SYSTEMATIC PROPOSITION TO IMPLEMENT CUSTOMER RELATIONSHIP MANAGEMENT SUPPORTED BY BUSINESS INTELLIGENCE TO ORGANIZATIONS IN THE TELECOMMUNICATION SECTOR

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ABSTRACT

Highlights: Telecommunications companies have to deal with ever-increasing amounts of data and information. To remain competitive in this market, they need to satisfy their customers' needs; the advancement of information technologies provides solutions for organizations to optimize their Customer Relationship Management (CRM) processes; companies find it difficult to implement BI-supported CRM.

Objective: Inserted in this context, this research aims to propose a CRM optimization system supported by Business Intelligence (BI) for organizations in the telecommunications sector.

Methodology: A literature survey was carried out in the Scopus and Web of Science databases seeking the concepts, fundamentals, discussions and models proposed within the researched context that could support the formulation of the systematics. In a second step, through a focus group of industry experts, new aspects and observations were added to the method, with the aim of incorporating current practices used in the market. In the third phase of the study, the proposed approach was applied to a telecommunications company operating in the Brazilian market, and its applicability in a real context was verified.

Results: The importance of the adoption of information technologies has been identified for the optimization of customer relationship management processes by the organizations of this sector. There was also the importance of developing roadmaps that can guide companies that choose this path due to the complexity and the various dimensions involved in the implementation. The applicability of the proposed systematic, its difficulties and benefits were verified through its practical test.

Limitations: The systematics proposed in this work was developed for the presented context. Thus, in order to be used in different contexts, such as other industry sectors, further studies are recommended.

Practical Implications: It is understood that the studies presented are of great value to organizations that wish to venture in these ways, by presenting knowledge that can help them in this sense, characterizing the usefulness of research for professional practice.

Value and originality: Finally, few studies have been found in the literature proposing systems for BI-supported CRM optimization, and no work oriented to the specific context of telecommunication organizations in the Brazilian market was found, which attests to the originality of the work.

Keywords: Customer Relationship Management, Business Intelligence, Telecommunications Industry.

1. INTRODUCTION

According to Shahraki et al. (2015), organizations incur high costs in their marketing, sales, and customer service processes. Effectiveness in these processes provides a competitive advantage for the organization; however, these activities must seek efficiency, operating at optimal cost. In this sense, traditional marketing techniques, encompassing mass activities, can be supported by the development of information technology (IT), becoming more efficient and effective. In the midst of this scenario, concepts such as Customer Relationship Management (CRM) gain strength (Zaby and Wilde, 2018).

The massive observed development of IT drives organizations to build IT infrastructures that can support their strategic goals. In this sense, other concepts are highlighted, such as Business Intelligence (BI) (Polyvyanyy *et al.,* 2017).

BI is founded as one of the resolutions to optimize decision making in dynamic scenarios with large amounts of information, adding wisdom to the enterprise and bringing greater efficiency to the processes. This technology has become a useful resource for companies. BI enables the creation of a single database to provide useful information to decision makers, reducing time and costs and providing greater quality and process flexibility (Cristescu, 2016; Al-Zadjali and Al-Busaidi, 2018).

The telecommunications sector is very dynamic: it presents a behavior in which companies go through cycles of termination of simultaneous customer subscriptions with the arrival of new subscribers (Gersil, 2016). Because of this movement in and out of customers, industry organizations are looking for new methodologies for customer retention.

Nonetheless, telecommunications companies have to face the challenge of managing a huge amount of data generated from their system, and which could increase in the coming years (Masoud and Ahmed, 2017). In fact, the amount of data in this sector exceeds that of most other industry sectors (Singh and Singh, 2016).

CRM is becoming a critical factor in building competitive advantage for organizations today. However, few business processes that use CRM are efficient and flexible. As an example, one can cite the fact that many customers are dissatisfied with complaint management (Zaby and Wilde, 2018).

Due to this context, a significant part of companies in this branch of the economy perceive the adoption of methods and tools, such as BI, as an opportunity to improve their CRM processes, becoming more competitive (Singh and Singh, 2016). However, a large proportion of organizations that choose to implement BI-enhanced CRM enhancement have had a significant part of their goals frustrated (Gharaibeh, 2015). Organizations lack scripts, models or systematics that can guide them, enabling greater success in this endeavor. (Gharaibeh, 2015; Shahraki *et al.*, 2015).

It is in the midst of the narrative presented so far that this paper has developed its research question:

- With the purpose of innovating BI-supported customer relationship management for telecommunications companies, what systematics brings effective results?

In this sense, the general objective of the present work is to propose a systematics for the improvement of CRM using BI for the telecommunications sector.

In order to achieve this objective, the following specific objectives were set:

1. Propose systematic improvement of CRM using BI for the telecommunications sector based on the findings in the literature;

2. Make adjustments to the proposed systematics, using expert opinion;

3. Evaluate the robustness of systematics after its application in an organization.

2. LITERATURE REVIEW

One of the biggest concerns of organizations is to preserve a good relationship with their consumers, seeking to serve them and make them loyal to their brand, turning this commitment into an increase in the amount of sales of their goods and services. This concern beneficially affects telecommunication organizations, which are increasingly prone to give their consumers distinctive and personalized treatment.

