The use of BPM to improve knowledge management

Using BPM to manage an organization's knowledge

Dissertation to obtain the Master´s Degree in Business Management

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Dedication

To my grandparents, for all the love and support.

Acknowledgement

I am deeply grateful for all the help and support I have received during the elaboration of this thesis. Without it, I could not complete it and continue my academic path.

A special thanks to my parents and grandparents for all the love and support.

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Abstract

In the context of an ever faster changing and growing global economy, adaptation is one of the critical elements for an organization to stay successful and competitive.

Managing change and staying ahead of the competition, organizations need to embrace new ways of doing business. BPM is already an established method to map an organization's process. Another use can be the management of an organization's knowledge to improve on the lost knowledge due to the rotation of the workforce.

This thesis aims to study the importance and need to manage an organization's knowledge by implementing a BPM solution.

The primary research contributes to a better understanding of the importance of BPM, along with managing knowledge inside organizations.

From the analysis, it is possible to conclude that BPM solutions not only greatly rely on specific organizational knowledge to be implemented successfully, but even with a simpler implementation, it can vastly improve retaining organizational knowledge.

Keywords

Business process management; Knowledge Management; Organizational Knowledge; Organizations; Industry 4.0

Resumo

Num contexto de uma economia global em constante mudança e crescimento, a adaptação é um dos elementos críticos para uma organização se manter bem-sucedida e competitiva.

Para gerir a mudança e manter-se à frente da concorrência, as organizações precisam de adotar novas formas de fazer negócio. O BPM já é um método estabelecido para mapear os processos de uma organização. Outra utilização pode ser a gestão do conhecimento de uma organização, para melhorar o conhecimento perdido devido à rotação dos recursos humanos.

Esta tese tem como objetivo estudar a importância e a necessidade de gerir o conhecimento de uma organização através da implementação de uma solução de BPM.

A pesquisa primária contribui para uma melhor compreensão da importância do BPM, juntamente com a gestão do conhecimento dentro das organizações.

A partir da análise, é possível concluir que as soluções de BPM não só dependem muito do conhecimento organizacional específico para serem implementadas com sucesso, mas mesmo com uma implementação mais simples, podem melhorar muito a retenção do conhecimento organizacional.

Palavras-chave

Gestão de Processos de Negócio; Gestão de Conhecimento; Conhecimento Organizacional; Organizações; Industria 4.0

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List of abbreviations and acronyms

AI – Artificial Intelligence

BP – Business Process/es

BPM – Business Process Management

BPMI - Business Process Management Initiative

BPML - Business Process Modelling Language

BPMN – Business Process Management and Notation

BPMS – Business Process Management Systems

BPQL – Business Process Query Language

CBR - Case-Based Reasoning

CRM – Customer Relationship Management

CSF – Critical Success Factors

ERP – Enterprise Resource Planning

ESGIN – Escola Superior de Gestão de Idanha-a-Nova

IEC – International Electrotechnical Commission

ISO – International Organization for Standardization

KM – Knowledge Management

KMS – Knowledge Management System

KPIs – Key Performance Indicators

OMG - Object Management Group

PA - Process Analysis

PD - Process Discovery

PI - Process Identification

QNQ – Quadro Nacional de Qualificações

SME – Small and Medium Enterprises

VAT – Value-added tax

1. Introduction

In a world where globalization and internationalization increase competitiveness, having clear and well-defined processes inside organizations is more critical than ever.

In developed countries, A-I-G collaboration drives innovation and knowledge transfer between stakeholders. It is also essential to manage the knowledge within the organizations, to have it readily available and secure so that the knowledge is not lost when an employee leaves.

Another well-known fact is the importance of managing the organization's knowledge as an effective tool to increase the organization's success.

For these reasons, it is necessary to improve business processes, be more efficient on the one hand, and manage organizational knowledge so that it is readily available.

After my first contact with BPMN and Bizagi's modelling software, during the curricular part of the master degree, the clarity of the diagrams caught my attention, and as an exciting topic, I was tempted to investigate and learn more about BPM.

By working in the finance department of a non-profit association, I identified some advantages and disadvantages that a BPM implementation could have in managing processes and knowledge. I wanted to learn more, research the topic and see other organizations' opinions.

A goal was established; first, it was necessary to study the various interactions of knowledge management and transfer inside organizations, and lastly, to see if Business Process Management (BPM) could help with maintaining the knowledge inside the organizations by shaping clear, well-defined processes, that could improve on knowledge retention.

1.1 Study object and investigation questions

Today, and in the context of a faster-growing economy, with ever-faster changes in how an organization manages knowledge and how quickly it adapts to overcome challenges, it is more important than ever to have clear processes that add value. Having clear and well-defined processes help to maintain knowledge within organizations.

For this study, the author will investigate the following questions:

RQ1 – Can BPM be used as a method to store and share knowledge?

RQ2 – Do BPM and KM work as optimization solutions for organizations?

RQ3 - Do professionals share knowledge with their colleagues?

RQ4 – Do professionals understand and know how to read the BPM diagrams?

RQ5 – Do top managers promote knowledge sharing?

1.2 Objectives

This thesis aims to perceive the importance of BPM inside organizations and whether it helps manage organizational knowledge.

With this, there are also other objectives to be achieved, such as:

- To understand what a business process is.
- Identify the key elements of BPMN 2.0.
- Understand the importance of BPM to organizations.
- Identify the difficulties organizations had in implementing BPM.
- Identify the main advantages of the implementation of BPM.
- Understand how knowledge is managed inside organizations.

1.3 Methodologic approach

For this thesis, the methodological approach used was Qualitative Research, with the primary objective of obtaining an answer to the research questions using a 360º method, with questionnaires and interviews.

Different search engines, such as Web of Science, Scopus, and Google Scholar, were used for the research, bibliometric review, and support for the state of the art of our thesis. Based on previous studies, articles, thesis, and organizational websites, between 11TH of November 2022 to 15th February 2023.

The main keywords used for this search were BPM, Knowledge Management, Knowledge Transfer and Business Processes, and BPM implementation.

For the author's study, a 360º method was used, having opted to conduct interviews with the top managers and questionaries to the workforce in a top-to-bottom method. This way, the findings of both can be compared to one another and find out what advantages and disadvantages a BPM implementation can have, along with how knowledge can be managed and maintained in an organization.

Lastly, in mapping a process in the organization, the author works as a form to complement the literature review and have a first-person interaction of the difficulties felt when trying to implement a BPM solution and gather knowledge.

For the interviews, the professionals/organizations invited some who needed to have BPM implemented in their organizations, and some had to sell those kinds of solutions.

The questionnaires were mainly distributed to professionals working in the organizations where the interviews were conducted.

1.4 Thesis structure

This thesis is structured as follows: the first chapter is dedicated to the initial introduction, objectives, investigation questions, and methodologic approach. After the initial setting, the second chapter is devoted to an overview of BPMN and its history, introducing BPMN 2.0 visual elements and their meanings and introducing BPM and how it should be implemented.

In the third chapter, we briefly overlook some of the available BPM software, comparing some features and its price. The fourth chapter is dedicated to the state of the art, where the current state of the knowledge is analyzed and serves as the basis for this study, introducing business process management and knowledge management.

In the fifth chapter, the bibliometric analysis is performed, and its results are discussed, after which the sixth chapter is dedicated to other relevant studies conducted by other authors.

The seventh and eighth chapters are dedicated to the author's study, the qualitative and quantitative studies, were the information gathered is summarized.

The ninth chapter is dedicated to mapping a process in the organization where the author works. In contrast, the tenth chapter is dedicated to the results and discussion, analysing the information gathered, interviews, questionnaires, mapping processes, and comparing to the literature.

This thesis ends with chapter eleven, presenting the conclusions, limitations, gaps, and further lines of investigation, while chapters twelve and thirteen are dedicated to the references and appendices, respectively.

2. Business Process Modelling and Notation

The interest in business process management and its applications has increased in the last few years. Previously, leading organizations were focused on developing business process architectures for better management and measurement. Today, with digital transformation, data management, artificial intelligence, and a steady increase in regional and international competitiveness, organizations are modifying and adapting to accommodate industry-wide changes for the use of new technologies (Harmon, 2019).

- **BPMN** stands for Business Process Modelling and Notation, and it is the standard for modelling business processes, which is a graphical representation system composed of symbols that represent process flows.
- **BPM** stands for Business Process Management and refers to a customizable management methodology that uses tools and techniques to analyze and improve processes across all departments, as discussed further in this paper.
- **BPMS** stands for Business Process Management Systems, which includes all the software and tools responsible for automation and execution through digital means, as discussed further in this paper.

2.1 History

Intending to develop a common language that professionals can understand, BPMN has evolved rapidly over the years as a method used to add predictability to businesses.

Initially developed by the Business Process Management Initiative (BPMI), version 1.0 was released to the public in May 2004. In June 2005, BPMI merged with the Object Management Group (OMG). Version 2.0 of BPMN was developed in 2010, and the actual version of the specification was released in December 2013. The latest version (2.0.2) has been formally published by ISO as the 2013 edition standard: ISO/IEC 19510 (GitBook, 2022). Figure 1 shows the history and evolution of BPMN over the years.

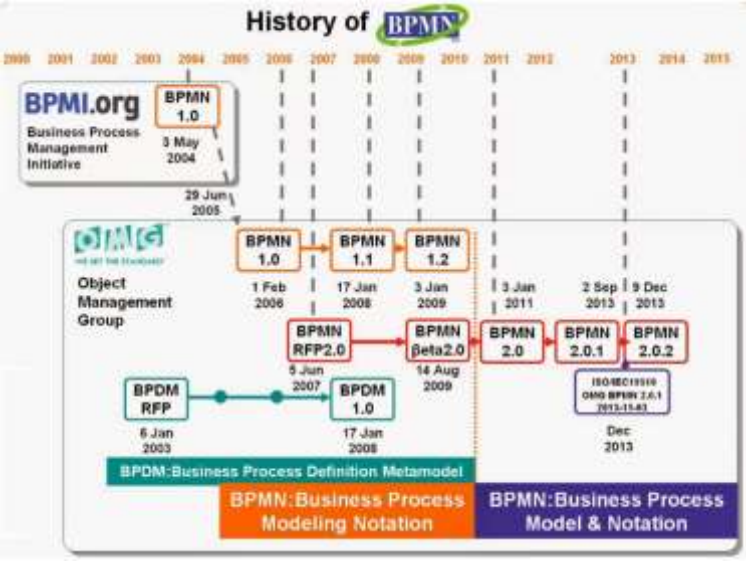

Figure 1 - Evolution of BPMN, Source (Source: Gitbook 2022)

In recent years, BPMN has become the leading standard as a business process modelling language, which is expressive and formal yet easy to understand (Chinosi & Trombetta, 2011).

Business Process Modelling is a term originally coined in the 1960s in the fields of systems engineering. In the 1990's companies began to replace words like "procedures" and "functions" with terms like "processes" and "workflows" (Chinosi & Trombetta, 2011; Harmon, 2019).

BPMN was designed with web services in mind and also developed Business Process Modelling Language (BPML) and Business Process Query Language (BPQL) (Owen & Raj, 2003). This way (BPMN) not only provides a language that is easily understood by all business users but also a way to converge and adapt different languages on a single standardized platform (Owen & Raj, 2003).

2.2 Introduction to BPM

Today and in the future, processes play an integral role in considering and positioning the potential impact of rapidly emerging digital technologies. Technologies such as artificial intelligence (AI), advanced data analytics, robotics, and blockchain are expanding process design options and providing new opportunities for companies (Harmon, 2019).

Concerns about efficiency, productivity, and achieving the set goals affect not only businesses but also nonprofit organizations (Harmon, 2019).

When an organization decides to implement a business process, they take into consideration various concerns about the implementation. This can start from top to bottom or as a broad to narrow vision and implementation of said processes.

In this way, there are:

Organization-wide concerns: Although it is possible to design and implement a specific process in isolation from others, according to Harmon (2019), the only way to achieve significant competitive advantage is to ensure that all the processes that make up a value chain are interconnected and mutually supportive.

On a different scale, in multinational organizations, it is necessary to ensure that all the processes are carried out in the same way in each market. This ensures that the service or product delivered to the customer is of the same comparable quality and that the internal performance indicators (KPIs) that work in one market can thus be applied to all other markets.

In Figure 2, we can visualize how the concern for process mapping should be ensured. The vertical axis indicates the scope of the concern, while the horizontal axis indicates the type of activity we are focusing on.

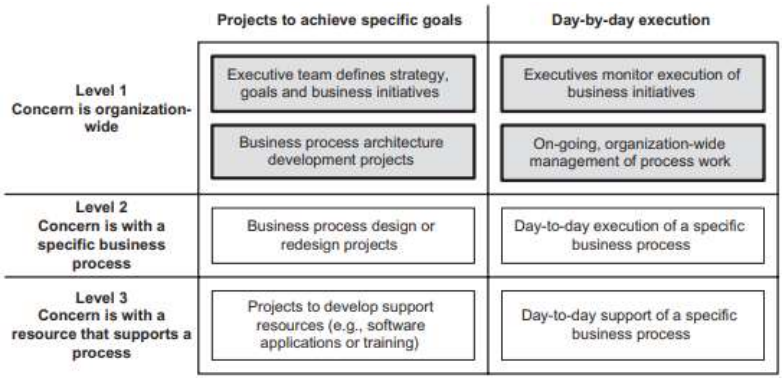

Figure 2 - Concerns in mapping business processes (Source: Harmon, 2019)

Process-level concerns: need to be carefully addressed as they determine the outcome. There is already a clear need for a well-defined process, although most of the time, the root of the problem is unclear, so the first task of any process is to ensure that the nature and scope of the problem are well-defined (Harmon, 2019).

Harmon (2019), a process is a bounded set of activities that are undertaken in response to an initiating event to generate a valued outcome and one that better contributes to the achievement of an organization's strategic goals.

In this way, processes can be examined as shown in figure 3, a process as-is which needs to-be (desired outcome), which means first identifying the nature of the problem and then considering what kind of intervention might be required to solve it (Chinosi & Trombetta, 2011).

This can also be seen in the context of Lean techniques or Six Sigma methodologies to improve the process continuously.

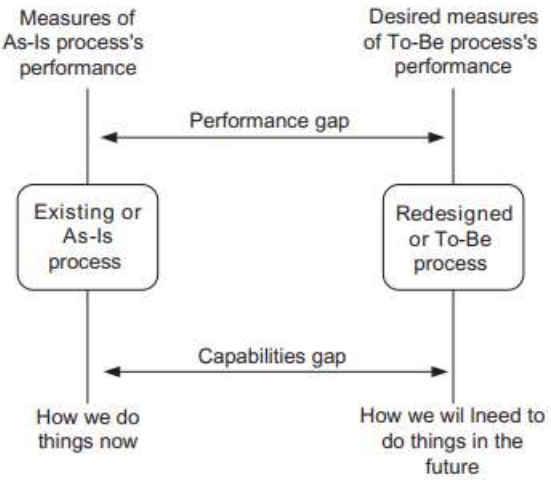

Figure 3 - As-is turning into To-be processes (Source: Harmon, 2019)

Figure 4 highlights a cause-consequence sequence in which each step can be examined and improved upon by comparing actual causes and consequences.

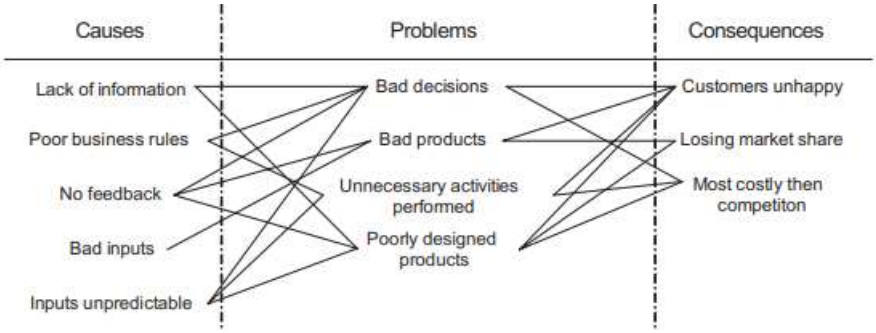

Figure 4 - Cause and Consequence Relations (Source: Harmon, 2019)

Implementation level concerns: once a process has been redesigned, it needs to be implemented, and some of the issues at this stage may be the training required for the employees to adapt or the existing software that needs to be adjusted.

At the same time, the diagrams must be simple enough for everyone to understand what they see.

2.3 BPM Visual Elements

The main goal of BPMN is to provide users with a notation that is easy to understand, not only by the business analysts who create the initial maps but also by the people who will execute those processes.

The visual elements in BPMN are categorized into four categories, as shown in figure 5: Flow objects; Connecting objects; Lanes or Swim lanes, and Artifacts.

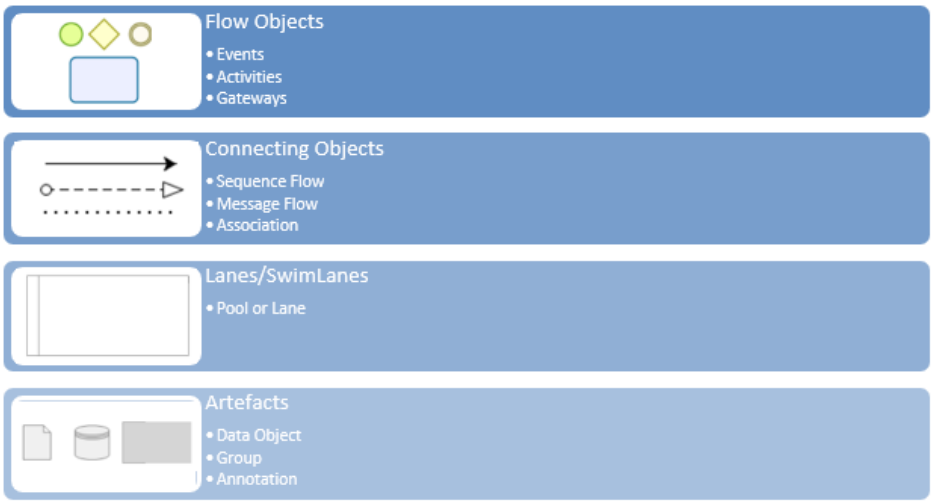

Figure 5 - BPMN 2.0 visual elements (Source: Self-Elaboration)

Flow objects:

Events are visually represented by a circle and mean something that happens during the business process. As shown in figure 6, they can either start a process flow, occur during the process flow, or end the process flow, depending on where they occur.

