.3	24,4%	24,4%
PMBoK	12,2%	14,6%
NBR ISO/IEC 17799/27001/ 27002	46,3%	43,9%
NBR ISO/IEC 31000	53,7%	53,7%
NBR ISO/IEC 38500	61%	61%
CMM CMMI	39%	39%

Graphic 5: Results of the *clusters* from Block 3 -Practices for IT Governance - Group 3 (weak groups in Practices for IT

Governance) and Group 4 (Strong in practices for IT Governance) in current scenarios and 2017.

The *clusters* from Group 3 represent 26 questionnaires (64%) out of 41 valid of the research. Whereas for the scenario 2017, the clusters from Group 3 represent 25 questionnaires (61%). These *clusters* considered the lowest averages and other internal variables for the formation of this group 3.

The *clusters* from Group 4 represent 15 questionnaires (36%) out of 41 valid of the research. Whereas for the scenario 2017, the clusters from Group 4 represent 16 questionnaires (39%). These *clusters* considered the highest averages and other internal variables for formation of Group 4.

In Group 3, all practices for IT governance have growth in the averages from the current scenario to the scenario of 2017, except the COBIT 4, because there is growth in the new version COBIT 5. The averages of the practices NBR ISO/IEC 31000 and ISO/IEC 37011 also decrease. Such indicator indicates a trend that the financial institutions selected for this group (61%) continue to invest, to an increasing extent, the practices for IT governance, however, it is verified lower averages (below 5, except for the PMBoK - Q25 (5.24) and with a significant number of zero scores - "I don't know".

In group4, all requirements for IT governance have growth in averages at the averages from the current scenarios to the scenarios of 2017. Such indicators suggest trends that the financial institutions continue to invest increasingly on the practices for IT governance. Two practices with lower means are stood out: CMM/CMMI – Q29 (4.75) and NBR ISO/IEC 38500 – Q28 (5.25). The other practices have averages between 6.94 and 8.13 for the scenario of 2017.

5 FINAL CONSIDERATIONS

In this study it was searched answers to meet the research question: Which requirements and practices of governance of the retail banks in Brazil adopted until 2014 and will continue adopting or implementing until 2017?

It was intended to evaluate, in retail banks in Brazil, the history of the use of requirements and practices of IT governance until 2014 and their projections up to 2017. Also, it was sought not only to check the adhesion and the reasons for the use of requirements and practices for IT governance in the retail banks surveyed, as well as to contribute to the record of historical information in relation to the subject for future research

As a summary of the main results obtained with the research carried out, it is presented the following results:

1) From the averages of requirements for IT governance, it was obtained, in descending order:

-the most adhesion to the current scenario: *compliance* and risks infrastructure, legal requirements and decisions shared (9).

-the most adhesion to 2017: *compliance* and risk, shared decisions, infrastructure and legal requirements.

- least adhesion to the current scenario: training, architecture, *framework*/methodology and investments and prioritizations.

- least adhesion to 2017: training, *framework*/methodology, communication and architecture.

Such results show the trends of prioritization of financial institutions not only in matters of security, risk, *compliance*, as well as on the question of supporting the business growth with the expansion of the technology infrastructure.

Another aspect that stood out was the greater adherence to the requirement shared decisions, showing the trend that the IT professionals work very close to business areas to meet the strategic projects of the companies.

The requirements with less adhesion mentioned for the current scenarios and 2017 demonstrate the need of the companies to work more in training, IT architecture, communication, and frameworks (practices) and methodologies.

2) At the *clusters* of requirements for IT governance, it was obtained the average, in descending order:

- Strong in requirements for IT governance for the current scenario: legal requirements, infrastructure *compliance* and risks and decisions shared;

- Strong in requirements for IT governance for the scenario 2017: *compliance* and risks, legal requirements, infrastructure and shared decisions;

- weak groups in requirements for IT governance it to the current scenario: IT architecture, value to the business, investments and prioritizations and Principles for IT;

- weak groups in requirements for IT governance it to 2017: investments and prioritizations, value to the business, IT architecture and principles for IT.

All requirements for IT governance have growth in averages from "Strong in requirements for IT Governance " (90% of the questionnaires in the current scenario and 85% in 2017) and also growth in the averages of "weak groups in requirements for IT Governance" (10% of the questionnaires in the current scenario and 15% in the scenario 2017). Such indicators suggest trends that the financial institutions continue to invest increasingly on the requirements for IT governance.

The results of the Strong in requirements for IT governance for the current scenarios and 2017 demonstrate a tendency to prioritizations for security issue; meet legal aspects and risks; shared decisions and infrastructure, in line also with the averages of the requirements for It governance with more adhesion presented in this research.

The weak groups in Requirements for IT Governance and reasons the lowest average in this set could be evaluated in further researches, as well as the Weak in Requirements to IT Governance accounted for a small number compared to the total number of the questionnaires in this research (four questionnaires for the current scenario and six questionnaires for the scenario 2017).