The literature indicates the importance of investigating the possible benefits of applying BI in CRM. In this sense, Moro et al. (2015), after conducting a literature review on the topic of BI in articles published in the period 2002-2013, observed gaps in research, as CRM has been little addressed with regard to BI applications. In another study, Khan et al. (2012) point to the importance of in-depth research into CRM and data warehousing in industries such as telecommunications.

According to Zaby and Wilde (2018), customers are more informed, connected and demanding because of the internet and the various options in the globalized marketplace. Their demands exhibit constant growth behavior and sudden changes. Similarly, competing companies are also better informed and more flexible.

In this way, customer relationship management is a critical source of competitive advantage. In a more specific analysis, Band (2013) points out that customer feedback management is gaining strength in the business environment. Between 2011 and 2012, the proportion of companies using customer voice programs increased from 55% to 68%, providing customer retention and organizational growth.

The difficulty of many companies is still the lack of understanding about their data, and not knowing what to do with them. In this sense, accurate and correct access to information is crucial for a business. In the telecommunications sector this pattern remains essentially because it is part of a dynamic market where new technologies emerge all the time (Maji and Sen, 2016).

Thus, it is important for an organization to process its information in order to expand or ensure its competitiveness through better informed decision making and process improvement (Munyoroku, 2016).

According to the work of Costa and Politano (2008), process mapping is extremely important as it helps senior management better understand their processes and even suggest improvements that influence decision making and customer satisfaction. It is important to efficiently manage processes vital to organizational performance, thereby increasing productivity and competitiveness within the organization (Meidan et al., 2017).

BI is a system that encompasses a new conception of information structure to create business value. BI-based processes make use of technological innovations to collect, conserve, evaluate, and offer access to information, converting it into data and knowledge. Its role is to help managers make better business decisions by making data more concise, up-to-date, and important, providing it with emerging needs (Cristescu, 2016; Al-Zadjali and Al--Busaidi, 2018).

In this sense, BI can be understood as the gathering of ideas and methods that aims to support business decision making, from the conversion of data into information and information into knowledge. This technology aims to use company information to support informed decisions, simplifying information access and evaluation, and enabling other opportunities to be discovered (Zaby and Wilde, 2018; Cristescu, 2016; Al-Zadjali and Al-Busaidi, 2018).

As Frisk and Bannister (2017) point out, BI, data analytics, and big data are closely related developments that are creating a revolution in organizational management and decision making. These developments have emerged as a result of advances in the area of information technology.

Many organizations still believe that BI works as an IT project, not as a definition linked to corporate strategic alignment, which enables the possibility of using tools, with the goal of modifying data to information that may influence decisions.

Therefore, there are four critical dimensions that are essential in BI implementation, so that the project is positive to the enterprise; they are (Miller et al., 2006): human capital; knowledge processes; culture; and infrastructure.

The human capital dimension is based on the experiences and information capabilities of the people belonging to the business, as well as on the training and evaluation characteristics that occur alongside the organization's goals.

Knowledge processes belong to the dimension that provides the way in which the related data needs to be realized, as well as where the processes are described, in order to improve the flow and utilization of information. Thus, it is further emphasized that the use of information is directly linked to strategic business processes.

The dimension of culture refers to the influence that the organization and its individuals have on the flow of information. That is, culture aggregates the norms of the organization regarding the moral, social, and conduct scenarios. Thus, the attitudes, points of view, priority scale and value that information has as a strategic activity incorporated over time are highlighted. According to Venter and Goede (2017) and Frisk and Bannister (2017), an information system is an integral part of the social structures present in the organization where it is applied. Therefore, it should be designed and developed not in isolation, but as part of the larger organizational and social system.

With regard to infrastructure, the software, hardware, and technological tools that structure, control, select, disclose, and apply information are considered.

Theoretically, CRM can be divided into two categories: operational and analytical. These two categories toge-

ther form a closed circuit. Analytical CRM is supported by BI technologies and concepts for conducting operational data analytics. The knowledge generated at this step helps decision making and contributes to continuous process improvement. According to Zaby and Wilde (2018), one of the key factors for process operation is continuous support for decision points in operational processes through BI. In this sense, the use of BI becomes an indispensable part of business processes, which are now called intelligent business processes.

In an empirical study that investigated the use of BI for CRM in the Nigerian telecommunications sector, Toyese (2014) noted the importance of integrating these two concepts to improve business-customer relationships. In the same vein, Maji and Sen (2016) studied the use of call detail records in data warehouse analysis in marketing. This process helps telecommunications companies create marketing offers and promotions that help retain customers. Munyoroku (2016), who researched BI and CRM in the telecommunications industry, demonstrated the existence of a significant positive relationship between the use of BI tools and customer service management, contributing to their satisfaction and, consequently, their retention.

3. THE METHOD

The present research, regarding its driving mode and the techniques adopted to solve the problem, presents a qualitative approach. The objectives can be classified as applied research, because the knowledge generated aims to provide practical recommendations for organizations in the telecommunications sector.

The methodological framework adopted for this work is now detailed. Following the model proposed by Costa (2014), the research is divided into six steps that are divided into three groupings, as illustrated in Figure 1. This presents the objectives and methods adopted at each step of the work. Then, each of the six steps of this research will be presented.