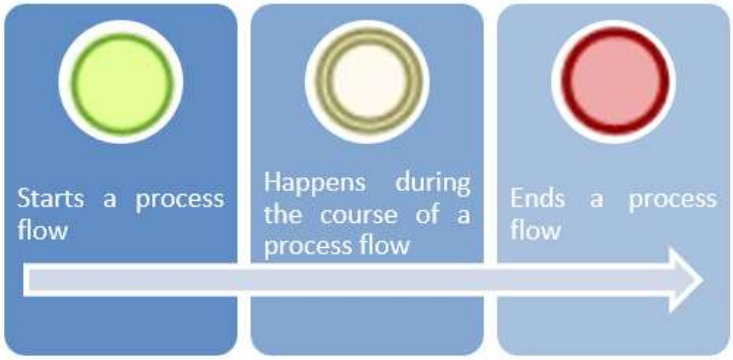

Figure 6 - Process Flow Objects (Source: Self-Elaboration)

Activities are visually represented by a rectangle, and there are two types of activities, processes and sub-processes. When a process is not further subdivided into actions, it is called a **Task**. These represent a generic action/task that the organization does, while sometimes it is necessary to include further actions within a **Process**, creating a "child diagram" these are called **subprocesses (es)**.

As shown in figure 7, a Task/Process is represented as a rectangle with rounded edges, and a Subprocess is represented by a plus sign at the bottom centre of the rectangle.

Figure 7 - Process and Subprocess (Left to Right)

Gateways model decision points in the process flow to control divergence and convergence. Visually, they are represented as a diamond shape, as shown in figure 8.

Figure 8 - Gateway

Connecting objects:

Connecting objects are, as the name suggests, objects that connect the flow objects, by adding sequence (the order in which a process flow is performed), by adding messages (information exchanged between two entities), and by adding association (associating data with flow objects).

A **sequence flow** is represented as shown in figure 9, a simple line with an arrow used to describe the order in which events occur.

Figure 9 - Sequence Flow

A **message flow** represents the exchange of messages between two participants in the process flow, visually illustrated in Figure 10 as a dotted line with an arrow.

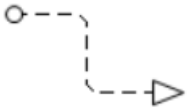

Figure 10 - Message Flow

Association, as shown in figure 11, is represented by a dotted line and is used to link text, data, inputs, and outputs that do not directly affect the process flow but are used to provide information about what the process flow does.

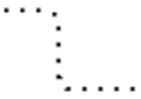

Figure 11 – Association

Lanes / Swim lanes:

Swimming pools can be divided into **pools** and **lanes**. This concept is used to organize the activities by separating them into categories.

By dividing processes into categories, it is possible to identify who is doing what.

As shown in figure 12, a **lane** is a subdivision within a **pool**. Typically, a collection represents an organization, and a lane is a department within that organization.

Figure 12 - Pool and lanes

Artifacts:

Used to give the reader additional information about the process, these can be,

Data objects, **groups,** and **text annotations**.

Data objects show how data is needed to complete the activity or what data was produced.

Groups are used for text annotations to add more information to help contextualise what an activity/process flow does. Usually, these are used to help the reader/user understand the BPMN diagram.

Visually, they are represented as shown in Figure 13, Data object; Groups; Text annotations.

Figure 13 - Data objects, Groups, and Texts

2.4 Business Process Life Cycle

Muehlen & Ho (2006), business process management covers the lifecycle of process discovery, specification, implementation, execution monitoring, and control to improve the quality of the processes.

The continuous improvement of the quality of the processes, no matter how it is carried out, must be based on the quality of the products or services that will be evaluated by the customers (Elzinga et al., 1995).

Process Identification:

- This is the first phase. In this phase, a business problem is presented, and relevant processes are identified and related to each other. The result of this phase can be a completely new process or a revised version of an existing one.

Process Discovery:

- Or "as-Is" process is the second phase. Here, the current state of each of the relevant processes is documented.

Process Analysis:

- This phase identifies, documents, and quantifies issues associated with the "as-Is" process. The result of this phase is a known issues document that can be structured and organized according to the impact or effort required to resolve the issue.

Process Redesign:

- This phase uses the identified issues to present solutions and implement changes that can help address the issues, evaluating and comparing multiple options. Finally, the most promising ones are implemented.

Process Implementation:

- In this phase, the changes required to improve the process are implemented, according to what was previously identified, it is also in this phase that the transition from the "as-Is" to the "to-Be" process begins, and later, this implementation is deployed in a BPMS.

Process monitoring and controlling:

- Once the redesigned process is up and running, relevant data is collected and analyzed to determine whether the changes have resolved the issues and how well it performs against the KPIs. Corrective actions can be taken if deviations occur, and if new problems arise in the same process, they can be addressed.

Management and optimization of the implemented process should also be considered as minor changes occur.

Figure 14 shows the process life cycle in a more graphic form,

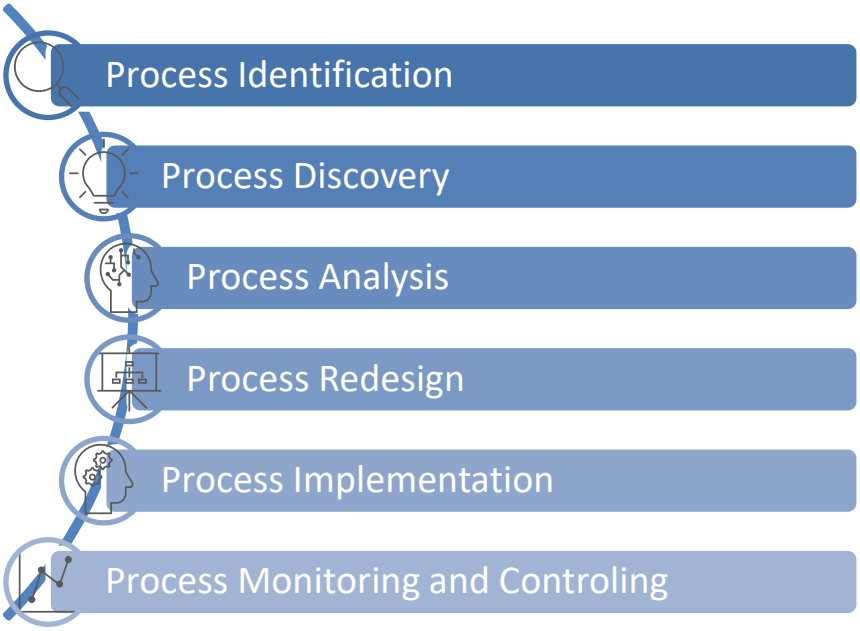

Figure 14 - Process lifecycle (Source: Self-Elaboration)

Although this part relates to the BPM lifecycle, it is also necessary to identify what types of processes we are dealing with to implement or improve them correctly.

According to Bizagi (2022), business processes can be categorized into different types, the most common being the following three:

Core:

Core processes are directly related to the creation of the value chain and directly add value to the customers by serving the customers' needs and generating revenue for the organization. Examples of this can be:

- Order parts (raw materials)
- Taking customer orders
- Product Manufacturing

Support:

Support processes enable core/operational processes to be conducted. These can also be known as secondary processes. While these do not provide direct value to the customers, they do indirectly, for example, by hiring people with the right skills for the job. Examples of this can be:

- Accounting
- Human resources
- Provisions
- Data management

Management:

Management processes involve all the planning and controlling of the core and support processes, enabling the business to run smoothly and ensuring that it complies with regulations and procedures. Examples of this can be:

- Strategic planning
- Budgeting
- Infrastructure management

2.5 BPM and ISO

ISO is the International Organization for Standardization. This organization specifies the requirements for a quality management system in an organization, in this case, the norm ISO 9001 (ISO, 2023).

This norm promotes a process approach like BPM, continuously improving the processes, managing quality, efficiency, and efficacy, ensuring the quality of products and services, and establishing a management quality control system.

With BPM, mapping and defining processes, helping to identify gaps in processes and improving on those, controlling and keeping the outcomes constant and measurable, and addressing risks and opportunities, with the bonus of a greater trust level in decision making.

2.6 Lean and Six Sigma methodologies

Lean:

With the publication of the Toyota Production System, the literature on lean, often referred to as the Toyota Way, began. Lean began in manufacturing and relied on a set of statistical and quality control techniques.

In this way, lean was derived from a process improvement approach, first developed at Toyota, and centered around two main pillars, continuous improvement and respect for people. For a time, the two methodologies remained similar. Lean focused on improving the flow of activities, whereas Six Sigma focused on improving the quality and consistency of process outputs (Harmon, 2019).

Loenen et al. (2022), lean is not a guided implementation process. Instead, lean transforms through network dynamics into predefined forms. Resulting sometimes in implementations that are not linear.

Six Sigma:

Methodologies are organized around a process improvement approach, divided into five stages, Define, Measure, Analyze, Improve, and Control (Harmon, 2019).

Define: this is the first phase. Here it is defined as what should be achieved. Ideally, there should be a clear understanding of the process to be improved.

Measure: in the second phase, there should be implemented measures to let the team know how well each requirement is being satisfied.

Analyze: in this phase, there should be analyzed what is causing the problem. Depending on the situation, some cases are more complex than others.

For example, in an auto shop, when a car is ready to be returned to the customer, if it is too far away or poorly stored, the simple task of returning it can be more time-consuming than it needs to be. This is a simple example that can be easily seen, although some cases are not so obvious and require more analysis.

Improve: in this phase, with the data gathered, the team starts to analyse ways to improve the process.

Control: this is the last phase, where the solutions that were presented earlier are implemented and then compared with the established measures.

With the graphic representation of the different stages in figure 15, it is possible to note that six sigma methodologies and lean methodologies. However, settling on different pillars, they have the same primary objectives, settling on the continuous improvement of the processes and activities.

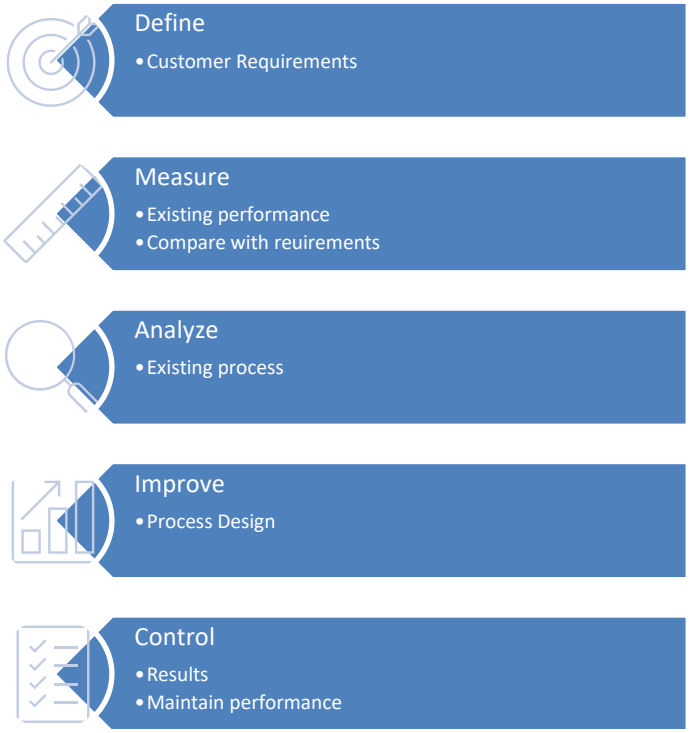

Figure 15 - Six Sigma stages (Source: Self-Elaboration)

2.7 Artificial Intelligence in process management

Although there are many definitions of artificial intelligence AI, a common definition is software that exhibits human-like capabilities (Microsoft, 2022).

However, there is still a significant gap between the expectations and the successful adaptation of AI to improve business. Existing frameworks have identified the need to focus on human-centred design (Tjondronegoro et al., 2022).

Redefining how machines communicate and operate with each other and with the environment, autonomously generating an operational plan with an end goal in mind, without the need for an operator to interfere, with computers exhibiting behaviour that can be called intelligent by humans (Wahlster, 2017), this way aiding the final user with helpful information about what might be disruptive events.

Another take on this could be case-based reasoning (CBR) as a form of AI that retrieves past information and can be adapted to solve a current problem (Tueschen & dos Santos, 2021).

Harmon (2019), AI technologies in process management can vary by two different approaches, one using knowledge and logic, usually being referred to as knowledge-based, and another using statistical analysis of patterns, usually referred to as machine learning or neural network systems.

As for knowledge-based approaches, they represent knowledge in an explicit way and use it to reason about problems, for which a knowledge-based system relies on a knowledge base, an inference engine, and a working memory. Harmon (2019), a knowledge base is essentially a basic set of rules; If A happens, and then B and then C, cumulatively, there is enough information that X will occur, and an inference engine relies upon logical principles, and if it can reach any conclusions, those are stored in the working memory.

As for neural network systems, these are composed of processing elements arranged in multiple layers, connected by links that either pass or do not pass information. When information is passed, that specific link becomes stronger. As more information is exposed to the network, it continues to modify and adapt the outcomes (Harmon, 2019).

Even though AI is still a long way from complete autonomy, it can already help in decision-making and in assisting in identifying performance indicators that are failing to meet the required target, helping the human counterpart to apply a corrective action sooner.

3. Business Process Management Systems

Business Process Management Systems (BPMS) are the software that put the process diagrams to work, giving the users capabilities such as implementing and executing business processes.

These tools have the functionalities to analyze and represent the previously established process diagrams, working as tools that seek improvement to the management systems, connecting people and processes, and managing the transformation and access to information (Santos et al., 2007).

Different BPMS software offer different types of solutions, so as always, BPMS software should be chosen according to the organization's needs and specifications.

When analyzing some BPMS options in an organizational knowledge scope, the benefits are notorious, as an organization depends on specialized knowledge to be successful (Salvadorinho & Teixeira, 2021).

By having software that stores, automates, monitors, and allows for sharing and interaction between different departments, critical information can be stored and accessed instantly.

Although there are several types of software to choose from, in this chapter, we will compare six available options.

The criteria for comparison are:

- Price.
- Features.
- Integration with other software.

Bizagi is a BPM software that offers solutions in the form of 3 products, Bizagi Modeler, Bizagi Studio, and Bizagi Automation, on a low-code development platform (Bizagi, 2022).

Figure 16 - Bizagi logo (Bizagi, 2022)

- Pricing is available upon request.
- Integrates with over 130 other software's.
- Features drag, and drop is intuitive to use, automation, cloud-native providing global access.

Zoho Creator, is a low-code application that allows users to create custom apps, design and develop workflows, and connect data from other software, among other functions (Zoho, 2023).

Figure 17 - Zoho Creator logo (Zoho, 2023)

- Pricing: starting at 37€ per user/month, and offers a 0€ for one user/app.
- Features: personalization, import data, model, and visualize, allows automation, and is available in multiple device apps.
- Integrates with more than 550 other software's.

Kissflow, is a no-code BPM software that allows users to easily adapt it to any business process system, enabling the users to create apps, processes, or case boards, integrating with Google (Kissflow, 2023).

Figure 18 - Kissflow logo (Kissflow, 2023)

- Pricing: starts at 15$ per user/month (with a minimum of 20 users)
- Features: dashboards, analytics and reporting, dynamic reporting, process optimization, process audit, and visual process design.
- Integrations: Google, Dropbox, SAP, Salesforce, and IBM.

IBM Blueworks Live, is a cloud-based BPM software option for documenting, improving, and automating workflows, featuring drag and drop and a centralized business process repository (IBM, 2023).

Figure 19 - IBM Blueworks Live logo (IBM, 2023)

- Pricing: starting at 53$ a month.
- Features: drag and drop, starter templates, real-time collaboration embedded tutorials, flexible permissions
- Integrations:

Processmaker, is low code development and industry-leading intelligent workflow automation software, robotic process automation, business rules, and data management (Processmaker, 2023).

Figure 20 - Processmaker logo (Processmaker, 2023)

- Pricing: starting from 1495$ per user/month
- Features: drag and drop, modelling, dashboards, document scanning, and storage.
- Integrations: Google, Dropbox, SAP, Salesforce, IBM, Microsoft Office, and G-Suite SSO

Microsoft Power Apps, although not fully BPM software Microsoft Power Apps capabilities, should not be disregarded, as they allow for much flexibility and integration. Working as a low-code app, it allows its users to create and share simple apps. Also integrating with most databases, it can also work as a tool to analyze and visualize data and processes.

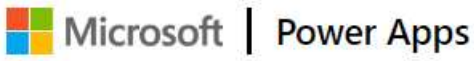

Figure 21 - Microsoft Power Apps logo (Microsoft, 2023)

- Pricing: starting from 4,20€ per user/month
- Features: manage and store data, integrates with Microsoft Azure, process automatization, connect data, and create apps.
- Integrations: integrates with the Microsoft universe applications.

Although these are only a few examples, there are more BPMS software. When choosing one, organizations should not only have the price in mind but also, and even more importantly, the features available, support options, and maybe the most important aspect of this all, the way the employees will accept and use it, since if it is not well received the implementation will not work correctly.

4. State of the art

In this chapter of the thesis, we will focus on the state of the art of BPM and its importance, knowledge management, and knowledge transfer inside organizations.

Business processes constitute the intangible and mostly unseen part of the organizations, which can easily be disregarded, although being one of the most important aspects of any organization.