3) From the averages of requirements for IT governance, it was obtained, in descending order:

-the most adhesion to the current scenario: PMBoK, ITIL v2 and v3 and, COBIT 4.1;

-the most adhesion to 2017: PMBoK, ITIL v2 and v3 and, COBIT 4.1;

The least adhesion to the current scenario: NBR ISO/IEC 38500, CMM/CMMI and NBR ISO/IEC 310000;

- The least adhesion to 2017: NBR ISO/IEC 38500, CMM/ CMMI and NBR ISO/IEC 310000.

Such results indicate the trends of implementation of practices, such as the PMBoK, which have grown in the world scenario, including with constant updates and considering human issues, such as was the creation of new knowledge area of *stakeholders'* management created in 2012 by PMI.

ITIL also presents statistics of growth with its integrated structure and focused on the complete management of services.

COBIT 5, released in 2012, also features a growing trend of implementations, because it is an integrated platform to meet the requirements for IT governance.

In relation to the practices of IT governance with less adhesion, there was a significant number of responses with score 0 (I don't know) in the 41 questionnaires answered, which influenced the decrease at the averages, as detailed in the research. In this case, there is an indication of the need for further research to not only to check the reasons that caused this situation, but also to evaluate the reasons of practices with less adhesion.

4)In the clusters of practices for IT governance, it was obtained the average, in descending order:

- Strong in Practices for IT governance for the current scenario: PMBoK, NBR ISO/IEC 177999/27001/27002, ITIL v2 e v3 and COBIT 4.1;

- Strong in Practices for IT governance for the scenario2017: ITIL v2 and v3 PMBoK, NBR ISO/IEC 177999/27001/27002, ISO31000, COBIT 5;

- weak groups in Practices for IT governance for the current scenario: PMBoK, ITIL v2 and v3 and COBIT 4.1;

- - weak groups in Practices for IT governance for the scenario 2017: PMBoK, ITIL v2 and v3, COBIT 5 and COBIT 4.1.

In weak groups in practices for IT Governance (26 questionnaires for the current scenario and 25 for the scenario 2017), all practices for IT governance have growth in the averages from the current scenario to the scenario of 2017, except for the COBIT 4, because there is growth for the new version of the COBIT 5. Only the averages of the practices NBR ISO/IEC 31000 and NBR ISO/IEC 38500 decrease. Such indicator indicates a trend that the financial institutions selected for this group continue to invest, to an increasing extent, on the practices for IT governance, however, it is verified lower averages (below 5, except for the PMBoK - Q25 (5.24) and with a significant number of zero scores - "I don't know", as it was already shown.

The practices NBR ISO/IEC 177999/27001/27002 and NBR ISO 31000 also stood out among the higher averages, showing trends already noted for prioritization in information security and risk in financial institutions.

In the Strong groups in practices for IT Governance (15 questionnaires for the current scenario and 16 for the scenario 2017), all practices for IT governance have growth in the averages from the current scenario to the scenario of 2017. Such indicators suggest trends that the financial institutions continue to invest increasingly on the practices for IT governance. Two practices with lower means are stood out: CMM/CMMI and NBR ISO/IEC 38500.

It was also sought to identify characteristics similar to banks and respondents with higher and lower averages within the results of the *clusters* of requirements for IT governance and practices for IT governance; in comparing the requirements and practices with higher and lower averages, there was no significant segmentations of characteristics of banks and respondents to the sets, that is, both in Strong groups as in weak groups in requirements for IT Governance and Strong groups and weak groups in practice for IT governance.

The results of this research are in line with the work carried out by the authors surveyed in theoretical foundation, showing that the banking

segment continues to invest increasingly on information technology and IT governance remains as a necessary requirement for the safe development for business.

As an example, in the history of the use of requirements and practices of IT governance until 2014 and their projections up to 2017, Cantón and Galegale (2008), in the results of their research, evaluated the processes of the COBIT in 2008 and predictions for 2010. It was assigned higher priority to: meet legal requirements, information security *compliance* and risk management to the scenario of 2008; whereas at the scenario for 2010, risk management, security, business continuity plan, internal controls and fulfilling legal requirements. Such results confirm the trends of using these same requirements in banks in the current research to the scenario until 2014 and projections for 2017.

In this work, it was pointed the results of requirements and practices for IT governance for the current scenario and projections for 2017, according to the research question.

The results of this study also lead to possible trends by manager respondents (approximately 75%) and analysts (25%) to the need of greater visibility of the frequencies of implementations of individual or partial requirements or to satisfy the IT governance, rather than the implementation of practices and methodologies to meet the needs of the companies in an integrated manner. The operation areas of the respondents were also different, highlighting the major respondents: IT and IT Governance, but a more detailed study in the future could assess the possible variations between the responses of areas from different performances.

Likewise, the index of answers "I don't know" for practices was high; thus, the requirements and practices with less adhesion averages to IT governance and its reasons could be more well evaluated in new studies.

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