Step 1: Literature Review

According to Flick (2013), there is a consensus among authors using qualitative methods and among those using quantitative methods that researchers should be familiar with the field they study and in which they wish to progress. The main topics addressed in the study are

process improvement, CRM and BI in the telecommunications sector in Brazil. At this stage of the study, a bibliographic research was conducted, seeking theoretical and empirical works, with the objective of identifying and understanding what has already been published about the mentioned themes and answering some questions adapted from Flick (2013):

- What is already known about the topics covered, namely process improvement and BI?

- What are the theories used and discussed in these areas?

- What concepts are used or discussed?

- What are the theoretical or methodological debates in this field?

- What questions remain open?

- What has not been studied?

- What are the methods used or discussed here?

Step 2: Analysis of key dimensions

In this stage of the study the focus is on the methodologies, tools and systematics proposed in the literature using BI to improve CRM. The main objective is to provide support for the formulation of the systematics proposed in step 3.

To meet this end, a systematic literature review was performed. To construct an initial set of bibliographic studies capable of supporting the research, the *webibliomining* model proposed by Costa (2010) was adopted. This is characterized by being an internet based method that makes use of the mining of bibliographic sources through tools of access and search of data and bibliographic information. In this research, the following steps that are part of the chosen model were adopted:

- Definition of the research sample;

- Sample search with keywords;

- Selection of articles for starting core composition.

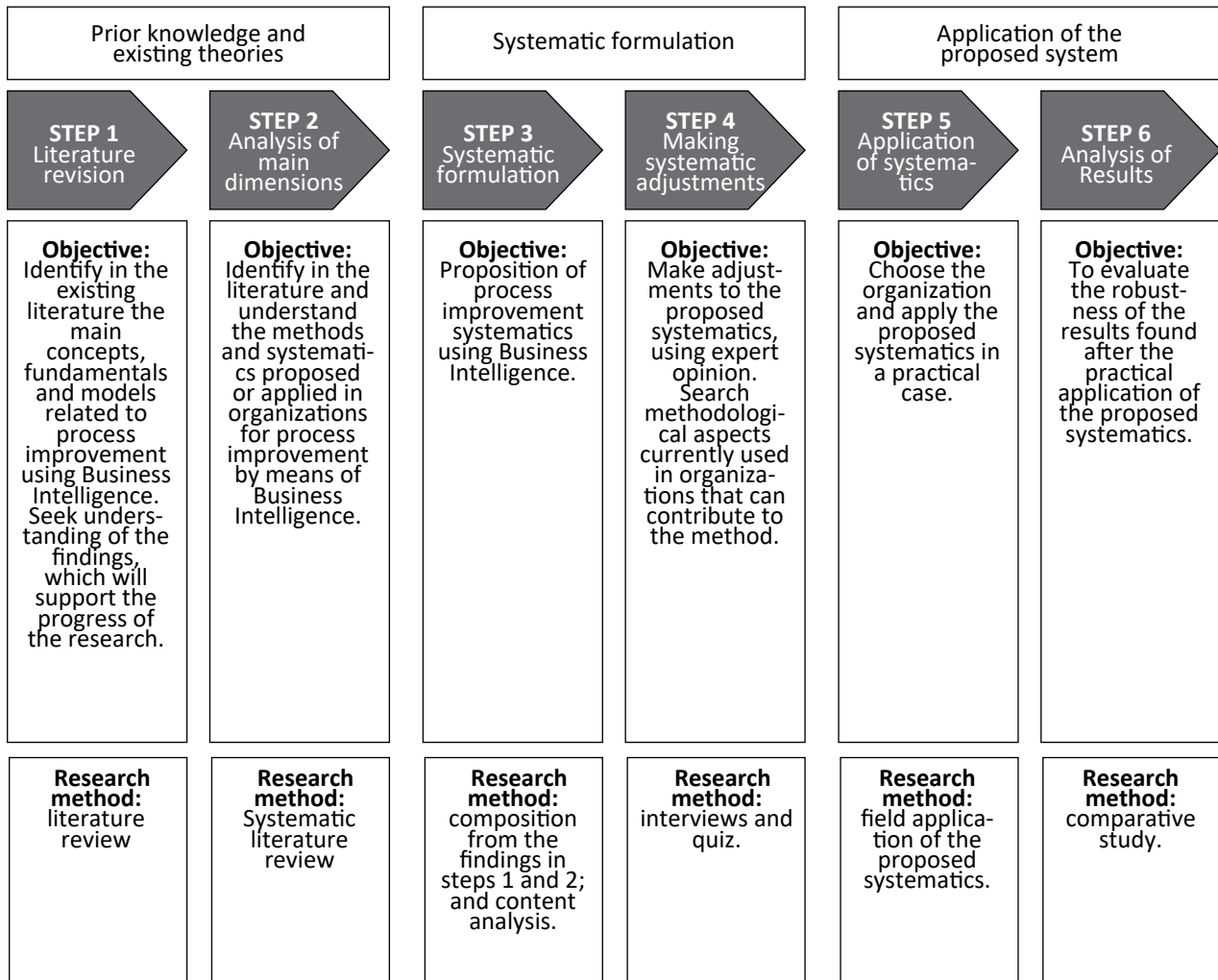- After the selection of articles, the necessary content was selected to support the next phase of the study.