While some can be simple enough to imagine, more complex BP can be challenging to visualize mentally. Mapping business processes ensures that they are easier to visualize and that all the intervenient see the same thing.

These also derive from a great part of knowledge, and just as business processes, knowledge plays a vital role in any organization, more so that a significant amount of knowledge is intangible and easily lost when an employee leaves.

Lastly, in the final part, as both BPM and KM lifecycles are complementary to each other, an overlapped life cycle is proposed, which is derived from both isolated life cycles combined into one.

4.1 Business Processes and their importance in organization's

Harmon (2019), business processes continue to be one of the most critical assets of an organization, determining the speed of value creation and the cost of serving the customer base.

Smart manufacturing, in Industry 4.0, aims to support decision-making to manage disruptive events when those may occur through a data-driven system. These intelligent manufacturing systems are usually networked information systems that are tightly coupled with physical processes (Kavakli et al., 2018). ANI (2018), digital transformation is based on the development of technologies that enable disruptive changes in business models, processes, and products. It is characterized by the introduction of digital technologies in the production processes.

Nevertheless, the management of knowledge and the transfer of knowledge to new operators is sometimes inefficient or does not happen at all, creating bottlenecks or, in the worst-case scenario, jeopardizing an organization's future. (Hislop et al., 2018; Roldán et al., 2019).

As Harmon (2019) said, what worked yesterday may not work today, and much of what works today may not work tomorrow. This underscores the importance of organizations adapting, either adapting and keeping up or falling behind so that business processes continue to be one of the most critical assets an organization has.

One of the reasons why managing knowledge is so valuable in organizations is that it is closer to action than data or information. Knowledge can be valued by the decisions or actions to which it leads (T. H. Davenport, 1998). Often becoming embedded in documents or repositories but also in processes, practices, and norms, by being originated in the minds of knowers when it is not shared or stored, it can be lost to the organization when the employee leaves (T. H. Davenport, 1998; Salvadorinho & Teixeira, 2021).

Thom & Avila (2021), BPM is a topic related to various areas and has gradually been adopted by different types of organizations. By applying BPM, the processes are more efficient, improving productivity and reducing costs.

This way, in an ever-changing world with evolving organizations, how knowledge is managed is of the utmost importance, not only by keeping the knowledge within the organization when an employee leaves but also by how employees can access and use it.

These methods are important in all companies, although different types and sizes require different approaches and implementation at different levels, depending on the desired outcomes but also on the existing level an organization already operates. For example, in an SME with little to no digitalization, applying an organization-wide BPMS

could do more harm than good. It is preferable to apply this in small steps, never losing focus on the objective and the organization's goals.

Processes put man, work, and machine into context. Traditionally, this meant that roles and resources are guided to ultimately arrive at a valuable contribution as the overall process outcome (Harmon, 2019).

4.2 Knowledge management

According to Oxford (2023), knowledge management (KM) is the systematic management and use of knowledge inside an organization to enhance its performance of the organization.

Nonaka (2007), creating new knowledge is not simply a matter of processing information but rather tapping on the tacit and highly subjective insights and intuitions of individual employees.

Nowadays, organizations implement KM to improve efficiency and to provide effective ways of using their intellectual assets. KM is no longer an option but rather a necessity for organizations (Akhavan et al., 2012; Akhavan & Pezeshkan, 2014).

Serrat (2017), knowledge is created and organized by flows of information that can either be tacit or explicit. Tacit knowledge is intuitive and non-verbalized, rooted in skills, experiences, insight, and intuition, being hard to formalize and communicate, as it is embedded in people's minds. Although it can be shared through discussion, and personal interactions, it is also seen as a form of sharing one's know-how.

This is a form of knowledge that cannot be easily transferred over large distances (Audretsch et al., 2011).

While explicit knowledge is codified and can be expressed in writing and drawings, this way, explicit knowledge is a derived form of tacit knowledge that can be seen as having been shared and stored in an organization.

In organizations, knowledge is created through four patterns of interactions, socialization, externalization, combination, and internalization (Serrat, 2017).

Socialization – Process of creating tacit knowledge through interactions.

Externalization – Process of articulating tacit into explicit knowledge.

Combination – Process of combining explicit knowledge through meetings.

Internalization – Process of converting explicit into tacit knowledge.

Although KM in organizations seems to be a valuable method of retaining knowledge inside an organization fostering its competitiveness (Audretsch et al., 2011; Dayasindhu, 2002), one of the most influencing success factors is organizational culture, defined by Serrat (2017), as the glue that holds organizations together, and

characterised by Warrick (2017), as a major success factor of an organization, that can significantly influence its performance, this way playing a pivotal role in KM management.

In Figure 22, it is possible to analyse the psychological and social factors affecting knowledge sharing.

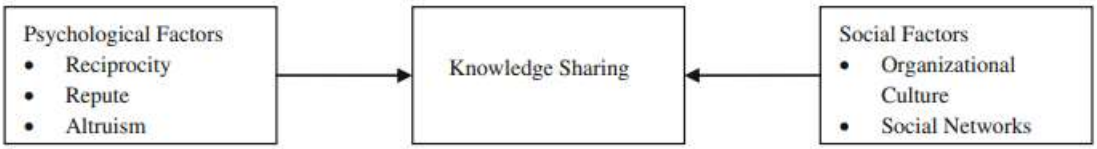

Figure 22 - Psychological and Social factors (Source: Serrat, 2017)

With psychological factors relying on trust, knowledge can be seen as a form of power, and when sharing it, one's value can be diminished. This way, sharing knowledge is made on reciprocity, this being sharing knowledge on the basis that it is possible to receive knowledge in the future. In addition to reputation, one's knowledge cannot represent a source of power if one does not have a reputation for expertise. Furthermore, in altruism, when knowledge is shared, due credit is acknowledged to the source (Serrat, 2017).

Social factors include organizational culture and social networks, relying heavily on leadership to drive knowledge sharing, while people are more likely to support an initiative when leadership behaviour is both credible and supportive (Serrat, 2017). On another scope, it is also essential when designing knowledge management systems that human and social factors are considered in the production and use of knowledge (T. Davenport & Voelpel, 2001).

With sharing being the most influential factor in a successful KM implementation, interpreting it as a behavioural and managerial issue, as it is the opposite of a successful KM implementation, with the primary goal being to encourage knowledge sharing and the use of other co-workers knowledge to accomplish organizational goals more efficiently (Akhavan & Pezeshkan, 2014; Bhatti et al., 2011).

Although knowledge management emerged in the early 1990s as a scientific discipline, it has since millennia been documented by philosophers emphasizing knowledge (Ives et al., 1997).

4.3 Knowledge transfer in organizations using BPM

In the aftermath of the COVID-19 restrictions, and the beginning of the economic recovery, organizations faced a new challenge: the previously laid-off workforce was now missing and, with it, some of the internal corporate knowledge.

Although the paper's main objective is not to study the aspects of the covid-19 pandemic, it is an excellent example of why organizational knowledge should be transferred and maintained.

Often the competitiveness of an organization depends on specialized knowledge, its diversity, and the way it is effectively integrated in the organization (Salvadorinho & Teixeira, 2021)

Ebrahimi et al. (2013), business process modelling will enhance the level of common knowledge in the organization in two ways. First, there is a need for stakeholder participation, mostly since business processes, as stated by Harmon (2019) and Ebrahimi et al. (2013), are multifunctional, often across various departments inside the same organization. Second, business processes transform the informal knowledge inside the organization into formal learning, therefore being accessible to a larger group that can share the knowledge.

Dayasindhu (2002) states that knowledge transfer is a critical factor in influencing competitiveness so that the retention and transfer of knowledge aim to improve performance.

Although on a greater non-organizational level, knowledge transfer and cooperation between different stakeholders are done through tightly linked networks, these same networks also work inside organizations, enabling access to new resources, with the production, acquisition, absorption, and dissemination of knowledge seen as a fundamental characteristic of contemporary competitiveness (Audretsch et al., 2011; Farinha et al., 2016).

Having a BPM approach to retain and manage this knowledge network, it is possible to direct an organization's resources more effectively and efficiently, diminishing wasted resources, or in this case, knowledge, improving the organization's competitiveness.

4.4 Knowledge Management in organizations

Today for any organization to stay competitive and successful, ensuring the continuity of its business, it needs to adapt, as globalization and internationalization of organizations have them competing against each other. Knowledge management became a factor in ensuring an organization's success, as they must know how to use and manage it effectively (Si Xue, 2017).

Although being aware of their knowledge is only part of the solution, being able to understand and use the existing knowledge to their advantage can be another dimension to the problem, according to Alavi & Leidner (2001), organizations that are aware of their knowledge have a unique and valuable resource that can be used to gain a competitive advantage, and with knowledge creation consisting of a continuous dialogue between tacit and explicit knowledge (Nonaka, 1994).

Aligning knowledge management with organizational strategy thus being tightly related to company goals it should provide a competitive advantage to the organization, a codification strategy aims to store and provide available knowledge to users explicitly, a personalization strategy aims to use information technology to help people/coworkers share knowledge (Greiner et al., 2007).

Furthermore, for Greiner et al. (2007), while social and cultural characteristics might influence organizational culture and, therefore, successful implementation of knowledge management initiatives, it is also possible to conclude that codification and personalization strategies should be treated as complementary to each other rather than extremes.

4.5 Overlap of the KM and BPM life cycles

Jung et al. (2007) and Nissen et al. (2000), the KM life cycle consists of six phases, as shown in figure 23.

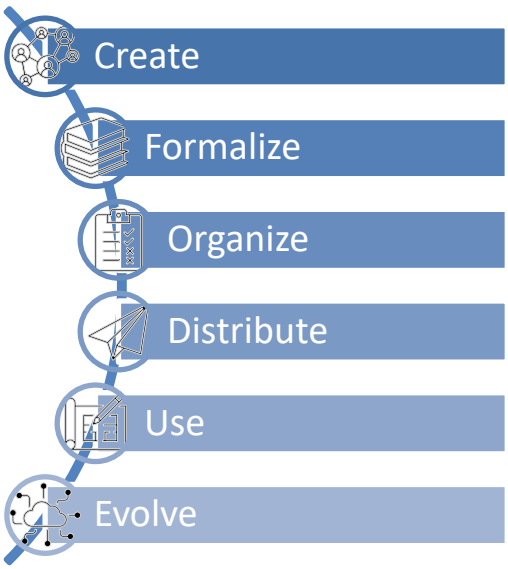

Figure 23 - Knowledge Management lifecycle (Source: Self-Elaboration)

This lifecycle is essentially the use of intangible knowledge, created by activity performers, and practical experience is stored and organized as formalized knowledge, and later when a user needs information, they can access this knowledge repository. This knowledge repository evolves as knowledge is updated or acquired (Jung et al., 2007).

With the BPM life cycle already covered in chapter 2, in this chapter, we will combine both into one lifecycle, as both already share most of the phases, this being while managing knowledge through its lifecycle, it already contains knowledge extracted from the BPM lifecycle, and vice versa, when implementing a BPM solution it can only be implemented through an overview of the current state of the business, and its processes, with this being the knowledge part (Harmon, 2019; Jung et al., 2007; Salvadorinho & Teixeira, 2021; Thom & Avila, 2021).

In Figure 24, it is possible to analyze the various links between two of the life cycles.

Let us use examples to analyze the different stages of this combined cycle.

Process identification, to correctly identify the process and its core problem and put it into perspective with other processes, the organization's goal and knowledge need to be shared among employees and managers.

For example, in an organization, top management determines through various methods that a specific process is underperforming and that it could be improved. This process already aligns with the organizational objectives, so management defines what

goals this particular process should meet and shares them with the employees, those with direct and indirect contact with this process, to get various points of view, and specific knowledge, hopefully, specific employee-related know-how.

Process Discovery, and Process Analysis, having identified the process and gathered helpful knowledge, it is time to "create knowledge". Following the previous example, the employees shared a considerable amount of knowledge, including experiences and specific know-how derived from those experiences. From this, the best-looking ideas are used and transformed from tacit knowledge into explicit knowledge related directly to process instances. With these being organized, formalized, and linked at direct process instances, or complete processes, this way, it creates new and usable knowledge.

Process Redesign, and Implementation In this stage, the process is redesigned, and the knowledge that was formalized and organized in the previous stages is left available to the process users.

Process Monitoring and Controlling In this stage, the implemented actions and gathered knowledge are compared to the desired objectives. As an organization's competitive edge does not present itself in a static form, any process and process-specific knowledge should not present itself in a static condition. This means processes need to be continuously monitored and improved when said improvements are meaningful, and learning should be updated and shared.

Having identified these interactions, it is possible to conclude that BPM and KM mutually influence each other. BPM has a positive impact on knowledge sharing inside organizations (Lavikka et al., 2015; Monashev & Krčál, 2021).

Although many authors recognize the vital role of KM in BPM, there still is a lack of attention to the topic in the existing literature in defining the scope of the possible interactions between both areas (Monashev & Krčál, 2021).

Figure 24 - KM and BPM life cycles (Source: Self-Elaboration)

Furthermore, as both life cycles mutually influence each other, it is possible to conclude that as time passes and new knowledge is created, it is possible to use that knowledge and improve on the existing process. Strategically aligning both methods to improve, using the already existing framework for successful implementation, as knowledge is a great part of any business process.

While lasting interactions between both lifecycles can differ from organization to organization, a broader view can also help understand what influences each.

5. Bibliometric analysis

Donthu et al. (2021), bibliometric analysis is a popular and rigorous method for exploring and analyzing large volumes of scientific data.

A methodology that can identify core research or authors, as well as their relationship, by covering all the publications related to a given topic.

5.1 Data source and research process

The data collected for the bibliometric analysis was retrieved by the authors on the 8th of December 2022 on the Scopus platform.

The keywords used were "BPMN in knowledge management," no language restrictions were used, and no other filters. The results were saved as "export citation to RIS."

This search returned 221 document results published between 2003 and 2023.

In Figure 25, we can examine the article type that was published, with conference papers counting for most of the works.

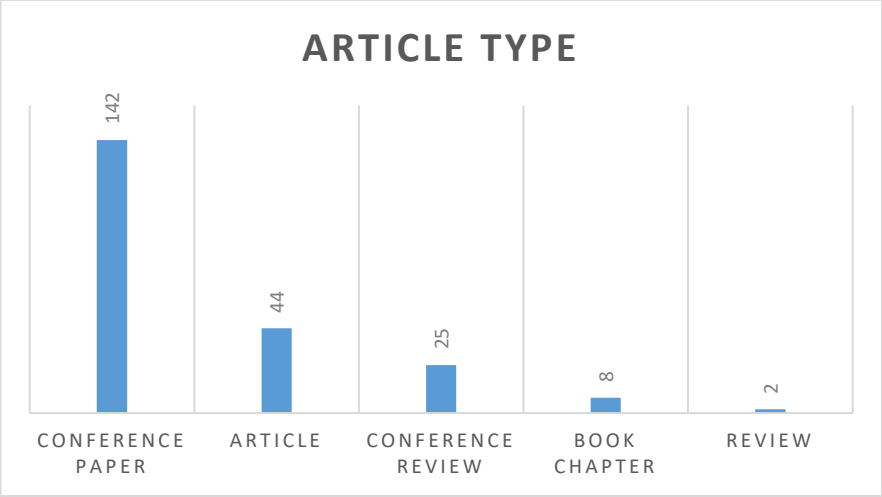

Figure 25 - Paper type (Source: Self-Elaboration)

Following Figure 26, it is possible to analyze the published papers per area of work, with the primary areas being Computer Science, Mathematics, and Business Management.

With published papers in Computer Sciences, Engineering, Mathematics, Decision Sciences, and Business Management, accounting for most works, going in line with the core foundations of BPM, and more specifically regarding Computer Sciences, as in implementing BPMS's.

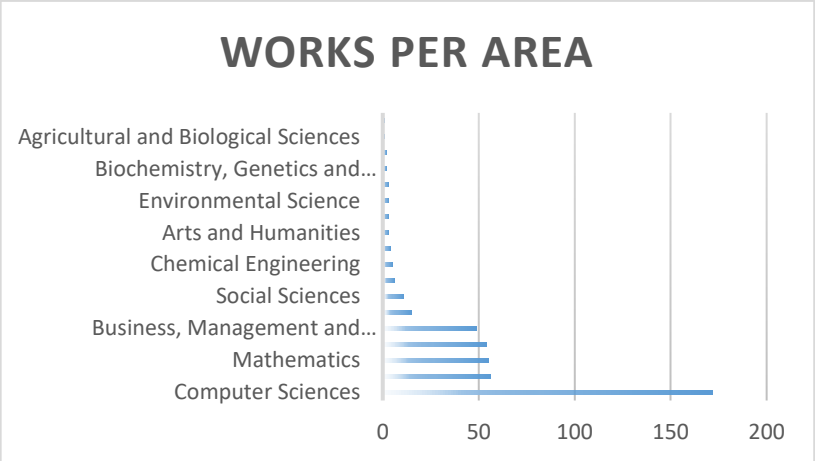

Figure 26 - Works per field of study (Source: Self-Elaboration)

Lastly, in Figure 27, it is possible to see the number of publications per year, showing a steady rise over the years, with a peak number of publications in 2017 of 29 published works, although in 2021, that number had declined to less than half 2022 saw a rise in the number of publications again.

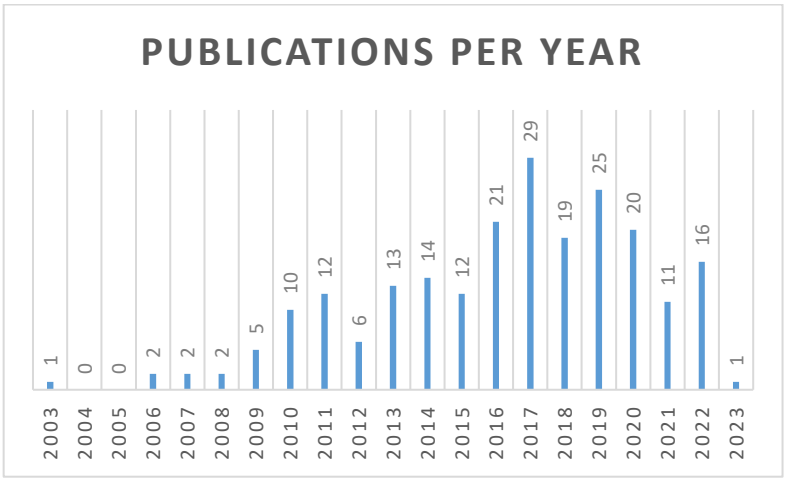

Figure 27 - Publications per year (Source: Self-Elaboration)

5.2 Research questions

Two methods were used to answer the research questions, one with interviews and the other with questionnaires. This way, it was possible to have a 360º view of the advantages and disadvantages of using a BPM solution.

The interview was divided into three parts, one regarding the qualifications, knowledge, and professional experience of the interviewees. A second part with questions directly related to BPMN, and a third part regarding the benefits of implementing BPMN. This interview was based on previously conducted studies (Luciano, 2022).

The questionnaires were divided into three parts based on the interview questions and literature review and later distributed to the employees.

The first part is dedicated to the social demographic questions. The second part analyses the participant's views on BPM implementation and knowledge sharing within organizations. Moreover, a third part is dedicated to the interpretation of BPM diagrams.

The professionals contacted for the interviews through an internal database of the organization where the author works and via google search for organizations that implemented BPM solutions.

5.3 Analytical tool

The analytical tool used for this research was **VOS Viewer**, a software that allows users to generate node-link maps, which can be used to observe the bibliometric networks visually. These may include journals, researchers, or individual publications and can be created based on citation, bibliographic coupling, co-citation, or co-authorship relations (*VosViewer*, 2022).

Figure 28 depicts the VOS viewer software logo, version 1.6.18, released on the 24th of January 2022, was used.

Figure 28 - Vos Viewer logo (VosViewer, 2022)

For this study, keyword co-occurrence networks were applied to construct the knowledge map.

Through co-occurrence analysis of high-frequency keywords, the research hotspots of the "BPMN in Knowledge Management" search were identified using the full counting method, with the minimum co-occurrence number of keywords being set to 3.

Of the 593 keywords extracted, forty-two met the objective. With these specifications, the network was built, with the similarities between the keywords being clustered into seven different clusters, as seen in figure 29.

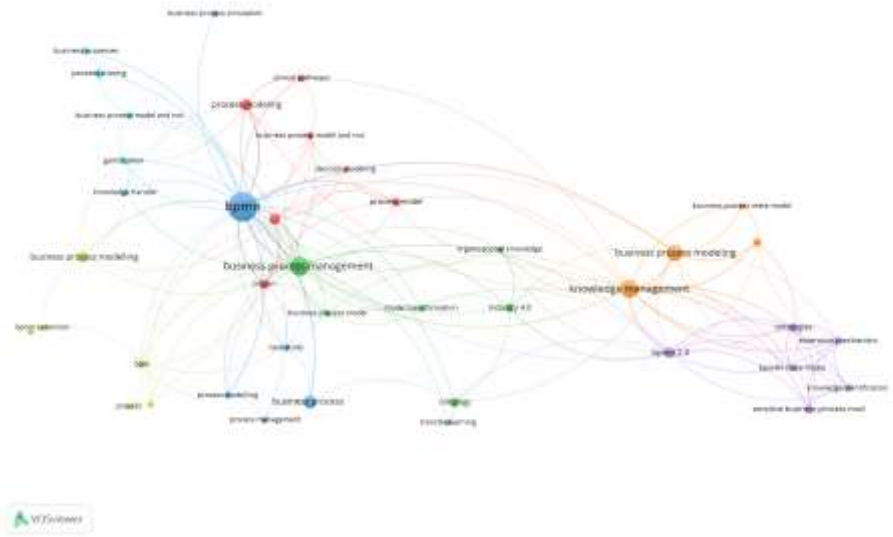

Figure 29 - VosViewer nodes view (VosViewer, 2022)

After the network map was built, the keywords clustered by distinct colours were rearranged, and figure 30 was built to see better which of the keywords belonged to which colour.

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Business Process Model and Notation	Business Process Management	BPMN	BPM	BPM4ki meta-model	Business Process Model and Notation (BPMN)	Business Process Meta-Model
Case Management	Business Process Model	Business Process	BPM Extension	BPMN 2.0	Business Processes	Business Process Modeling
Clinical Pathways	Industry 4.0	Business Process simulation	Business Process Modeling	Extension Mechanism	Gamification	Knowledge Management
CMMN	Model Transformation	Case Study	Cloud Computing	Knowledge Identification	Knowledge Transfer	Sensitive Business Process
Decision Modeling	Ontology	Process Management	Process	Ontologies	Process Mining	
Process Model	Organizational Knowledge	Process Modeling	Workflow	Sensitive Business Process Modeling		
Process Modeling	Transfer Learning					

Figure 30 - Keywords clustered (Source: Self-Elaboration)

6. Other relevant studies

In this thesis chapter, we decided to demonstrate the importance of knowledge management and BPM implementation by examining other studies on the same topic.

These studies were ordered from the most recent to the oldest and were selected based on their relevance to the author's study, BPM implementation, and knowledge transfer, each having a complementary view of the other.

With a brief overview of the following studies, it can be concluded that BPM can be used as a KM facilitator by not only relying upon direct input knowledge for the mapping but also as a graphic form to visualize the processes and connections between them and highlight the gaps.

However, as seen in the second study by Bai & Sarkis (2013) and Jung et al. (2007), the successful implementation of either BPM or KM depends on various success factors, not only the organization's goals being in line to implement BPM, but also a reassurance of the management support and a “safe place to share knowledge amongst co-workers”.

Without these critical success factors, although a BPM implementation can be accomplished, it undoubtedly is a more complex way of accomplishment.

6.1 Salvadorinho & Teixeira, 2021

In this paper, the authors study the impact of tacit knowledge in the organizational context and how it can be improved from a BPM point of view.

In the context of Industry 4.0 (I4.0), knowledge management presents a challenge, as with faster changes, knowledge is not transferred quickly enough from expert operators to newly arrived operators.

BPM is a valuable tool that can ease knowledge management, thus accomplishing a process repository.

In this study, the authors used a case study approach by investigating a company that produces flush toilets.

By examining the shop floor, the author aimed to map a repository, using the concepts of BPMN and BPMN 2.0, by having a final objective to manage knowledge in an unstable environment since it will make available expertise to manage the rotation of the workforce, preserving knowledge inside doors.

The strategy settled in the first three stages, Process Identification (PI), Process Discovery (PD), and Process Analysis (PA), starting to identify the “As-Is” processes that later will be transformed into the “To-Be” processes.

During the analysis of the tasks performed, the authors identified the following problems,

- Performing redundant tasks
- Lack of communication between systems
- Manual Records (high paper traffic)
- Outdated information
- Low level of real-time machine state interpretation

The authors concluded that business process modelling can be applied to establish knowledge management in a company. Furthermore, it serves as a tool to study all the gaps in the enterprise's processes. Although it is crucial to reveal the difficulty in applying changes in the organization's processes.

6.2 Bai & Sarkis, 2013

In this study, the authors seek to study what affects the success of BPM implementation in organizations, identifying the critical success factors (CSFs), so they can aid the project managers in making the proper BPM implementation strategies. For this, the authors used multi-site field study data with a novel grey-based DEMANTEL (decision-making trial and evaluation laboratory) approach to visualize the structure of the causal relations between the CSFs, obtaining the influence level of these factors.

Based on previous literature, the authors choose to pinpoint eight different success factors, listed as follows:

1. **Strategic Alignment,**

To achieve a successful BPM implementation, it needs to be in line with the strategy of the organization, having the processes designed, executed, and managed according to the strategic priorities of the organization.

2. **Project Management,**

Playing a critical role, and since BPM implementation requires a vast number of implementations with an elevated level of uncertainty, solid project management is needed to implement the different stages of BPM adequately.

3. **Information Technology,**

It is a natural partner to BPM, playing a central role in the implementation, for the author's information technology is both an enabler and a facilitator of changes identified in BPM projects.

4. **Performance Measurement,**

To ensure goals are met, BPM implementation should be regularly measured for more efficient and effective control.

This should form a continuous loop supporting further improvements through feedback and monitoring from the users.

5. **Collaborative environment,**

Employees working together horizontally across various departments of an organization is an effective measure, as to implement BPM, there is a need to have clear communication and a clear view of the organization's strategy and goals.

Top managers should also drive the changes by sharing their vision. This way, employees also become more responsive.

6. **Top management support,**

The authors concluded that top managers should be fully committed when implementing BPM, having precise knowledge about the current state and if it aligns with the organization's strategy, and also having clear communications with the employees to motivate the changes.

7. **User focus,**

BPM is expected to reshape workflows improving both user service efficiency and effectiveness, and on the other hand, user involvement helps in the acceptance of the changes.

8. **Culture,**

It is composed of values and beliefs that differentiate one group from another. Organizational culture incorporates the collective values and beliefs concerning the process-centred organization, creating a facilitating environment in adopting BPM, leading to success.

The authors concluded that the most important factors are Strategic alignment, Top management support, Project management, and a Collaborative environment. These factors contribute more than all the others to a successful BPM implementation. For example, the project manager should ensure that the implementation follows the established goals and top management should provide a solid guarantee that the implementation will be supported financially and politically.

Furthermore, in a collaborative environment, employees feel more at ease in sharing information, thus improving the implementation while sharing their knowledge and experiences.

6.3 Jung et al., 2007

In this study, the authors proposed an architecture for integrating knowledge management systems KMSs and BPMSs, combining the advantages of both paradigms. Extending the concept of process knowledge and classifying it into three types and satisfying the needs of both the KM and BPM life cycles.

Defining the process knowledge:

- Process template knowledge: Knowledge derived from the analysis and simulation information from the template design phase.

- Process instance knowledge: Process instance information, along with process performance measures according to evaluation criteria, also contains information about the environment, results, and resources.

- Process-related knowledge: General explicit knowledge of traditional knowledge management is summarized from the point of the process perspective.

Process knowledge contains not only knowledge embedded in knowledge management systems but also information generated throughout the BPM life cycle, together supporting knowledge-intensive activities.

The integrated system architecture the authors proposed consisted of four major pillars:

- **Process creation, modelling, and pre-analysis**

  Process-related knowledge that is valuable is analysed and stored when a process template is created, this being the first output and the second being process-related knowledge.

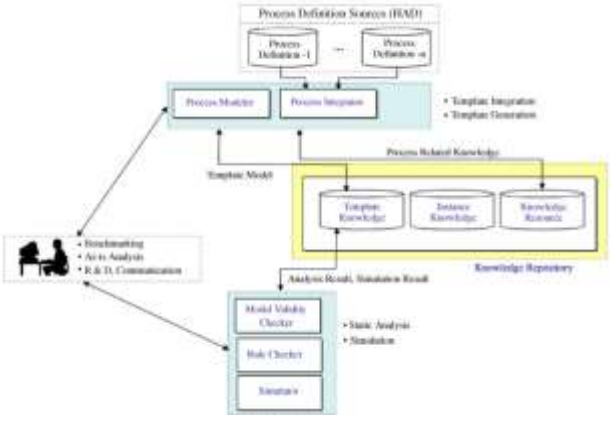

Figure 31 - Process Creation (Source: Jung et al., 2007)

- **Process enactment**

  In this phase, special conditions for the process initiation are set, such as performers, resources, dates, and other constraints derived from various analyses.
  Within this phase, a knowledge delivery tool provides process-related knowledge, reducing information overload and increasing efficiency, while a tacit knowledge description tool supports process performers, with their know-how being stored and used by other performers.

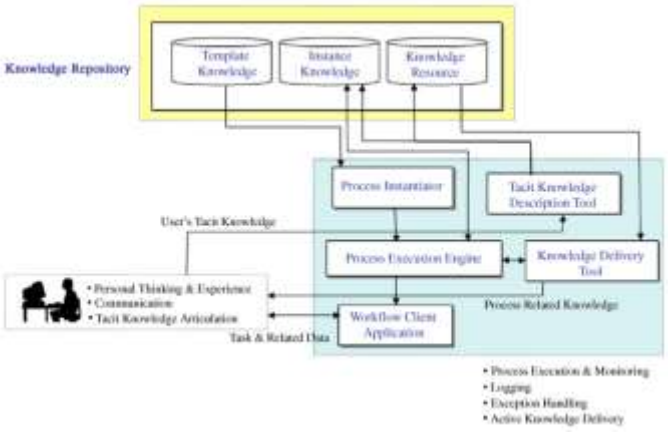

Figure 32 - Process Enactments (Source: Jung et al., 2007)

- **Post-analysis and evolution**

For this stage, a knowledge harvester creates process-related knowledge from tacit knowledge by choosing the tacit knowledge from the process with the best result. At the same time, the instance analyzer investigates performers' execution information, and the process evaluation tool evaluates the process.

These tools support the evolution of existing knowledge based on updated process execution results.

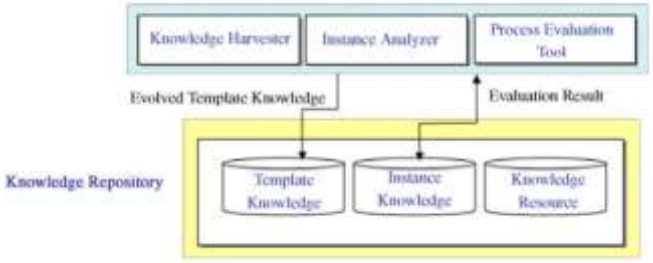

Figure 33 - Process Post Analysis and evolution (Source: Jung et al., 2007)

- **Knowledge repository and common functionalities**

At this stage, the knowledge repository and the components related to the use phase of the KM life cycle are utilized throughout the whole BPM lifecycle, with the knowledge repository storing process-related knowledge.

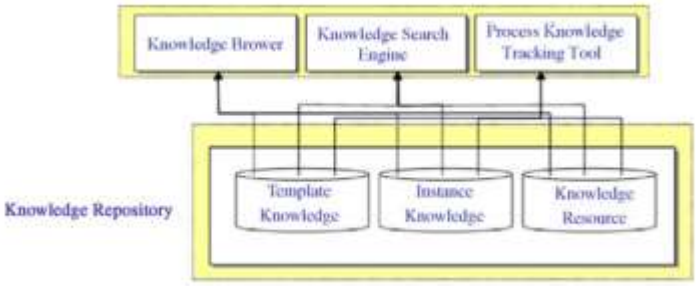

Figure 34 - Knowledge repository and common functionalities (Source: Jung et al., 2007)

These are process-oriented knowledge management from a BPM lifecycle perspective.

The authors concluded that process-oriented knowledge could provide process designers with design or redesign processes with existing templates and execution results stored in a process repository, enabling more effective and efficient redesign/design.

Process performers can also receive valuable knowledge at the right time, reducing information overload and improving efficiency. Furthermore, this knowledge can be used by other performers that work on the same process.

7. Qualitative Study

This chapter will describe the data collected regarding the qualitative part of the study.

For the interviews, a semi-structured approach was used, as this method typically consists of a dialogue between researcher and participant, allowing the researcher to explore the participant's thoughts, feelings and beliefs about a particular topic (DeJonckheere & Vaughn, 2019).

Qualitative research is defined as the study of the nature of the phenomena, their quality and manifestations, excluded from their range, frequency and place (Busetto et al., 2020; Philipsen & Vernooy-Dassen, 2004).

A more pragmatic definition generally is data in the form of words instead of numbers (Busetto et al., 2020; Punch, 2014).

According to Bucholtz (2000), there are two types of transcription methods, naturalistic and non-naturalistic (naturalized and denaturalized), often representing two extremes of transcription options.

According to Nascimento & Steinbruch (2019), there are two views on this topic, the first perspective presented (Bucholtz, 2000) and the second perspective presented by Oliver et al. (2005).

In a naturalized approach (Bucholtz, 2000), the transcript text agrees with the written discursive conventions, having many characteristics that do not occur in spoken language, while Oliver et al. (2005), this form keeps as many details as possible, it is written as it is said.

Furthermore, with these two authors, this also applies to denaturalized transcription, while Oliver et al. (2005), in this form, the grammar is corrected, and perceptions are pondered. (Bucholtz, 2000), this is the most faithful to the speech.

For this study, a denaturalized approach was used, based on Oliver et al. (2005), correcting repeated words and deleting speech inadequacies while maintaining an unbiased approach.

7.1 Interview guide

The interview consists of 15 questions, as shown in Appendix 2a and Appendix 2b in the appendices section of this study. The questions are divided as shown in figure 35, with each of the three parts of the interview aiming to explore a specific aspect.

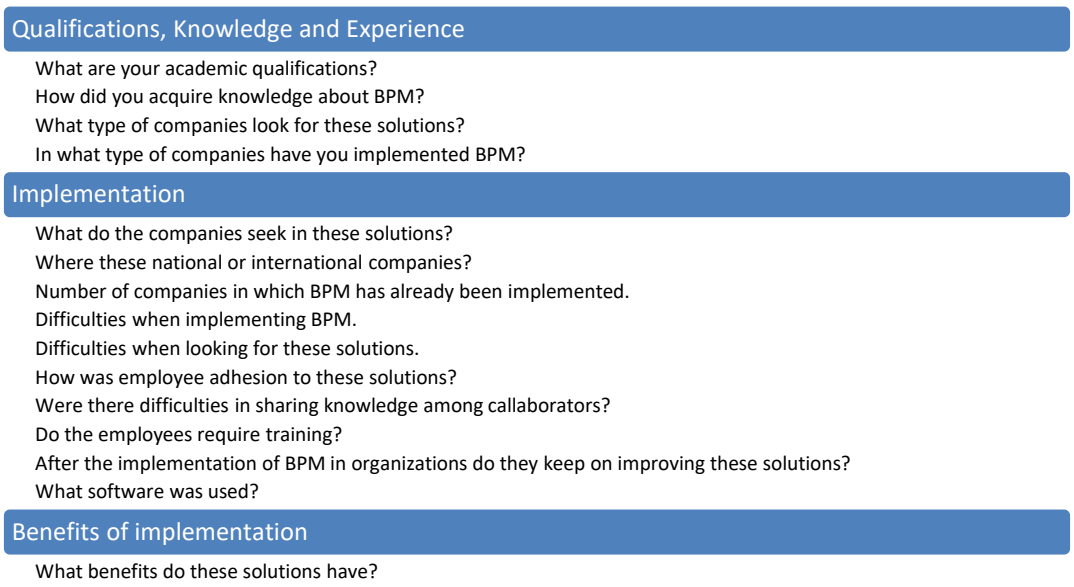

Figure 35 - Interview subdivision

7.2 Interview sample characterization

For the qualitative study, a total of 3 interviews were conducted.