Figure 1. Method Steps.
Source: Prepared from Costa (2014).

Step 3: Systematics Formulation

Based on the information collected and synthesized in steps 1 and 2, a conceptual model was developed for a BI-supported CRM improvement system for the telecommunications industry. The construction of the systematics was conducted through the composition of the following elements:

1. Guiding principles;

2. Dimensions of the model

3. Steps of the model.

Step 4: Making adjustments to the system

According to Westphal et al. (1996) and Flick (2013), the focus group is a technique that seeks to obtain data through carefully planned discussions. In these discussions, participants express their views on a proposed issue in a non-embarrassing environment.

The group meeting presents a dynamic in which participants discuss various aspects of a specific topic, not limited to questions asked by a researcher that are answered by participants.

Commonly, the group is made up of four to 15 participants, who are selected due to their experience in relation to the theme in question. The search for relative homogeneity among members is also recommended. The criteria that should guide the choice of participants for a focus group session should be based on the study objectives. In this sense, the sample can be characterized as an intentional sample (Dilório *et al*. 1994; Westphal *et al*. 1996).

The main objective of this research phase was to incorporate to the method aspects of the real environment of organizations in the telecommunications sector, more precisely, organizations that implemented technological innovations in BI-supported CRM processes. In this sense, the main objective can be subdivided into two specific objectives based on the proposed systematics:

1. Identify the main barriers to be faced at each stage of the proposed systematics, taking into account its three dimensions (people, infrastructure and knowledge);

Identify the critical success factors for each step of the proposed systematics, taking its three dimensions into account, people, infrastructure, and knowledge).

Seeking alignment with the objectives outlined, the following criteria were established for the selection of sample members:

1. Individuals who belong to the strategic level of telecommunications industry organizations;

2. Individuals who have worked or are involved in operations related to CRM process management and improvement.

The construction of the group was made possible by the fact that the author of this research works at the strategic level of a telecommunications sector organization and has contact with other professionals positioned in this market.

In order to achieve the objectives, the following script was set for the meeting of the group:

Group contextualization and preparation: In this stage, in addition to contextualization, care was taken to show the group the potential benefits for all participants in terms of knowledge and exchange of experiences, and the importance of everyone being free to express their opinions was emphasized;

Systematics presentation: the proposed systematics was presented with all its principles, dimensions and stages;

Debates: At this stage, a debate was opened and each participant was encouraged to address key barriers and critical success factors for BI-supported CRM improvement;

Data collection: At the end of the debate each participant received a questionnaire to be answered.

Steps 5 and 6

These steps together consist in the application of the proposed systematics in an organization of the telecommunications sector to verify its applicability.

4. RESULTS

Telecommunications companies lack technologies and tools such as BI to improve their customer retention processes (Singh and Singh, 2016). An effective and efficient CRM process is now considered a critical success factor for organizational competitiveness (Zaby and Wilde, 2018). The researched literature points to the possible benefits of BI application in CRM improvement (Moro et al., 2015; Khan *et al.*, 2012).

However, a large proportion of organizations that chose to implement CRM or BI had a good part of their objectives frustrated (Gharaibeh, 2015). At this stage of the work a systematics, whose objective is to assist organizations in implementing BI-supported CRM improvement for companies in the telecommunications sector, will be proposed. The proposition of the systematics is supported by the findings of steps 1 and 2 of the method and is guided by principles, has dimensions to be considered, and is divided into steps, as presented below.

Principles

The conceptual model is based on a set of guiding principles identified in the literature, namely:

- Customer orientation;

- Collaboration (Systemic View);

- Organizational Support;

- Continuous Improvement.

Customer orientation

The main goal of CRM is to strengthen an organization's relationship with its customers and then build customer loyalty, enhancing the company's competitive potential. The pursuit of strengthening the customer-organization relationship should not be restricted to marketing, sales, and customer service departments. In this sense, CRM should be treated as a management strategy of the company involving all organizational bodies. Therefore, this becomes a guiding principle that must be present in all steps of the proposed systematics. Thus, the objectives and goals of each step should take into account the principle of customer orientation.

Collaboration (systemic view)

Replace the departmental view with the systemic view, developing integration and collaboration between different organizational sectors in pursuit of the company's objectives. Seek decision-making that considers not only the immediate need of each sector, but the impact and consequences that the decision can have on all other areas and how it can impact the stated objectives. A project using BI is not an IT issue but a definition linked to the strategic alignment of the organization.

Organizational Support

This principle underscores the importance of top management support and back-up for the successful implementation and ongoing operation of CRM supported by BI tools. Organizational leaders must be involved in the process, developing policies, guidelines, distributing responsibilities, setting goals and objectives, and developing organizational culture that supports the success of the enterprise.

Continuous improvement

The process of managing customer-company relations extends over time and should be periodically reevaluated, always seeking to improve it. Continuous improvement can be understood as an analysis of the current state of processes to identify activities that can be improved. The goal is to diagnose inefficiencies and bottlenecks, among other issues, so that they can be eliminated through modifications or innovations, making the process more efficient and delivering more value to customers.