- 1 to organizations that already have implemented BPM solutions.
- 2 to organizations that provided BPM solutions.

These interviews were recorded using Microsoft Teams, with the consent of the participant, and later translated into writing using GoTranscribe. Although the translation still needed to be reviewed, it made the process significantly quicker.

To keep the participants private, data relative to the workplace and specific projects worked on were kept private. Furthermore, the interviews will be referred to as A, B, and C, with interview A being to an organization that had a BPM solution implemented but also provided those kinds of solutions, and interviews B, and C to organizations that provided BPM solutions, and were all conducted between the 15th of May and 5TH of July 2023.

While in the next two subchapters, part of the interviews are analyzed, the complete interview can be seen in the appendix's section of this thesis.

7.3 Interviews with organizations that implemented BPM solutions

Starting with interview A, in this case, this organization had implemented and is currently using a BPM solution but also provides these solutions. This interview focused more on the aspect of having implemented and using this solution internally, although it also bought some aspects regarding the implementation of these solutions.

The interview started with briefly introducing what the interviewee thought about BPM. His personal views and thoughts, and his academic qualifications.

For the interviewee, a BPM solution often is an optimization solution, identifying and improving various aspects regarding that process, this being in line with what was previously identified in the literature by (Harmon, 2019; Salvadorinho & Teixeira, 2021).

While most of the organizations BPM had been implementing by its organizations were national organizations.The interviewee also stated that a BPM (Redmine) system managed 3 of its four business departments. While it was able to be customized to better adequate the user's reality, it also kept records of users' created knowledge to solve problems through user interaction between each other, creating a framework of steps to follow to solve that issue. This highlights the previously analysed interactions of knowledge creation and retention (Alavi & Leidner, 2001; Dayasindhu, 2002; Ebrahimi et al., 2013).

While the difficulties felt when looking for a BPM solution are usually more in line with finding an adequate solution to the organization’s specific needs and, after that, to customize that solution to its specific needs.

When asked about employee adhesion to these solutions, the interviewee stated that they could have more or less adhesion, but for one, they did not have much of a choice, as it was simply part of their job, and their work could invalidate someone else’s work if that knowledge is lost, underlining the importance of knowledge transfer (Alavi & Leidner, 2001; Dayasindhu, 2002).

When asked about employee training to use this application, the interviewee stated that any employee who starts is given training to use and understand how the processes and the application work. Most of the time, they could understand by themselves, but it would not be that efficient, so it is given training, and later, the employees strengthen their knowledge with normal usage and work.

As for the later improvements on applied solutions, the interviewee stated that they keep on improving their solution as they get more experience over time, updating it as needed.

7.4 Interviews with organizations that provide BPM solutions

Following interview B, this organization sold and implemented BPM solutions, along with other services, including business plans and analysis, accounting, auditing, and ISO auditing, already having implemented a few solutions.

When asked about what types of organizations look for these solutions and the difficulties felt in implementing and looking for a solution, the organization stated that the difficulties when looking for a solution might be the type of business itself. In contrast, more usual businesses, or businesses with fewer specificities, might find a solution that requires less customization, and one with more specificity might require more customization to fit the organization's particular needs better.

Regarding the benefits of these solutions, the interviewee stated that usually the organizations look for improvement in controlling and efficiency, also referencing that having all the information stored accessible, standardized and in one place is really important, so it is not lost when an employee leaves, (T. H. Davenport, 1998; Salvadorinho & Teixeira, 2021).

While for difficulties when implementing these solutions, usually there are not many difficulties. The clients usually come with a proactive approach and work together, with the employees usually also adhering to these solutions. This is usually traced back to the management and how it works with its employees.

In this case, the interviewee gave an example of a service they provided, affirming that we had a lot of support from the employees in gathering specific information, but also when we gave them training, this being representative that the parts were involved.

When the interviewee was asked if the organizations kept on improving the implemented solutions, he stated that it was a common practice, especially in the organizations that had a more significant dimension, thus completing the BPM life cycle.

Ending with interview C, this organization sold BPM solutions, designing and redesigning processes, along with ERP and CRM solutions. Dematerializing processes and reengineering the processes are based on four axes, automatization, simplification, interoperability, and dematerialization.

When asked if there was a specific type of organization that looked for these solutions, the interviewee gave an example, stating that an organization had implemented a BPM solution recently using a software called Creation, which was previously named BPM Online. This consisted of digitalizing and dematerializing a process that involved walking a total of 400 meters to deliver a document about the quality of a load, while later, a colleague had to introduce the data in the system.

Usually, organizations with more typical processes tend to find a solution that fits more efficiently, while more unusual processes tend to require more customized solutions to fit the organization's needs.

This is also a prime example of this solution's efficiency for the organization. For the interviewee, the organizations usually look for efficiency associated with cost reductions when looking for these solutions, as well as information quality and control.

With user adhesion to these solutions, the interviewee stated that there are two user types, the one/s who have been with them since the beginning of the service. This user has an overall view of the organization and the users that take part in testing the solution, referring to the fact that testing can take almost half of the time these solutions take.

This way, all the users are encouraged to share their opinions, and in the cases that some users are opposed to change, strong leadership is needed sometimes. Explaining the process and why some information is not vital for that specific user can be vital for someone further in the process, underlining, "Even though there is resistance to change, it is vital to know how to present and explain the solution".

While also stating that organisations usually tend to keep improving these solutions even more if the cost to change is low.

8. Quantitative Study

This chapter will describe the data collected regarding the quantitative part of this study.

A quantitative method of investigation is defined as data in the form of numbers, producing objective knowledge (Punch, 2014).

To gather the answers to the questionnaires, first, they were shared in the organizations of the interviews, but as that returned few answers, they were shared with a broader audience and as a form to keep the answers private.

8.1 Questionnaire guide and demographic characterization

The questionnaire consists of a total of 32 questions, which can be consulted in appendix 3 in the appendixes section and is divided as shown in figure 36.

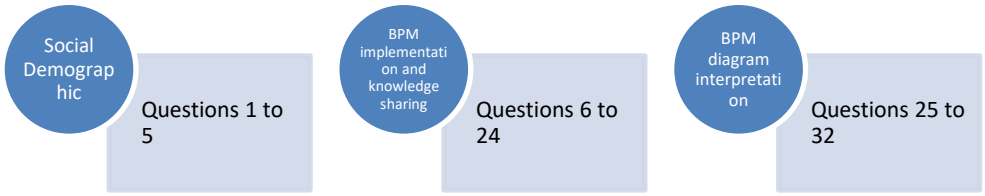

Figure 36 - Questionnaire subdivision

The questions for the questionnaires are based on the interview questions and from the literature review conducted previously on this study.

A total of 81 questionnaires were obtained, with the following demographic division, as represented by figures 37 and 38, forty-six of the inquiries were female, with most of the female population being between 36 and 45 years old (21 answers).

Figure 37 represents the number of female participants, while Figure 38 depicts the ages of the female participants, 35 being the male population, and 46 the female, and on the circular graphic to the right, the division by age range of the female population, this also applies in the same way for figures, 39 and 40, although, in those for the male population.

Figure 37 - Women participants questionnaires (Source: Self-elaboration)

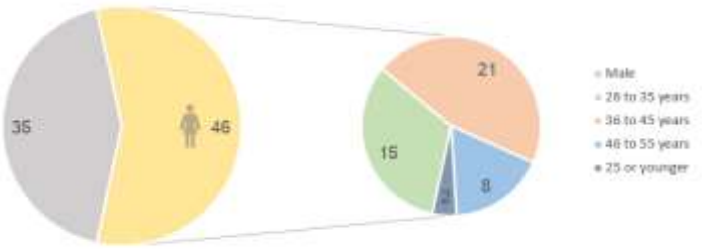

Figure 38 - Age of women participants (Source: Self-elaboration)

The male population represents the remaining 35 of the inquiries, with most of them also being between 36 and 45 years old, as shown by figures 39 and 40.

Figure 39 - Men participants questionnaires (Source: Self-elaboration)

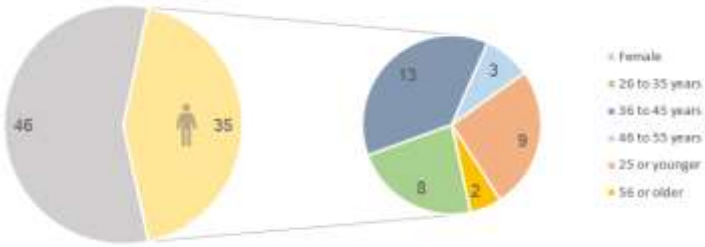

Figure 40 - Age of male participants (Source: Self-elaboration)

Regarding the qualifications, and according to the Quadro Nacional de Qualificações (QNQ), there are eight levels, with level 8 being a doctorate degree, seven being a master's degree, and level 6 being a bachelor's.

As shown in Figure 41, most of the answers were from a QNQ level 6 or 7, only two from a QNQ level 8, one from a QNQ level 3, and six answers from a QNQ level 5, representing that of the 81 respondents, 91,36% have a level 6 or higher qualification.

Figure 41 - Scholar level of the participants (Source: Self-elaboration)

When comparing the job position and how long the inquiries were working in the organization, most were senior technicians or at a similar job position, working in the organization between 2 and 4 years, as seen in Figure 42.

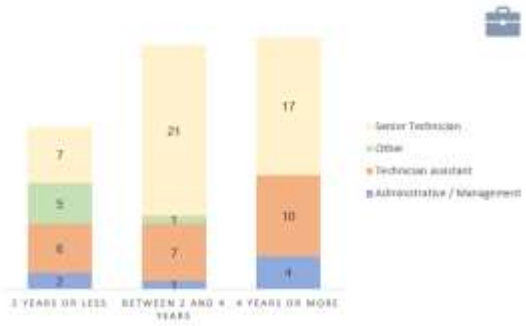

Figure 42 - Job position (Source: Self-elaboration)

8.2 Questionnaire analysis

When comparing the remaining questions, and starting with Q6, of the 81 participants, 43 answered that they were familiar with the concepts of BPM.

Figure 43 - Participants answering Yes on Question 6 (Source: Self-elaboration)

From these inquiries, 13 got all the questions correct, and none got all the answers wrong or made five mistakes.

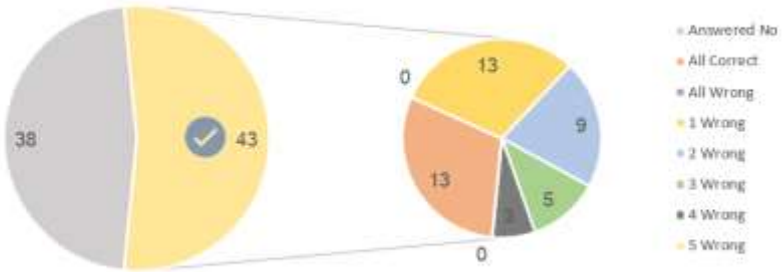

Figure 44 - Number of mistakes after answering Yes on Q6 (Source: Self-elaboration)

From these inquiries, and regarding the ones that answered Yes on Q6, four have not found the diagrams of easy interpretation, and of these four, only one had all the questions Q25 to Q30 correct. Of the other three, one had three questions wrong, and two had 1 question wrong.

When comparing with Q31, all the inquiries that answered Yes on Q6 also answered Yes on Q31, meaning that all the inquiries that had BPM knowledge found that comparable diagrams could help know how to proceed in certain circumstances.

When analysing the remaining questions, 38 participants answered that they were unfamiliar with the concepts of BPM.

Figure 45 - Participants answering No on Question 6 (Source: Self-elaboration)

In this case, it is possible to see that only seven inquiries got all the answers right, although none got all the answers wrong, from Q25 to Q30.

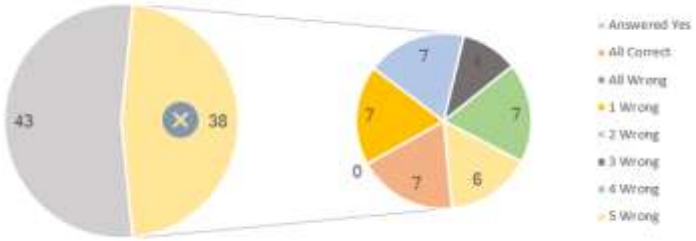

Figure 46 - Number of mistakes after answering No on Q6 (Source: Self-elaboration)

When analysing the inquiries that answered No to Q6, that gave no mistakes in Q25 to Q30 and answered Yes on Q32, only 7 fulfilled these conditions at the same time, as shown in Figure 47.

From these 38 and with a total of 22 answering Yes (figure 47 left) and 16 answering No (figure 47 right), on Q32, this is, finding the diagrams of easy interpretation.

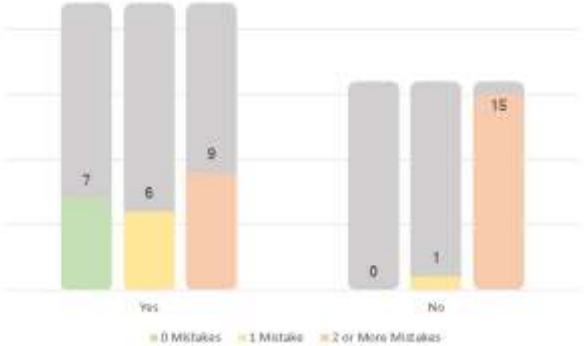

Figure 47 - Mistake division No on Q6, Yes/No on Q32 (Source: Self-elaboration)

From these inquiries, 35 answered Yes on Q31, despite not being familiar with the concepts of BPM, finding comparable diagrams useful.

When analysing if the management promoted knowledge sharing, Q10, the respondents could answer on a scale from 1 (disagree) to 5 (agree). We got the following results, shown in Figure 48.

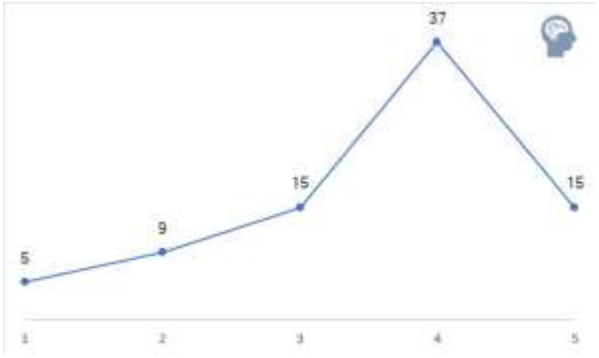

Figure 48 - Agreement on Q10 (Source: Self-elaboration)

From the 81 answers, more than half agree that the management promotes knowledge sharing between the employees.

Regarding Q11, Q12, Q14, Q20, Q21, Q23 and Q24, shown in figure 49 the analysis shows that,

Q11 – Most respondents share new ways of executing tasks with their colleagues.
Q12 – Consider useful a repository with information about disruptive tasks.
Q14 – Considers that specialized knowledge is easily accessible.
Q20 – Feels at ease sharing information with colleagues.
Q21 – Agrees sharing knowledge is mutual.
Q23 – Exists the sharing of improvements when a project/service ends.
Q24 – There exists continuous improvement and control in the project/service lifespan.

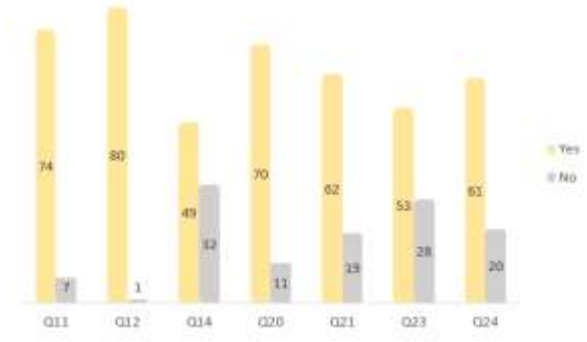

Figure 49 - Knowledge sharing Yes/No (Source: Self-elaboration)

While contrasting with this, on Q22, when the inquiries were asked if there was a sharing of lessons and experiences when acquired when a project/service ends, 33 answered with Yes, 28 with No, and 20 with Do not Know, as shown in figure 50. Moreover, of the 28 inquiries that answered No on Q22 (green), 18 also answered No on Q23, and 10 Yes on Q23 (grey and yellow).

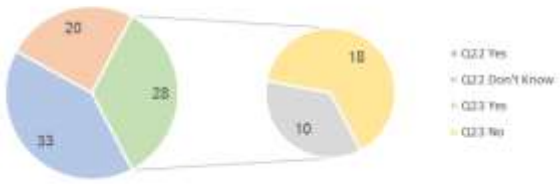

Figure 50 - Contrast between Q22 and Q23 (Source: Self-elaboration)

While it could be expected that from these 28 also answering No on Q23, as lessons and experiences are needed to apply improvements, that does not happen.

When analysing Q25 to Q30, Q29 we only got 13 answers wrong, followed by Q28 with 18 answers wrong. While Q25 and Q30 got 28 and 26 wrong answers, respectively, and Q26 and Q27 got 34 and 30 wrong answers. The questions that got the most wrong answers were those that only had the diagram, and nothing written on it, while Q28 to Q30 had the diagram with annotations. Although the scope of the answers is small, it is still possible to conclude that annotations on diagrams help in understanding them.

Adequate training is also an important aspect to consider. Even though some people were able to understand and find the diagrams simple and easy, most of the time, it is more efficient to train new employees and show them and give them proper accompaniment.

9. Process mapping and application

In this chapter, the author mapped two processes of an organization. This organization did not have any processes mapped at all, having a substantial amount of information and knowledge that could be better used and stored for future reference.

This decision was made as a form of testing, in part, if what the literature review said was according to what was felt by the author when mapping specific processes.

Furthermore, it is an excellent way to apply previously acquired knowledge, which can be used for a better understanding of the literature, an improved understanding of the information acquired from the interviews and the questionnaires, and further identify some of the study limitations.

9.1 The organization

For the application of methods previously studied and aborded, and as a form of further study, two processes were mapped.

It is of particular interest to the association that its services provided are knowledge-intensive and up-to-date. For the organization, it is vital that processes are well mapped, and tasks are distributed accordingly, emphasizing the need for continuous improvement and adaptation to new parameters in innovation processes, knowledge transfer, IDT, marketing, and internationalization.

9.2 Mapped processes and knowledge repository

The methodology applied to map a process was to interview the co-workers who executed those tasks, writing down key takeaways and difficulties felt while doing that.

With this first approach, it was possible to map two processes in an organization that did not have any processes mapped at all. While mapping the processes, the information gathered proved to help create a more detailed knowledge repository, working alongside the BPM diagrams as a valuable guide to executing tasks while maintaining consistency properly.

This knowledge repository works as a guide to read and interpret BPM diagrams while keeping the diagrams visually simple and with all the information needed in the same place written so that it can be easily accessed.

The mapped process was:

- Financial Process – Invoice Management and Project Allocation

The program used to map these processes was the Bizagi Modeler, as the author was already familiarized with the use of this specific program.

With the mapping of the processes, a knowledge repository was created, as, when executing these tasks, the much-needed information is written down and can be consulted later as needed.

9.2.1 Invoice management and project allocation

This process is related to the receiver of invoices and how they are managed internally for storage and payment.

In Figure 51, we are able to overview the entire process.

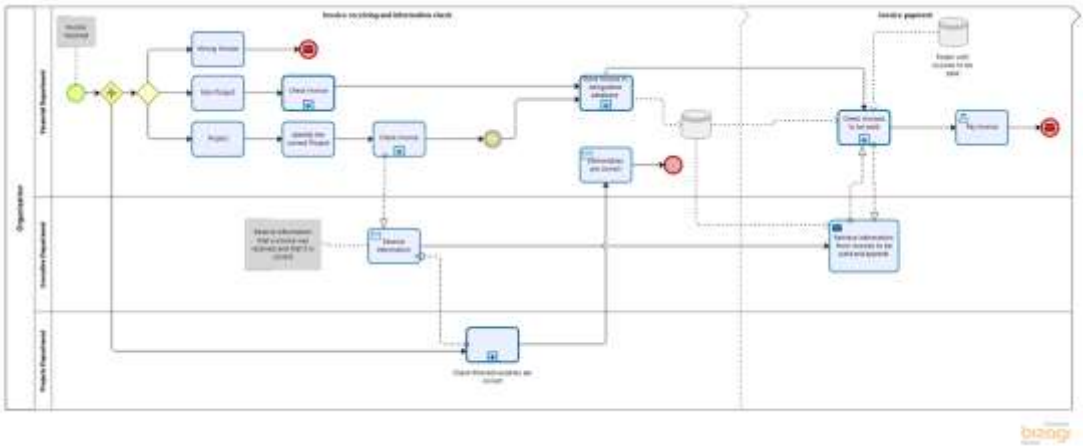

Figure 51 - Invoice receival process overview (Source: Self-elaboration)

When an invoice is received, it can either be related to projects or not, so the first step is to identify it correctly, according to Figure 52.

If it is not related to projects, then it is only necessary to check if the values are correct and archive them. Usually, this can be checked by speaking with either the colleague who bought the invoice if that is the case or by checking the email, which most of the time contains all the necessary information.

When the invoices are related to projects, there is a need to take a few extra steps.

1. Identify the correct project.
    a. See the list of projects in execution
2. Start to check the invoice.
    a. Start the subprocess “Check Invoice”.

Again, the information to correctly identify the project, most of the time, is either on the invoice itself or can be checked on the email. When an invoice is project-related, and depending on the project, it is also necessary to determine what type of cost it is (distributable or indivisible), as this has VAT implications.

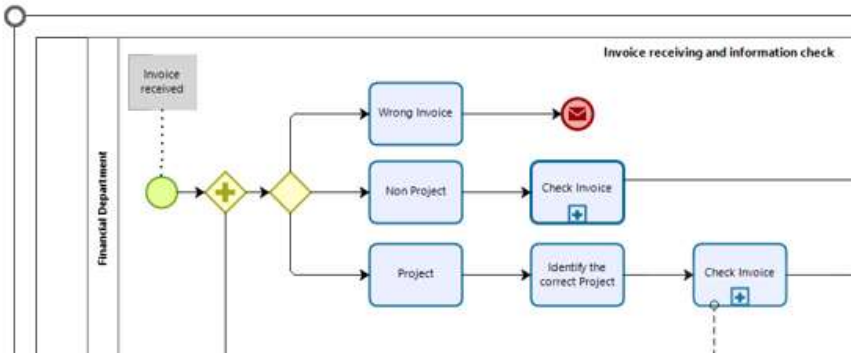

Figure 52 - First Check (Source: Self-elaboration)

After correctly identifying the project, it is necessary to check if the information on the invoice is correct, as depicted in Figure 53.

The information that needs to be checked is the following:

1. Invoice value
    a. The value should be equal to or less than the project investment line
    b. The value should be equal to the values of the public procurement procedure.
2. Invoice Description
    a. It should be according to the project investment type
3. Invoice date
    a. It should be between the dates of the project execution

When either one of the previous conditions is incorrect, this process is terminated, and a message is sent to the respective project managers and the invoice sender, informing the latter that it should be corrected and what corrections should be made.

Regarding point 1 a), let us assume there is an error and the invoice value exceeds the project investment line. In this case, the invoice is considered incorrect, and the process is terminated, as stated above.

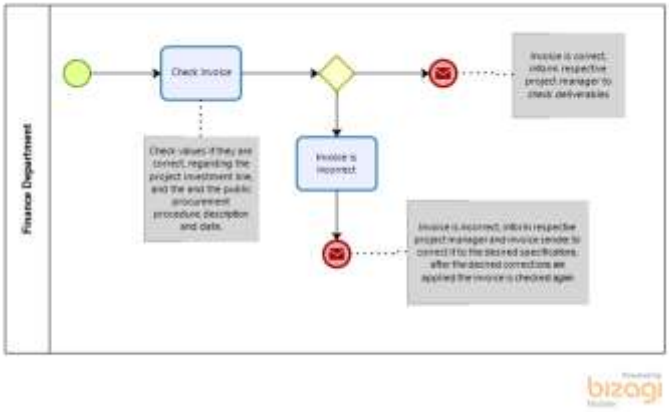

Figure 53 - Invoice Check (Source: Self-elaboration)

If the conditions are deemed correct, the subprocess will end with a message sent to the executive department, and the process will continue with the subprocess of invoice storage procedure, figure 56.

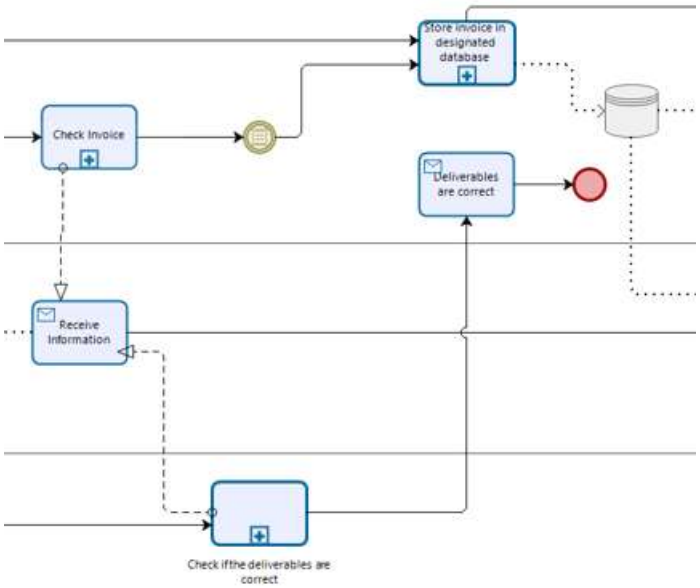

Figure 54 - Invoice received process (Source: Self-elaboration)

In the meantime, another subprocess took place that was initiated at the same time the invoice was received.

When the invoice is received, the project manager will check the deliverables, as seen in figure 54.

This subprocess, figure 55, takes place to check the deliverables that are sent alongside the invoice. These must follow a particular set of rules/parameters.

1. Check if the deliverables are correct to the invoice sent
2. Check if the deliverables have the financing logos on them
3. Check if the deliverables are according to what was requested and check if they have mistakes

These three checks ensure that the deliverables are according to what was requested and that the work is deemed correct. If any of these checks are deemed incorrect, a message is sent to the service/product provider to correct what is needed, and the subprocess repeats itself. This subprocess ends with a message sent to both the financial and executive departments.

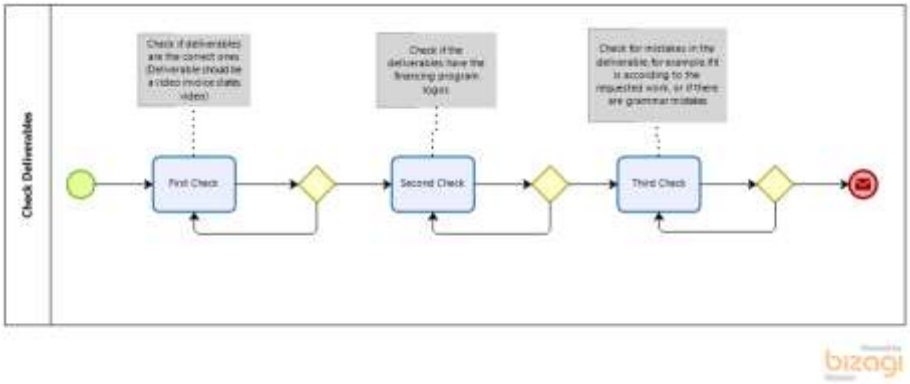

Figure 55 - Subprocess Deliverables check (Source: Self-elaboration)

In Figure 56, we can analyse the subprocess related to the correct storage of received invoices. Having previously gathered specific information on the invoices, invoice value, invoice descriptions, and invoice date, and having also passed all the previous inspections and tasks, the deliverables are deemed correct.

The subprocess for storage of received invoices can start. The invoices are saved in a database and in physical format with two copies.

For the database, it is necessary to fill in some fields. For this, the user should first read the correct fill instructions in the database.

Regarding the two physical copies, these are to ensure the proper accounting procedures and later for auditing purposes. One of the copies is stored in the monthly folder to be later taken to the accounting department, and another is stored in the folder with invoices to be paid.

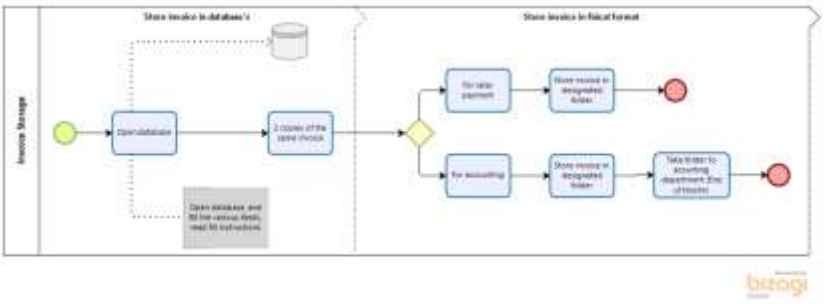

Figure 56 - Subprocess database storage (Source: Self-elaboration)

Later, and as seen in Figure 57, the process continues after a milestone is achieved. This happens to pay the invoices. To achieve this, the previously stored information is now retrieved and analysed.

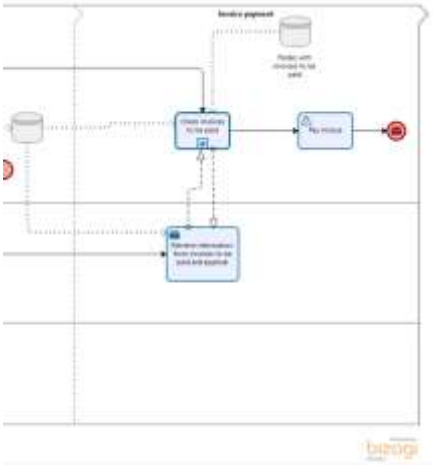

Figure 57 - Invoice received process (Milestone) (Source: Self-elaboration)

The steps needed to achieve this can be analysed in the subprocess shown in Figure 58.

First, the user starts with retrieving information from the previously filled-out database and applying filters to it, first by invoice type (project/non-project), then by invoice antiquity. This works as a better way to visualize the needed information.

If an invoice is less than 30 days old and does not belong to a project, then the process ends as this invoice does not need to be paid yet, but if it is from a project, and the project ends in 30 days or less, then a payment request must be made. For invoices over 30 days old, a payment request should be made.

According to the available funds, the executive department approves or rejects the payment. If the payment is rejected, the invoice is unpaid, and the process restarts later. If the payment is approved, the invoice is paid, and the process ends with a message sent to the service provider.

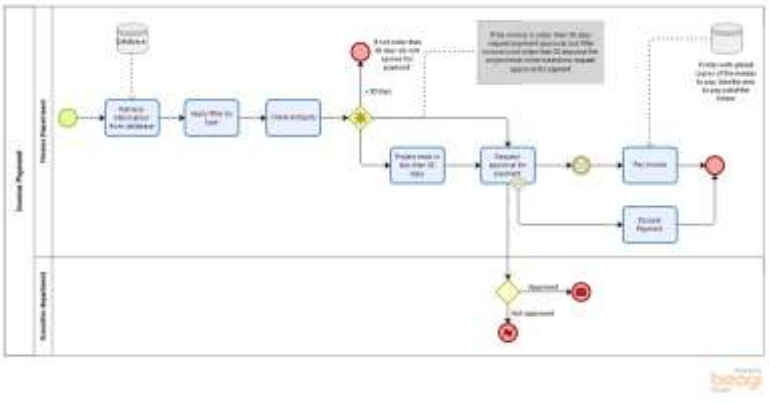

Figure 58 - Subprocess Invoice Payment (Source: Self-elaboration)

10. Results and discussion

In this chapter, the author presents the conclusions obtained from the interviews and questionnaires, confronting them with the information obtained via the mapping of the process and what was previously studied in the literature review.

When asked about the difficulties when looking for a BPM solution, all three interviews stated similar difficulties. It mainly depends on the business type and specific needs, with customization then being adjusted to the user's specific needs, while the benefits usually are set in the scope of improved efficiency, costs, time and control.

Though training, usage, and employee adhesion are usually mandatory, interviewee A stated that training the employees is much more efficient, while interviewee C shared that employee adhesion and training play a large part in the testing part of the implementation. Strong leadership is also needed while also knowing how to present these solutions. In this case, when mapping the process, the author found out that when asking for specific knowledge, it largely depended on how the initial approach and explanation were done. While in the questionaries, Q17 averaged 4,33, most of the employees referred to feeling comfortable when sharing knowledge. It is also possible to conclude that how the initial approach was made had significant influence, linked with social and cultural characteristics (Greiner et al., 2007).

When comparing if the colleagues understood the diagrams, the author found out that while most of them did not have specific BPM knowledge, it was relatively easy for them to understand the diagrams, even more, so the ones that had annotations. However, it must be noted that previous training is more time-efficient when presenting these diagrams. This is also a pattern seen in the questionnaires as the diagrams with annotations (Q28 to Q30) had fewer mistakes when the inquiries answered that they had BPM-related knowledge.

When comparing if the organizations usually kept on improving the implemented solutions, all the interviewees answered positively, with interviewee A answering that "they keep on improving the solution as they get more experience, and update it as needed" and interviewee B "it is common practice, especially in organizations with bigger dimensions", and interviewee C "usually organizations tend to improve in the solutions especially if the cost to change is low", this being in line with Harmon (2019) what worked yesterday, may not work today as business and economy are not static.

When mapping the processes, the author also felt that this indicates the constant need for evolution. While the process was mapped and started as an "As-Is" sketch, further improvements still need to be made, either by further testing or updating it due to the acquisition of different software.

Lastly, we can get the following conclusions when confronting these results with the proposed research questions, as shown in Figure 59.

RQ1 Can BPM be used as a method to store and share knowledge?

- Yes, processes are mapped, and procedures are stored, employees and management are able to consult a record of created knowledge to either solve problems, or as a guide to what to do when they are new in the organization.

RQ2 Does BPM along with KM work as optimization solution for organizations?

- Yes, as KM is a large part of BPM, as BPM directly influences the processes and optimizes them, this can only be done with specific knowledge, by interacting and involving the employees when implementing a BPM solution.

RQ3 Do professionals share knowledge with their colleagues?

- Mostly yes, but it really depends on how the initial approach is done, and on the culture of the organization itself.

RQ4 Do professionals understand, and know how to read the BPM diagrams?

- For themselves mostly they understand, if consulting the diagrams with sidenotes/aditional information that can be improved, but it is much more efficient to give the professionals proper training.

RQ5 Do top managers promote knowledge sharing?

- From the data gathered from the questionnaires tends to be yes, but the culture of the organization has a great impact in this aspect.

Figure 59 - Research Questions analysis (Source: Self-Elaboration)

11. Conclusions

This study seeks to demonstrate and validate the real-world implications and difficulties of implementing a BPM solution allied with KM in organizations to boost common knowledge and improve knowledge lost.