Chart 1 presents the authors found in the literature that point out the importance of each of the guiding principles adopted, as follows.

Chart 1. Principles validated by the literature.

Principles of BI-backed CRM improvement systematics	
Principles	**Bibliographic Reference (Researchers who indicated the importance of the principle)**
Guidance for Customers	1. Al-Zadjali and Al-Busaidi (2018) 2. Band (2013) 3. Günter (2012) 4. Homburg and Bruhn (2013) 5. Shahraki et al. (2015) 6. Sharp and Mcdermott (2001) 7. Toyese (2014)
Collaboration (Systemic View)	1. Miller et al. (2006) 2. Frisk and Bannister (2017) 3. Shahraki et al. (2015) 4. Sharp and Mcdermott (2001) 5. Venter and Goede (2017)
Organizational support	1. ABPMP (2013) 2. BABOK (2009) 3. Shahraki et al. (2015) 4. Sharp and Mcdermott (2001)
Continuous improvement	1. ABPMP (2013) 2. BABOK (2009) 3. Sharp and Mcdermott (2001)

Source: The authors themselves (2018).

The dimensions of the model

The literature pointed out the importance of three dimensions considered critical for the success in the implementation of the systematics:

- People;

- Infrastructure;

- Knowledge.

People

This dimension encompasses the knowledge, skills and experience of workers, as well as the forms of recruitment and training, desired skills, work organization, among other elements. A process requires the right people, with the right skills, in the right activity, in accordance with the goals of that process.

Infrastructure

In this dimension, much more than the physical facilities, the software, hardware, equipment and technological tools should be taken into account in order to collect, structure, control, select, disclose, and apply the information.

Knowledge

Knowledge processes belong to the dimension that provides the way in which related data need to be made and where the processes are described, in order to improve the flow and utilization of information. Thus, it is further emphasized that the use of information is directly linked to strategic business processes.

Chart 2 shows the authors, found in the literature, that reinforce the importance of these dimensions.

Chart 2. Dimensions validated by the literature.

Dimensions of BI-backed CRM improvement systematics	
Dimension	**Bibliographic Reference (Works that indicated the importance of the dimension)**
Dimension 1 PEOPLE	1. Gharaibeh (2015) 2. Miller et al (2006) 3. Sharp and Mcdermott (2001)
Dimension 2 INFRASTRUCTURE	1. Moro et al. (2015) 2. Gharaibeh (2015) 3. Khan (2012) 4. Masoud and Ahmed (2017) 5. Shahraki et al. (2015) 6. Sharp and Mcdermott (2001) 7. Singh and Singh (2016)
Dimension 3 KNOWLEDGE	1. Maji and Sen (2016) 2. Miller et al. (2006) 3. Monyorocu (2016) 4. Shahraki et al. (2015) 5. Sharp and Mcdermott (2001)

Source: The authors themselves (2018)

The model steps

The proposed systematics forms a continuous cycle composed of five steps:

- Project;

- Modeling;

- Simulation;

- Implantation;

- Monitoring;

- Evaluation.

Project

At this stage, many corporate meetings are held to make decisions that will shape the project. In this sense, the objectives and goals of the process should be defined and should be aligned with the strategic objectives of the organization and the guiding principles of the model. Performance goals should also be set for each dimension (infrastructure, people, and knowledge management).

Deadlines and process steps should be established, as well as the technological resources to be used and the individuals responsible for each area and step to be performed. Human and financial resources should also be estimated, as well as strategies and policies that support implementation.

Detailing

In this step, all processes should be detailed and fully described. Performance indicators and control processes are established and schedules are prepared, as well as the amount of resources required in a disaggregated manner (human, financial, technological and other resources identified). This detailing should be performed for each step of the proposed systematics and should take into account all dimensions of the model.

Simulation

After detailing and establishing indicators, the processes can be simulated in a virtual platform. This step aims to detect failures, bottlenecks and other nonconformities in the process, allowing their remodeling and adjustment before implementation, reducing costs and bringing greater efficiency to the process.

Implementation

After detailing all the processes and activities and the adjustments made during the simulation phase, they can be implemented according to the detailed plan established in step 2 and adjusted in step 3. In this phase it is important to follow up the activities, performing the adjustments necessary to meet the established goals.

Monitoring and evaluation

Processes are tracked through predefined performance indicators, and assessments for weaknesses and opportunities for process improvement are carried out.

If the processes do not achieve the expected results in relation to the defined indicators, actions must be taken to control the observed deviations. With the identification of weaknesses and opportunities for improvement, the process returns to step 1, in which innovation projects and adjustments to the system are carried out, starting a new cycle.

Table 3 presents the authors who pointed out the importance of each of the steps, justifying their adoption.