When searching for what BPM is, we concluded and validated through the interviews that it is primarily an optimization solution, allowing for a greater adaptation to changing requirements (Salvadorinho & Teixeira, 2021). These optimizations, as the respondents have said, can be on different levels, from time spent doing a task to optimization of data and information. Not only that, but a successful BPM implementation dramatically depends on managing knowledge, implementing it with the inputs of various actors and capturing tacit knowledge so that when an employee leaves, it is not lost (Salvadorinho & Teixeira, 2021; Serrat, 2017).

However, from the survey analysis, it is possible to conclude that most respondents answered positively about sharing knowledge among themselves. On the other hand, we could not conclude positively that top managers promoted knowledge sharing among their teams, although when the author directly asked the colleagues, the responses were mostly positive and depended greatly on how the initial approach was made. It is not possible to conclude if managers promote knowledge sharing in their teams safely.

Furthermore, when analysing this specific point, the results are significantly impacted by who makes the questions, if they are in a position of power or not, and this being tightly linked with organizational culture and leadership, to give an example for knowledge sharing (Serrat, 2017).

When analysing if the professionals understood the diagrams, the answers were mostly positive, with the author concluding that even with little BPM knowledge, they understood the diagrams even better after a short explanation. Although BPM notation and symbols can be easily understood, training the employees beforehand is much more efficient.

This underlines the importance of the processes and the knowledge behind them. If a process is mapped and explained, much like in Chapter 9, it is possible to create a guide that can be used by new employees in the organization, helping them integrate and tap on all the knowledge that was created and stored before them.

We can conclude that, albeit being solutions that do not apply and work to all organization's sizes and require a great effort in the scope of implementation and budget, even a simple implementation can bring improvements to most organizations. Since even if an organization maps some processes and becomes aware of how some tasks are done, it is possible to optimize some processes, or on the other hand, to at least keep a record of how specific tasks are done, ensuring they are done the same way by either employee A or B.

On another scope, the connection and dependence of BPM on knowledge also significantly improves in an ever-fasting changing world, as specific knowledge can make a difference in organizations even more if they improve on lost time when workforce rotations happen. Keeping specific knowledge inside the organization almost eliminates the need for a steep and challenging learning curve for the new employee. Additionally, by standardizing the way tasks are done, performance indicators can be recorded and analysed, but they are also a more reliable source of information, also working to ensure a greater understanding of what can and should be optimized.

11.1 Limitations and gaps

As with any study, this one also has certain limitations and gaps, with a limitation being the small sample of surveys after the interviews, determined by time limitations.

Although to be able to achieve a bigger representativeness of the needs of the organizations, a more significant sample would be needed, we must not neglect the representativeness of this sample, as it gives excellent insight into what the organizations feel is essential, along with difficulties faced, and the representativeness of knowledge awareness in organizations.

Another limitation of this study is that the translation of the interviews is a tremendously time-consuming activity, directly limiting the total number of interviews that could be done, as they were first corrected in Portuguese and then translated into English in specific passages.

While a gap in this study can be the relation between authority and knowledge sharing, as authority can either be formal or informal, with informal authority being the one given to a person by an organization and formal authority being recognized by their followers, this can have vast impacts when implementing these kinds of solutions, or as seen, the employees not recognizing on their leaders the push for knowledge sharing inside organizations.

11.2 Future Work

With the original proposal of this study achieved further perspectives were recognized. While knowledge management in organizations essentially depends on the organization’s approach and culture, it is also important to note that further studies need to occur with a bigger sample size of Portuguese SMEs to understand better how we place against international organizations.

On the business process management side of the study, technology impacts and artificial intelligence is a constant evolutionary act that impacts today's solutions in the market. Further study might include a perspective on the evolution of the Portuguese SMEs in the digitalization race.

In retrospect, even though we have learned much from this study, it also undermined the complexity and scope of this study, perhaps overambitious for the sample size.

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13. Appendices

Appendix 1 – Email asking for an interview:

Assunto: Estudo sobre a importância da implementação de uma notação BPMN, para manutenção e transferência de conhecimento dentro das organizações.

Exmo(a) Senhor(a)

Espero que se encontre bem,

Sou aluno da Escola Superior de Gestão de Idanha-a-Nova, do Instituto Politécnico de Castelo Branco, onde estou a realizar um estudo no âmbito da tese no Mestrado de Gestão de Empresas.

Tendo como base estudar a importância da implementação de um sistema de BPMN nas organizações assim como quais as vantagens, e obstáculos existentes no decurso da implementação deste tipo de soluções, com vista á melhoria dos processos e da manutenção do conhecimento especializado dentro das organizações.

Assim como a formação dada aos colaboradores e a forma como os mesmos interagem neste processo.

Desta forma gostaria de lhe perguntar se estaria disposto a agendar uma entrevista cujo objetivo será o aprofundamento de algumas destas questões.

Grato desde já pela atenção dispensada a este assunto, aguardo uma resposta tao breve quanto possível.

Tobias Machado

Appendix 2a – Interview Guide (English)

1. What are your academic qualifications?
2. How did you acquire knowledge about BPM?
3. What type of companies look for these solutions?
4. In what type of companies have you implemented BPM?
5. What do the companies seek in these solutions?
6. Were these national or international companies?
7. Number of companies in which BPM has already been implemented.
8. Difficulties when implementing BPM.
9. Difficulties when looking for these solutions.
10. How was employee adhesion to these solutions?
11. Were there difficulties in sharing knowledge among collaborators?
12. Do the employees require training?
13. After the implementation of BPM in organizations, do they keep on improving these solutions?
14. What software was used?
15. What benefits do these solutions have?

Appendix 2b – Guião da entrevista (Português)

1. Quais são as suas qualificações académicas?
2. Como é que adquiriu conhecimentos sobre BPM?
3. Que tipo de empresas procuram estas soluções?
4. Em que tipo de empresas implementou o BPM?
5. O que procuram as empresas nestas soluções?
6. Eram empresas nacionais ou internacionais?
7. Em quantas empresas já implementou soluções BPM?
8. Dificuldades na implementação do BPM.
9. Dificuldades na procura destas soluções.
10. Como foi a adesão dos colaboradores a estas soluções?
11. Existiram dificuldades na partilha de conhecimento entre colaboradores?
12. Considera que os colaboradores necessitam de formação?
13. Após a implementação do BPM, as organizações, continuam a melhorar estas soluções?
14. Qual o software que foi utilizado?
15. Quais os benefícios destas soluções?

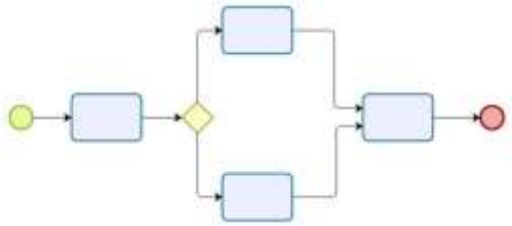
Appendix 3 – Questionaries Guide (Portuguese only)

1. Qual o seu sexo?
    a. Masculino
    b. Feminino
2. Qual a sua idade?
    a. Até 25 anos
    b. 26 a 35 anos
    c. 36 a 45
    d. 46 a 55
    e. Mais de 56 anos
3. Qual o seu nível de escolaridade? (QNQ)
    a. Nível 1
    b. Nível 2
    c. Nível 3
    d. Nível 4
    e. Nível 5
    f. Nível 6
    g. Nível 7
    h. Nível 8
4. Há quantos anos está na atual empresa?
    a. Até 2 anos
    b. Entre 2 e 4 anos
    c. Mais de 4 anos
5. Qual a sua posição atual?
    a. Administração / Gestão / Coordenação (ou equivalente)
    b. Técnico Superior (ou equivalente)
    c. Assistente técnico (ou equivalente)
    d. Outra (Estudante, Desempregado...)
6. Conhece os conceitos de gestão de processos?
    a. Sim
    b. Não
7. Tem conhecimento se na sua empresa está a ser implementado algum tipo de gestão de processos?
    a. Sim
    b. Não
    c. Não sei

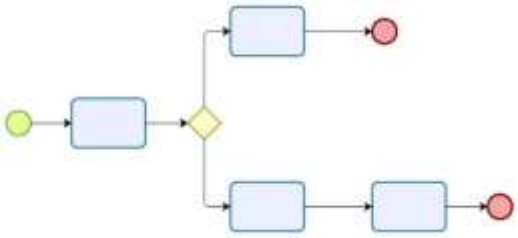
8. Caso tenha sido implementado um sistema BPM na sua empresa, recebeu formação?
    a. Recebi formação e foi implementado
    b. Recebi formação, mas não foi implementado
    c. Não recebi formação, mas foi implementado
    d. Não recebi formação e não foi implementado
9. Caso já existisse um sistema BPM na empresa quando iniciou, recebeu formação?
    a. Sim recebi formação e já estava implementado
    b. Sim recebi formação, mas não estava implementado
    c. Não recebi formação, mas estava implementado
    d. Não recebi formação e não estava implementado
10. As chefias promovem a partilha de conhecimento?
    a. 1 = Discordo
    b. 5 = Concordo
11. Partilha novas formas de executar tarefas com os seus colegas?
    a. Sim
    b. Não
12. Considera que seria útil ter disponível um repositório com informações sobre como proceder perante ações disruptivas?
    a. Sim
    b. Não
13. Considera que a gestão de processos é um elemento-chave na sua empresa?
    a. Sim
    b. Não
14. Quando tem necessidade de recorrer a conhecimento especializado, o mesmo está facilmente acessível?
    a. Sim
    b. Não
15. Considera que dentro da sua empresa existem processos que podem ser melhorados?
    a. Sim
    b. Não
16. Sente-se confortável a usar métodos previamente delineados com a vista à melhoria interna de processos?
    a. 1 = Nada Confortável
    b. 5 = Totalmente Confortável
17. Sente-se confortável a partilhar o seu conhecimento com os colegas?
    a. 1 = Nada Confortável
    b. 5 = Totalmente Confortável

18. A gestão de conhecimento está presente na cultura organizacional da entidade onde trabalho.
    a. 1 = Discordo
    b. 5 = Concordo
19. Nas avaliações de desempenho a partilha e criação de conhecimento são elementos presentes?
    a. Sim
    b. Não
20. Sente-se confortável a partilhar o seu conhecimento técnico com os colegas?
    a. Sim
    b. Não
21. Quando partilho conhecimento, experiências e intuições com os colegas, considero que é recíproca a partilha. Concorda com a expressão anterior?
    a. Sim
    b. Não
22. Existe uma partilha de lições e experiências adquiridas quando um projeto/serviço termina?
    a. Sim
    b. Não
    c. Não sei
23. Existe uma partilha de melhorias a efetuar no futuro, no final de um projeto/serviço concluído?
    a. Sim
    b. Não
24. Durante um projeto/serviço, existe um controlo e melhoria continua ao longo do prazo temporal?
    a. Sim
    b. Não
25. A imagem a seguir representa 4 ícones de notações usuais de gestão de processos, escolha a opção que considere ser a mais correta.
    a. Fim de processo, Decisão, Atividade, Inicio de processo
    b. Inicio de processo, Decisão, Atividade, Fim de processo
    c. Inicio de processo, Atividade, Decisão, Fim de processo
    d. Atividade, Inicio de processo, Fim de processo, Decisão

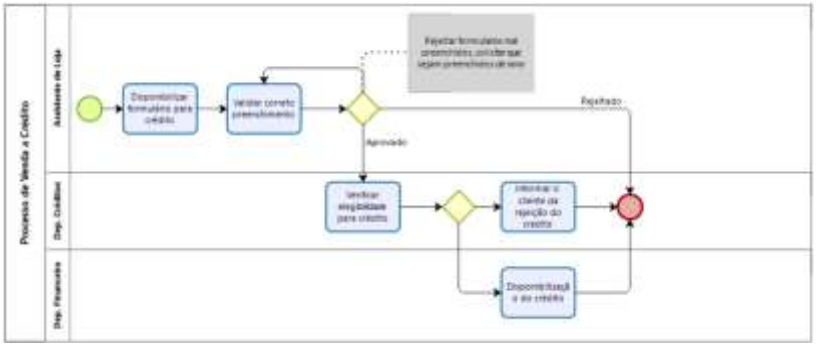
26. Na imagem a seguir, considera que:
    a. Existe um processo de decisão e o resultado é o mesmo
    b. Não existe um processo de decisão e o resultado é o mesmo
    c. Existe um processo de decisão e o resultado não é o mesmo
    d. Não existe um processo de decisão e o resultado não é o mesmo



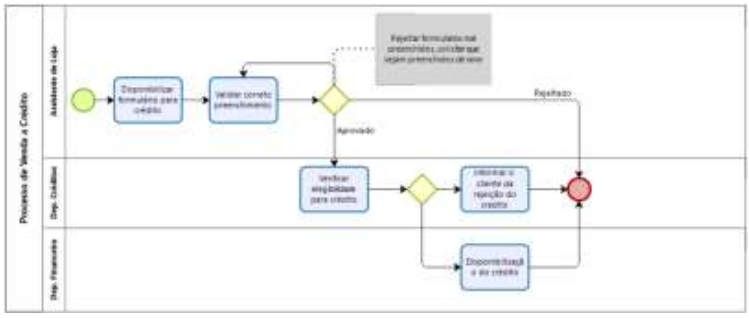
27. Na imagem a seguir considera que:
    a. Existe um processo de decisão, resultados diferentes com tarefas diferentes
    b. Existe um processo de decisão, resultados iguais e tarefas iguais
    c. Existe um processo de decisão, resultados iguais e tarefas diferentes



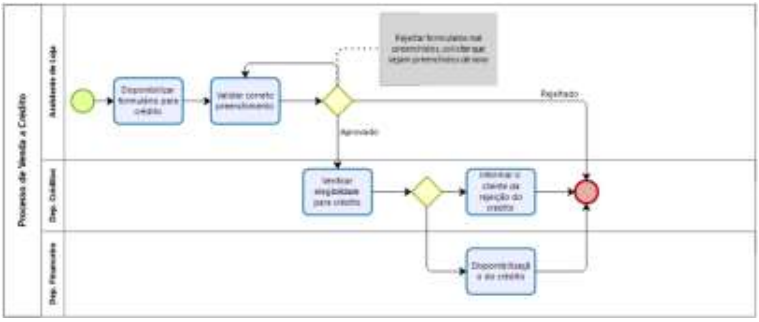
28. Conforme a imagem a seguir apresentada, escolha a opção que considere ser a mais adequada.
    a. O assistente de loja disponibiliza o formulário ao cliente, e valida o correto preenchimento do mesmo, de seguida envia o formulário para o departamento de análise de créditos para verificação das condições de elegibilidade do crédito
    b. O assistente de loja disponibiliza o formulário ao cliente, e valida as condições de elegibilidade do crédito
    c. O departamento de análise de créditos disponibiliza o formulário ao cliente, e valida o correto preenchimento do mesmo.



29. Conforme a imagem a seguir apresentada, escolha a opção que considere ser a mais adequada.
    a. O departamento financeiro apenas disponibiliza o crédito após ter sido verificada a elegibilidade do mesmo.
    b. O assistente de loja valida o crédito.
    c. O departamento financeiro disponibiliza o crédito antes de ter sido verificada a elegibilidade do mesmo.



30. Conforme a imagem a seguir apresentada, escolha a opção que considere ser a mais adequada.
    a. Nenhum dos departamentos pode terminar o processo
    b. Todos os departamentos podem terminar o processo
    c. Nenhum dos departamentos verifica o formulário



31. Relativamente aos diagramas anteriores, considera que seriam úteis para saber como proceder perante determinadas tarefas?
    a. Sim
    b. Não
32. Considera os diagramas anteriores fáceis de interpretar?
    a. Sim
    b. Não

Appendix 4 – Interview A (Portuguese only)

[Entrevistador]

De uma forma geral, o que esperava de uma solução BPM? Como adquiriu conhecimentos sobre BPM?

[Entrevistado]

Vamos começar pelo início, BPM, business process management, mas isso faz de conta que tenho sete anos, o que é que isso significa na prática? Isto é que para percebermos aquilo que eu acho que é o que está em cima da mesa.

Essencialmente é passar os processos internos da empresa a um diagrama que pode ser consultado por um lado, pelas chefias sobre o que está inerente àquele processo, de outra forma também serve para melhorar vários aspetos e para identificar certos problemas, que possa haver na naquele processo, otimizá-lo e melhorá-lo ao longo do tempo, que é uma das partes do ciclo de vida do BPM. Sendo que as empresas procuram na maioria, soluções de otimização. Tive um primeiro contato com BPM, quando tirei uma pós-graduação em análise de negócios, a partir daí aprofundei com formações e muita leitura sobre o tema.

[Entrevistador]

Nas empresas em que implementou soluções de BPM, eram empresas nacionais ou internacionais?

[Entrevistado]

Maioritariamente nacionais, as empresas nas quais implementámos soluções de BPM, são na sua grande maioria empresas nacionais, PME's na sua grande maioria também.

[Entrevistador]

Quais a dificuldades sentidas na implementação do BPM?

[Entrevistado]

Á primeira vista, evidente daquilo que já falamos, basicamente, a nossa empresa está na área da digitalização da indústria. Esta digitalização, gere esses processos de transformação industrial. É isso que nós aplicamos. No nosso caso, já adiantando basicamente temos quatro departamentos comercial, desenvolvimento, isto é, departamento programação, departamento de implementação da nossa tecnologia e

suporte à nossa tecnologia. Onde é que eu quero chegar todos esses três departamentos vamos esquecer o comercial, mas os três departamentos nós temos um sistema de informação que é o RedMine, que é um software de gestão dos projetos, open source. Que me gere estratificadamente todos estes processos de desenvolvimento, implementação e suporte, possível de ser personalizado, isto é, ele tem uma base, mas depois podes programar esse software para que ele se adeque melhor à tua realidade, e ao teu tipo de processos, hoje esta ferramenta controla estes três departamentos cruciais da empresa.