Chart 3. Steps validated by the literature

Steps of the BI-backed CRM improvement systematics	
Process step	**Bibliographic Reference (Works that indicated the importance of the step)**
Step 1 PROJECT	1. ABPMP (2013) 2. Miller et al. (2006) 3. Gharaibeh (2015) 4. Shahraki et al. (2015) 5. Sharp and Mcdermott (2001)
Step 2 DETAILING	1. ABPMP (2013) 2. BABOK (2009) 3. Corrêa et al. (2005) 4. Costa and Politano (2008) 5. Sharp and Mcdermott (2001)
Step 3 SIMULATION	1. ABPMP (2013) 2. BABOK (2009) 3. Sharp and Mcdermott (2001)
Step 4 IMPLEMENTATION	1. ABPMP (2013) 2. BABOK (2009) 3. Sharp and Mcdermott (2001)
Step 5 MONITORING AND EVALUATION	1. ABPMP (2013) 2. BABOK (2009) 3. Sharp and Mcdermott (2001)

Source: The authors themselves (2018).

Figure 2 presents the systematics pointing out its guiding principles, their dimensions and stages, and their continuous character.
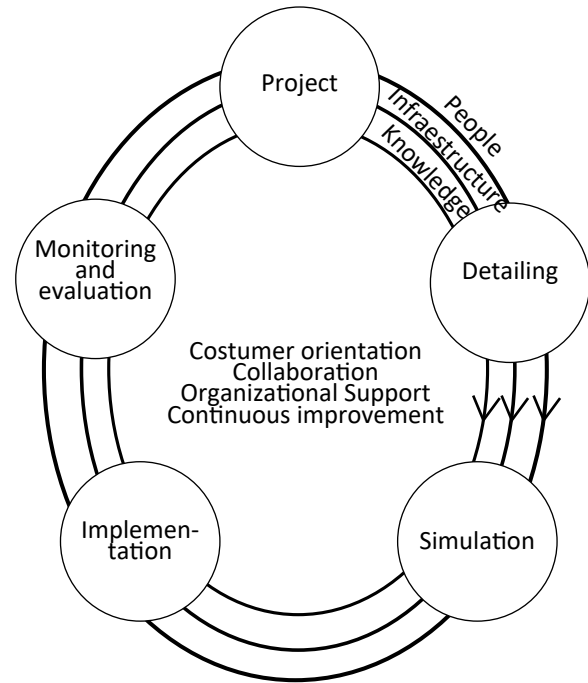

Figura 2. Conceptual model of BI-supported CRM
Source: The authors themselves (2018).

5. THE FOCUS GROUP

This section of the paper presents the results of data collection at the focus group meeting. The sample consisted of six people who work in telecommunications companies in Brazil, occupying positions of strategic level, as shown below:

- Participant 1 - Business and Project Manager;

- Participant 2 - Quality and Process Analyst;

- Participant 3 - Support and Customer Service Coordination;

- Participant 4 - Senior Process Analyst;

- Participant 5 - Management Systems Management;

- Participant 6 - Process Management.

At this stage of the work, according to expert opinion, the main barriers and critical success factors for the implementation of the systematics proposed by this study were identified. All the knowledge produced in this phase of the research was used to implement the systematics in an organization of the telecommunications sector.

Most participants pointed out the importance of aspects related to people, knowledge and infrastructure during the presented stages, which can reinforce the importance of the dimensions adopted by the systematics proposed in this study.

Similarly, the importance of the guiding principles adopted for systematics was also reinforced. The guiding principles are as follows: customer orientation, collaboration, organizational support, and continuous improvement.

6. APPLICATION OF THE PROPOSED SYSTEMS AND RESULTS ANALYSIS

Due to the context in which the system is proposed, it was sought an organization belonging to the telecommunications sector that operates in the Brazilian market, these being the only criteria used for their choice.

It is an organization of the telecommunications sector that operates in the Brazilian context. The company has an innovative profile, demonstrating an appetite to invest in new technologies to improve processes, products and their relationship with its audience, currently offering voice and data services. The service is offered through various packages that may include both types of services (data and voice) for fixed and mobile telephony, for individual customers as well as packages for families and businesses.

The company was founded seven years ago and can be considered a young company. Its headquarters is located in Rio de Janeiro. It currently has clients in the states of Rio de Janeiro and São Paulo; however, due to the growth seen in recent years in its participation in this market, objectives have been set to expand its activities to other Brazilian states.

In recent years, the company has been seeing a steady increase in its customer base and, therefore, an increasing volume of information. While previously managed to be satisfactorily managed through spreadsheets, managers now see the need to deploy high-tech systems and software for satisfactory and intelligent management of their data and information.

Organizing and managing this information is now part of the organization's strategic plan that provides an opportunity to gain competitive advantage in its marketplace through better CRM backed by intelligent technologies.

The company realized its inability to serve its customers with satisfaction, as the number of subscriptions was growing exponentially. The need for a support system was verified. More specifically, the need to have something beyond CRM was identified: a junction between CRM and BI.

The process was started by connecting a customer with problems in the contracted services. The attendant, in his experience, sent the request to the industry responsible for solving the problem via e-mail. There was no system in place to automatically forward requests to the responsible industry, manage turnaround time or handle the data produced, and provide information to evaluate and improve process performance. The negative results found were as follows:

- Recurring complaints from customers who have not had their services reinstated since the first call;

- Missed calls within the stipulated deadline;

- Calls routed to wrong areas;

- Poor process control

- Failure to report to improve management and process (lack of information).

The implementation of the new BI-supported CRM system using the systematics proposed in this work was adopted. The major problems identified in the system implementation were as follows, according to the dimensions adopted for the system:

- **People:** resistance to change by employees involved in the process. Some people have reluctant behaviors to change certain routines and to contribute to the detailing of processes, retaining certain information;

- **Infrastructure:** In the design phase, it was found that the software cost was higher than expected due to the established objectives. It took many meetings to prioritize and set goals and reduce cost;

- **Knowledge:** difficulty in formalizing all processes and tasks in order to maintain a "library" for future consultation and training.

The step that took the longest time to roll out was detailing because of the difficulty in detailing and modeling all processes and activities, which involves people from

all sectors of the organization and requiring them to stop their daily routines and participate in the project. Top management support was considered as a key factor in achieving employee participation.

Following deployment, the company has established benchmarks to measure its performance in the customer service and support process and performance improvements can be observed in the following aspects:

- Reduction in call answering time;

- Decrease in recurring calls, originating from missed calls or poorly answered calls;

- Decreased call drop rate that occurs when the customer calls and stays on the line waiting for service;

- Decreased number of calls;

- Reduced training time for new industry employees.

Table 4 presents some data showing the improvements in the first three months after implementation.

The organization today verifies performance improvements in the customer service process and has all its processes mapped and detailed activities. This allows you to calculate times, costs, the amount of resources needed, and establish indicators for performance appraisal and goal setting, as well as for weaknesses and opportunities for improvement.

7. FINAL CONSIDERATIONS

Regarding the telecommunications sector, research has shown the large amount of information present in the daily lives of these companies. This factor makes the managing of this important input complex for informed decision making, enabling better response to customer needs. In this sense, many studies found in this work have highlighted the importance of agile and dynamic CRM systems, which may be supported by technologies such as BI.

In addition to the literature, this perception was also verified in research conducted with market experts and by the company in which the proposed systematic was applied. Due to the growth of its market, the organization has realized its inability to satisfactorily handle its vast amount of information in order to better treat its audience. Thus, it found an urgent need to adopt a technology to support its CRM by choosing the BI.

However, despite the need, the research found another factor: the difficulty of organizations deploying BI-supported CRM systems. Many organizations that have decided to follow this path have had much of their goals thwarted due to a lack of knowledge on the subject.

It was immersed in this problem that this study sought to identify all aspects that should be taken into account when it comes to implementing a BI-supported CRM system and to understand the relationships between the verified aspects. In this sense, a system has been proposed to help and increase the probability of success of organizations seeking to venture this way.

Chart 4. Quantitative data for the first three months after implantation

Indicator	Comparative Data	Objective	Goal	August	September	October
Data activation estimated time (ET)	ET set versus spent time	Measure the amount of tasks performed within ET in percentage	90%	61,15%	66,67%	77,23%
Voice activation ET	ET set versus spent time	Measure the amount of tasks performed within ET as a percentage	90%	63,16%	69,17%	80,31%
Customer support ET	ET set versus spent time	Measure the amount of tasks performed within ET as a percentage	90%	72,50%	75,12%	81,91%
Call Abandonment Rate	Total abandonment versus total calls month	Measure the number of customers who drop calls because they are not answered as a percentage	10%	18,51%	17,83%	14,77%
Customer Call Recurrence	Total calls versus same customer calls	Estimate the number of unresolved issues in the first call as a percentage	10%	21,54%	15,60%	13,91%

Source: The authors themselves (2018).

The proposed systematics is based on knowledge from the academic literature and others brought from organizational practices. Its applicability has been attested in a practical case. It is understood that such applicability is not the "final word" for companies seeking an implementation a script; however, it is believed that it may be of great value to organizations wishing to improve the management of their customer relationships with BI support through the knowledge produced.

REFERENCES

ABPMP (2013), "Guia para o gerenciamento de processos de negócio: Corpo comum de conhecimento ABPMP BPM CBOK 3.0", Association of business process management professionals, Brasil.

Al-Zadjali, M; Al-Busaidi, K. A. (2018), "Empowering CRM through business intelligence applications: a study in the telecommunications sector", International Journal of Knowledge Management, Vol. 14, No. 4, pp. 68-87.

BABOK (2009), "Um guia para o corpo de conhecimento de análise de negócios", International Institute of Business Analysis. Toronto, Ontario, Canadá.

Band, W. (2013), Navigate the future of CRM in 2013, Forrester Research Inc., Cambridge.

Corrêa, K. E. S. et al. (2005), "Mapeamento do processo de fornecimento em uma rede de supermercados", In: Encontro Nacional de Engenharia de Produção, 2005, Porto Alegre. Anais... Porto Alegre: ABEPRO.

Costa E. P. and Politano P. R. (2008), "Modelagem e mapeamento: técnicas imprescindíveis na gestão de processos de negócios", In: Encontro Nacional de Engenharia de Produção, 28, 2008, Rio de Janeiro. Anais... Rio de Janeiro: ABEPRO.

Costa, H. G. (2010), "Modelo para webibliomining: proposta e caso de aplicação". Revista da FAE, v. 13, n.1, p.115-126.

Costa, L. (2014) "Método multicritério para apoio à análise e seleção de investimentos sustentáveis em fundos de pensão". 2014 Tese (Doutorado) - COPPE, da Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2014.