Basicamente existe um problema, esse problema é registado la é distribuído as pessoas interagem, geram o conhecimento na solução desse problema nesta aplicação. Basicamente, neste momento que nós temos aí a estes três níveis, digamos, essa aplicação a suportar tudo isso. O próprio software permite, por exemplo, temos um cliente que ligou porque o software teve um erro ou teve um problema já tens um framework de trabalho de resolução daquele problema que é colocado com pelo cliente. O significa que todos os problemas que estou a falar, objetivamente, numa perspetiva de suporte os clientes já têm a tecnologia funcionar. Um problema é reportado e basicamente nós vamos ter um diário, de passos a seguir. Uma coisa é um problema de um cliente outra coisa é uma nova função que queremos desenvolver na aplicação.

[Entrevistador]

Que dificuldades sentiu quando procurava uma solução BPM? Consegue dar um exemplo?

[Entrevistado]

Na sua grande maioria a dificuldade na procura destas soluções passa por encontrar o software mais adequado à empresa, ou seja, aquele que faça mais sentido, que tenha mais funcionalidades que sejam uteis. No nosso caso, e para as nossas necessidades o software que utilizamos serve perfeitamente. Resumindo, a dificuldade está em encontrar uma solução que realmente seja a adequada. A dificuldade foi de alguma maneira selecionarmos uma solução, foi encontrar e selecionar uma solução e depois personalizar, a solução, à nossa realidade. Basicamente é isto qual a solução vais assumir? E depois todo o trabalho de customização de uma solução que existe à nossa realidade do dotando-a, de características muito específicas ao nosso trabalho. Aparentemente, são essas grandes dificuldades. O fato das pessoas assumirem ou não é um à parte, mas também aqui, deve existir alguma democracia.

[Entrevistador]

Sente que os colaboradores tiveram uma boa adesão? Sentiam-se à vontade a partilhar seu conhecimento? Ou sentiu que existiram dificuldades?

[Entrevistado]

Podem ter mais ou menos à vontade. Não têm como fugir. Faz parte do trabalho deles, têm de assumir não é muito opcional, porque se um colaborador não interagir com aplicação está a deixar em causa todo o trabalho em equipa. Depois há diretores de departamentos que se necessário, vão atrás deste roadmap de desenvolvimento ou suporte ou de implementação.

[Entrevistador]

Então e relativamente à formação? Foi-lhes dada formação?

[Entrevistado]

Exatamente é-lhe dado alguma formação, sobre a ferramenta e basicamente começa a trabalhar de acordo com aqueles princípios que gerem estes diferentes departamentos. E óbvio que qualquer colaborador que entre na empresa precisa de ter formação sobre a ferramenta e sobre os processos em que ele vai assumir como trabalhador dentro da empresa e que estão desmaterializados na ferramenta, por si só e sem essa formação conseguem entender o os diagramas porque digamos têm linhas continuas. Têm passos que eles têm de seguir, mas não é tão eficiente nem eficaz do que terem uma formação. É como é. E depois dessa formação vai se consolidar na medida que eles vão executar no trabalho deles, na ferramenta.

[Entrevistador]

No seu caso, e nas empresas onde implementou soluções BPM, existiu uma melhoria continua?

[Entrevistado]

Sim sempre, à medida que vamos tendo cada vez mais experiência, vamos melhorando a solução, é quase como tentativa e erro, assumimos que vamos evoluir para ali, mas afinal temos de corrigir esta situação, e afinal vamos evoluir para além.

Melhoramos a nossa solução internamente, e conforme os clientes nos questionam, por vezes, mesmo aquando da implementação original, existem funcionalidades que não consideram necessárias e depois acabam por solicitar essa “atualização”.

Appendix 5 – Interview B (Portuguese only)

[Entrevistador]

Fale-me um pouco da sua empresa, por exemplo qual o tipo de serviços que presta, como é que teve conhecimentos sobre BPM?

[Entrevistado]

Ora, nós temos várias áreas onde atuamos, por exemplo consultoria, e auditorias, consultorias podem ser por exemplo para aplicação de normas ISO, ou para implementar sistemas de gestão, inserindo-se aqui o BPM, entre outros, sistemas de informação.

Conhecimento sobre BPM, tive quando fiz parte de uma formação ISO, onde o tema foi abordado de uma forma vaga, mais tarde quando vim para esta empresa, é que realmente tive a formação adequada ao trabalho a desenvolver, pelo que pude aprofundar os conhecimentos sobre a o tema.

[Entrevistador]

Então e na sua experiência, que tipo de empresas procuram este tipo de soluções, e quais as dificuldades na procura ou implementação destas soluções? Caso lhe seja possível dar um exemplo seria ótimo.

[Entrevistado]

Sim claro, começo se calhar pelo mais simples, dificuldades na procura de um sistema BPM. Ora vê, aqui é um pouco também como vendemos o serviço, nós trabalhamos essencialmente com um software que é sempre esse que recomendamos ao cliente, este depois será adaptado à realidade do cliente em específico. Agora a questão está mesmo aqui, se é uma empresa que tenha um tipo de negócio mais típico, não existem muitas alterações que temos que fazer.

Um exemplo, se é por exemplo uma empresa de logística, com camiões que transportem apenas peças para carros tem menos especificidades que uma digamos até que opere na mesma área, mas transporte produtos radioativos. O que te quero dizer com isto é uma empresa que tenha um negócio que seja menos usual terá uma maior dificuldade em encontrar uma solução que sem que seja personalizada lhe sirva.

Por acaso neste último local onde implementamos e redesenhamos uns processos, uma empresa que opera na área das conservas, e estava a investir para melhorar uns aspetos administrativos e de controlo. Embora já tivessem as linhas de produção todas montadas e a operar queriam um software de gestão mais moderno, com mais capacidades e um maior controlo sobre quebras e essencialmente produtos mal fabricados. O sistema que nós implementamos permitiu-lhes assim o controlo que

desejavam e melhor ainda uma unificação entre várias máquinas que tinham que não juntava os dados sem a interação de uma pessoa.

Junto a isto melhorou também em termos de designação de tarefas e controlo, agora um trabalhador quando termina uma tarefa, pode dar a mesma como concluída no software e passar à seguinte a informação fica disponível em cloud e acessível para todos os intervenientes.

Normalmente não é habitual termos grandes dificuldades na implementação destas soluções, quando os clientes nos abordam já trazem uma mentalidade de proatividade, e empenho e as coisas ate acabam por correr bem, mas sim claro, também já tivemos casos mais complicados, quer por um cliente mudar de ideias, quer fosse por ser mesmo algo que não se quisesse empenhar, mas isso são exceções, por norma quando existe empenho dos dois lados corre bem, por exemplo, neste ultimo caso, uma dificuldade que tivemos foi mesmo não ter uma boa conetividade à internet em algumas zonas, zonas nas quais os tablets não conseguiam enviar informação.

[Entrevistador]

Considera que por norma os colaboradores aderem bem a estas soluções?

[Entrevistado]

Como te disse há pouco, por norma sim, lá esta, também parte da chefia e da forma como gerem o negócio deles, por norma sim, neste último caso, tivemos imenso apoio por parte dos trabalhadores, não só na recolha de informação específica, mas também depois quando demos uma formação. Penso que ficaram satisfeitos por ter um sistema melhor.

[Entrevistador]

Por norma são empresas nacionais ou internacionais?

[Entrevistado]

No nosso caso são empresas nacionais só.

[Entrevistador]

Por norma quais são as vantagens que este tipo de soluções tem?

[Entrevistado]

Acho que essencialmente é o fato de podermos consultar a informação toda num só sítio, e ter a informação toda padronizada, isto é a mesma aplicação permite que a consulta seja toda efetuada no mesmo sítio, e fica tudo guardado até que permita.

Neste caso em específico os quando existem quebras o trabalhador consegue reportar logo as quantidades não tem de preencher nada em papel. Ficou tudo digital, e claro que com isto a empresa também se tornou mais eficiente.

[Entrevistador]

Nas empresas onde implementam este tipo de soluções existe por norma um sentido de melhoria ao longo do tempo?

[Entrevistado]

Em algumas sim, penso que nas de maior dimensão temos isso muito presente, não consigo agora especificar, mas sei que não é tao raro quanto isso uma empresa que há uns anos implementou algo, nos venha pedir de novo para redesenharmos certos processos em específico ou porque adquiriu algo, ou porque mudou algo internamente.

Appendix 6 – Interview C (Portuguese only)

[Entrevistador]

Fale-me um pouco de si, o que a sua empresa faz, como por exemplo qual o objetivo da mesma, e como adquiriu os conhecimentos de BPM, ou as suas qualificações académicas.

[Entrevistado]

Somos uma empresa de consultoria, de desenho e redesenho processos de negócio na ótica também da engenharia, dos processos. Sendo que fui adquirindo os conhecimentos sobre BPM, ao longo dos anos através de várias formações e cursos que fiz, até chegar ao ponto de criar esta empresa.

Como otimizar os processos das organizações, processos das mais variadas áreas administrativas, industriais, processos comerciais para as várias áreas. Neste processo, da reengenharia chegamos à conclusão que hoje em dia não se faz o desenho de processo sem a digitalização, e a automatização dos processos, e é aí que entra o BPM, não chega fazer o desenho é também necessário perceber que ferramentas te podem

auxiliar no novo desenho. Nos trabalhos que nós fazemos é desmaterializar processos administrativos, ter o formulário A formulário B, formulário C. Perceber como se vai transformar no sistema, dinâmico com o argumento de que o BPM utiliza, que é, o BPM tem regras do negócio programadas, o que significa que consegues automatizar, os processos porque eu não vou precisar de dizer ao colaborador que a seguir ao passo A que tem que fazer passo B. O sistema que sabe que a seguir ao passo A tem que fazer o passo B. De acordo com as condições, e informação que ele depositou no passo A, vai para o B, para o C ou para o D, e é o sistema que sabe o caminho não é o colaborador, que com a sua experiência e conhecimento, já tem que saber que a seguir àquele passo deve fazer isto para determinadas condições. É essa a nossa perspetiva é que BPM, nomeadamente aqui, nestes quatro eixos, simplificação dos processos de automatização, desmaterialização e a interoperabilidade entre sistemas, que é garantir que os processos passam de uns sistemas para os outros. É dessa forma que nós vemos o BPM e temos projetos.

[Entrevistador]

Então e por exemplo, existe um tipo específico de empresa que procure este tipo de soluções? Ou pode dar algum exemplo numa empresa onde tenha implementado uma solução de BPM?

[Entrevistado]

Posso dar um exemplo de processo de apoio logístico, numa empresa onde saíam cem camiões por dia. Havia sempre um processo em que era necessário fazer a inspeção da qualidade do camião à chegada do processo de enchimento e à saída e checklists de qualidade que existiam manuais, um processo administrativo, que tinham que andar cerca de duzentos metros para a frente, duzentos metros para trás, quando hoje em dia se consegue fazer uma checklist eletrónica que alguém tem um tablet, faz a checklist com isso, tira as fotografias no momento e desaparece aqui do meio uma quantidade de passos do processo, passos que essencialmente é pegar numa folha A que está num sitio e ir entregar ao sitio B e alguém ter que introduzir os dados num sistema.

É daí que vem o nosso trabalho, nós começamos a trabalhar com uma ferramenta que na altura se chamava BPM Online e que hoje em dia chama Creatio, mais numa perspetiva também de criação da sua própria aplicação baseada muito em workflows.

Workflow do processo, no sentido que é mais do desenho das várias etapas em cada um dos processos. E aquilo que nós vemos é que de fato, empresas que tenham muitos processos atípicos que não estão geralmente já mapeados, em ferramentas ERP onde já tem os processos de produção, processo de faturação, processos comerciais CRM, são empresas que desenvolvem várias atividades em que geralmente os seus processos

não estão mapeados nestas ferramentas procuram soluções BPM porque, vão poder desenhar o seu workflow, podem ser coisas mais simples a coisas mais complexas.

[Entrevistador]

Na sua opinião quando as empresas procuram este tipo de soluções, o que procuram melhorar?

[Entrevistado]

A eficiência, que geralmente está associada a custo, eficiência na componente da produtividade, como no exemplo que dei que agora fazem em tempo real é o paradigma da eficiência. O seu trabalho ficou muito mais otimizado. Procuram qualidade no sentido de qualidade dos dados, qualidade da informação, o fato de ter a informação estruturada. E o controlo das atividades e tarefas nomeadamente uma das coisas que também está muito associada ao BPM, que é o controlo de KPI's eu quero saber tempos, quero perceber prazos. No fundo se tenho uma tarefa para fazer até amanhã, eu quero saber que tarefas estão pendentes para fazer até amanhã.

[Entrevistador]

E por norma são mais empresas nacionais ou internacionais?

[Entrevistado]

Grupos nacionais. Grupos internacionais. Vou dizer que as que temos trabalhado são geralmente grandes empresas. Deixa-me ir um bocadinho atrás, nós podemos falar, do BPM em várias camadas nós temos uma primeira camada. Podemos ter mais uma aplicação que me gere os desenhos dos fluxos organizacionais e também fazemos uma modelação em BPMN. Eu consigo perceber como é o processo depois de associar as instruções de trabalho, e tenho a minha aplicação de desenho de processos que me permite só mapear o processo, mas é estática, e isso é um nível mais básico. Não tem automatismos. Temos ferramentas hoje em dia, de process mining, que vão sobretudo aos ERP's perceber os sítios em que as pessoas introduzem informação nos sistemas como é que são os processos e aí ferramentas de process mining vão desenhar e vão identificar o botlenecks nos processos. Quando temos o outro nível, que é a ferramenta de BPM, geralmente, têm que estar associado a alguma coisa que permita ter um front office, um desenho das minhas páginas e que me dá um fluxo de informação eu crio uma aplicação baseada nestes workflows, que deixaram ser um simples desenho de tarefas manuais de etapa a etapa. Algumas delas são manuais, outras são automáticas, um exemplo eu quando desenho um workflow em BPMN eu acho que a pessoa A vai fazer esta atividade trabalhada a condição Z vai fazer a atividade X ou Y. No BPM que permite automação, integra a tarefa num webservice, e que vai buscar mais informação a outras bases de dados. Geralmente são empresas de grande dimensão, tem capacidade para fazer este tipo de mudança muitas nacionais já o fazem. Mas embora

possa haver pequenas empresas que percebendo o valor de construir aplicações rápidas com esta tecnologia, também aproveitam, depois, porque normalmente são sempre soluções dispendiosas.

[Entrevistador]

Existem dificuldades, ou já sentiu dificuldades na procura e implementação e procura deste tipo de soluções?

[Entrevistado]

Tem a ver com a tipificação no negócio. Quando é um negócio mais atípico é normal, que não que não existam soluções feitas no mercado que respondam aos meus processos. Mas quando eu faço, quando a minha atividade seja industrial, mais atípica, também tem a ver com a própria filosofia da empresa que é empresas gostam, de adaptar a boas práticas e a softwares já existentes e há outras empresas que de fato querem inovar e querem ser diferentes e de fato dizer que o meu processo é único.

[Entrevistador]

Normalmente qual é a adesão dos colaboradores a este tipo de soluções, aqui adesão considere por favor como, por exemplo o á vontade na partilha de conhecimento, se a existência de formação faz diferença ou não na aceitação, ou por exemplo se o estarem envolvidos no processo é sequer considerado.

[Entrevistado]

Aqui há dois tipos de utilizadores, há o utilizador que esteve connosco que tem a visão da empresa, o que é de fato o que nós precisamos. Precisamos que do lado do cliente haja bom analista funcional alguém que perceba bem do negócio e da organização, e essa pessoa ou essas pessoas que vai desenhar os processos de acordo com a sua visão.

Às vezes a sua visão não tem que ser necessariamente a visão do resto do grupo, ou pode não ser a melhor, mas quanto mais pessoas estiverem envolvidas no processo de criação melhor. De acordo com o nosso processo nós temos, uma fase muito longa de testes e é aí que tem que existir uma grande participação, de vários atores.

No processo de implementação cinquenta por cento do esforço é nas fases de testes cíclicos, de melhoria contínua, digamos apresentamos um produto, desenhamos o processo, testem, não é bem assim volta para trás, melhoramos, testa de novo. O esforço de teste juntamente com equipas, sejam capazes de representar cinquenta por cento do esforço de implementação. E isso é quase condição de sucesso. Às vezes temos tanta pressa e não funciona, e o que vai gerar são anticorpos, ter resistentes, ou seja, resistentes à mudança.

As pessoas que estão no terreno são meros operacionais. Têm que ter uma liderança e uma gestão forte. Dizer é assim vamos trabalhar, são regras o processo está definido, está escrito e têm que o fazer. Essas pessoas muitas vezes não têm a visão do todo, que é a informação de que a questão introduzir no computador é crítica, poderá não ser crítica para eles, mas é crítica para o processo mais à frente, e para a organização. Isso parte que às vezes tem que se saber explicar, ou seja embora haja resistência à adoção tem que se saber explicar e apresentar.

É preciso ter os líderes do nosso lado. As pessoas devem começar a ser envolvidas quanto mais cedo melhor. Por isso é que estou a dizer que a maneira que projetamos os testes, vamos a fazer testes com o mais alargado possível pessoas para os utilizadores finais, porque eles próprios já vão ficar comprometidos, as opiniões deles já foram ouvidas, e isso é importante.

[Entrevistador]

Considera que as empresas por norma tendem a melhorar os processos ao longo do tempo ou não?

[Entrevistado]

Isso agora depende muito da cultura própria empresa, geralmente tendem a melhorar, é normal haver parte de um processo de melhoria contínua sobretudo se falarmos numa aplicação que o custo de alteração seja rápido e ágil e esse é o grande benefício de ter uma programação low-code vão certamente aproveitar e melhorar ao longo do tempo, mas também temos empresas que estabilizam certa forma.