Cristescu, M. P. (2016), "Traditional Enterprise Business Intelligence Software Compared to Software as a Service Business Intelligence, Informatica Economica, Vol. 20, No. 01.

Dilório, C.; Hockenberry-Eaton, M.; Maibach, E., et al. (1994), "Focus group: an interview method for nursing research", The Journal of Neuroscience Nursing, Vol. 26, No. 3, pp. 175-180.

Flick, U. (2013), Introdução a metodologia de pesquisa: um guia para iniciantes, Penso, Porto Alegre.

Frisk, J. E.; Bannister, F. (2017), "Improving the use of analytics and big data by changing the decision-making culture: a design approach", Management Decision, Vol. 55, No. 10, pp. 2074-2088.

Gersil, M. (2016), "Data Mining Practice in the Scope of CRM: Churn Management in the Telecommunication Sector", International Journal of Business Management and Economic Research, Vol. 7, No. 2, pp. 560–567.

Gharaibeh, N. K. (2015), "Enhancing CRM Business Intelligence Applications by Web User Experience Model", International Journal of Advanced Computer Science and Applications, Vol. 6, No. 7. pp. 1-6.

Günter, B. (2012), "Beschwerdemanagement als Schlüssel zur Kundenzufriedenheit", In: Homburg, C (Ed.). Kundenzufriedenheit: Konzepte—Methoden—Erfahrungen, 8th ed., Gabler, Wiesbaden, p. 325–348.

Homburg, C.; Bruhn, M. (2013), "Kundenbindungsmanagement: Eine Einführung in die theoretischen und praktischen Problemstellungen", In: Bruhn, M.; Homburg, C. (Eds.), Handbuch Kundenbindungsmanagement: Strategien und Instrumente für ein erfolgreiches CRM, 8th ed., Springer Gabler, Wiesbaden, p. 3–39.

Khan, A.; Ehsan, N.; Mirza, E.; et al. (2012), "Integration between Customer Relationship Management (CRM) and Data Warehousing", Procedia Technology, 1, pp. 239–249. doi: 10.1016/j.protcy.2012.02.050

Maji, G; Sen, S. (2016), "Data Warehouse Based Analysis on CDR to Retain and Acquire Customers by Targeted Marketing", 2016 5th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), 7-9 sept. 2016, Noida, India. doi: 10.1109/ICRITO.2016.7784955

Masoud, R.; Ahmed, T. M. (2017), "Using data mining in telecommunication industry: Customer's churn prediction model", Journal of Theoretical and Applied Information Technology, Vol. 91, No. 2, pp. 322–328.

Meidan, A.; García. J. A. G.; Escalona, M. J., et al. (2017), "A survey on business processes management suites", Computers Standards & Interfaces, Vol. 51, pp. 71-86.

Miller, G. J.; Bräutigam, D.; Gerlach, S. V. (2006), Business Intelligence Competency Centers: A Team Approach to Maximizing Competitive Advantage, John Wiley & Sons.

Moro, S.; Cortez, P.; Rita, P. (2015), "Business intelligence in banking: A literature analysis from 2002 to 2013 using text mining and latent Dirichlet allocation", Expert Systems with Applications, Vol. 42, No. 3, pp. 1314–1324. doi:10.1016/j.eswa.2014.09.024

Munyoroku, R. W. (2016), Business Intelligence Systems and Customer Relationship Management in Mobile Telecommu-

nications Firms in Kenya [Doctoral Dissertation], University of Nairobi, Nairobi, Kenya.

Polyvyanyy, A.; Ouyang, C.; Barros, A., et al. (2017), "Process querying: Enabling business intelligence through query-based process analytics", Decision Support Systems, Vol. 100, pp. 41–56.

Shahraki, A; Dezhkam, A; Dejkam, L. (2015), "Developed model of management of successfull customer relationship in the context of business intelligence", Indian Journal of Science and Technology, Vol. 8, No. 35, pp. 1-8.

Sharp A.; Mcdermott P. (2001), Workflow Modeling: Tools for Process Improvement and Application Development, Artech House.

Singh, I.; Singh, S. (2016), "Model for targeting customers based on analyticsin telecom domain", International Journal of Modern Education and Computer Science, Vol. 8, No. 11, pp. 43–49. doi:10.5815/ijmecs.2016.11.06.

Toyese, A. Y. (2014), "Customer relationship management and customer loyalty in Nigerian telecommunication industry", Journal of Business and Retail Management Research, Vol. 8, No 2, pp. 1–7.

Venter, C; Goede, R. (2017), "The use of critical systems heuristics to surface and reconcile users' conflicting visions for a business intelligence system", Systemic Pratice and Action Research, Vol. 30, pp. 407-432.

Westphal, M. F; Bogus, C. M; Faria, M. M. (1996), "Grupos focais: experiências precursoras em programas educativos em saúde no Brasil", Boletín de la Oficina Sanitaria Panamericana, Vol. 20, No. 6, pp. 472-481.

Zaby, C; Wilde, K. D. (2018), "Intelligent Business Processes in CRM", Business & Information Systems Engineering, Vol. 60, No. 4, pp. 284-304.