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Implementing an End-to-End BPM Framework:

Achieving Operational Excellence in the Service Industry

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Project Work

presented as partial requirement for obtaining the Master Degree in Information Management

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

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Implementing an end-to-end BPM Framework:

Achieving Operational Excellence in the Service Industry

by

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Project presented as partial requirement for obtaining the master's degree in information management, with a specialization in Information Management Systems

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Lisbon, July 10th, 2024

ABSTRACT

The merging of globalization and digitalization has transformed the modern business landscape, creating an environment of relentless change and amplified pressure for innovation. Digital transformation plays a critical role in enabling organizations to remain competitive, while enhancing their operational infrastructure and revolutionizing value creation. This context underscores the essential role of Business Process Management (BPM) as a transformative solution that addresses an organization's operational inefficiencies while being aligned with its strategic goals. This project work focuses on the retail sector- particularly a Food Delivery Company- which is projected to see substantial growth in the near future, driven by changing consumer preferences and technological advancements. Despite being profitable, the Portuguese chain under study faces critical operational challenges due to outdated processes affecting supply chain management, store operations, and customer service. By examining existing processes and organizational dynamics, this research aims to identify improvement opportunities and propose tailored BPM strategies while utilizing a holistic BPM framework, with the goal of enhancing the efficiency and effectiveness of its business processes while also preparing them for future expansion, increasing standardization, innovating, and exploring digital transformation opportunities.

KEYWORDS

Business Process Management; BPM Lifecycle; Digital Transformation; Information Technology; Retail Sector.

Sustainable Development Goals (SDG):

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LIST OF ABBREVIATIONS AND ACRONYMS

BPM	Business Process Management
BPMN	Business Process Management and Notation
VA	Value-Adding
BVA	Business Value-Adding
NVA	Non-Value-Adding
BPR	Business Process Reengineering
WFM	Workflow Management System
PM	Process Mining
IT	Information Technology
TQM	Total Quality Management
QI	Qualitative Impact
HACCP	Hazard Analysis and Critical Control Point
OM	Operations Management
QM	Quality Management
OMG	Object Management Group
PICK	Possible, Implement, Challenge, Kill

1. INTRODUCTION

In the contemporary business environment, globalization and digitalization have converged to create a landscape characterized by relentless change and heightened pressure for innovation (Kraus et al., 2021). Digital transformation emerges as a central theme in this discourse, as it is bridging the gap to the more technological fourth revolution, given its pivotal role in enhancing competitiveness and enabling organizations to transform information into valuable insights that can be taken advantage of (Vrana & Singh, 2021).

As per Wirtz et al. (2022), digital disruptions are having a major impact on businesses and reshaping the global economy, drawing a growing focus on both research and practical applications. While faced with such digital disruptions, organizations are forced to create and design strategic responses, and that's where they leverage digital technologies to remain competitive while entirely changing the way they create value (Calderon-Monge & Ribeiro-Soriano, 2023).

This integration of digital technologies translates into several changes at various levels of the business, namely the process level, organization level, business domain level, and society level (Parviainen et al., 2017). It becomes clear that establishing new and updated business models becomes mandatory for companies to grow and improve (Bouncken et al., 2021), and it ultimately allows them to survive and achieve competitive advantages in a digital economy.

Considering the known benefits of applying Business Process Management (BPM) and its technological branches into organizations and making them more efficient and productive (Dumas et al., 2018), the focus of this project work will be on applying them in the retail sector. While it is essential to present the ongoing digital transformation in the global economy, it is also important to contextualize what role the retail sector plays in it. The food delivery sector is so prominent that in 2018, the Swiss Investment Bank UBS highlighted the growing prominence of the food delivery sector in a report titled "Is the Kitchen Dead?". The report projected that by 2030, many meals that were traditionally cooked at home could instead be ordered online and delivered from restaurants. It noted that the overall cost of a professionally prepared and delivered meal could become similar to or even lower than the cost of home-cooked food. This raises the question of what potential size the food delivery sector can get, as it is evidently clearer the world of opportunities companies can explore efficiently and innovatively.

To effectively leverage this opportunity, retail companies need to gain competitive advantages by adapting to the sector's digital transformation. This transformation suggests that businesses rethink their operational strategies to remain agile, flexible and competitive, and responsive to the challenges and demands of the digital era, while considering several factors regarding the ever-changing consumer expectations, the market behavior and dynamics, and the fast technological advancements (Sagar, 2024).

Since the increasing viability of digitalization is crucial to influencing the retail industry's developing trajectory (Hagberg et al., 2016), this digital transformation should be made by leveraging digital technologies to improve business processes (Kubrak et al., 2023). In this scope, the growing opportunities raised by digital technologies have called for a need to optimize all stages of business processes, which can be fulfilled by BPM (Dumas et al., 2018). BPM comes as a *"body of principles, methods, and tools to discover, analyse, redesign, implement and monitor business processes"* (Dumas et al., 2018, p. 28). It is a fundamental discipline for organizations that continuously improves organizational processes at their core (Brocke & Rosemann, 2015), and ultimately leads to value creation, which allows organizations to gain competitive advantages (Brocke et al., 2022).

Given the context of this dynamic service industry, the focus shifts to an emerging Food Delivery Company. It is particularly relevant to focus on this sector as the Restaurant Delivery market is projected to reach 141bn EUR by the end of the year while having a compound annual growth rate of 4,33%, with a user base of 1.5bn users by 2028 (Statista Search Department, 2023). The Portuguese chain in question has some establishments specializing in order fulfilment. However, despite maintaining consistent profitability, the company grapples with a critical challenge rooted in outdated operational processes, affecting domains such as supply chain and stock management, store operations, and customer service. These inefficiencies impede seamless service delivery, often leading to customer complaints. Recognizing the obligation to meet evolving standards of service excellence and operational efficiency, the company strategically commits to addressing these challenges.

This project work explores the intricate business problem, emphasizing the paramount need for BPM as a transformative solution. Through a meticulous examination of existing processes and organizational dynamics, the goal is to unveil opportunities for improvement and propose tailored BPM strategies. The ultimate objective is to propel the Food Delivery Company towards comprehensive organizational enhancement, rectifying inefficiencies, and positioning itself as a more resilient entity in the competitive service industry landscape. While adopting Dumas' framework for BPM, the goal is to optimize a selected process of the company, mainly to increase its efficiency and efficacy while providing clear context to its intricacies and most relevant characteristics. This project work aims to prepare the business for future expansion by standardizing, innovating, and exploring digital transformation opportunities for its process of focus clearly and simply, namely through Operations Management (OM), Quality Management (QM), and others (Dumas et al., 2018).

To achieve these results, this project work is initiated with an introduction of BPM and its context, followed by a theoretical background regarding the literature review. Then, a framework with the research methodology will be presented, followed by the project development (To-Be model). At the final stage, the results of the research and their implications for the business will be presented, as well as some conclusions and future works regarding the project.

2. THEORETICAL BACKGROUND

2.1. BUSINESS CONTEXT

Previously, the focus was on introducing the project's scope, which is fundamentally based on process improvement through BPM in a retail sector food delivery company. It is also necessary to characterize the retail sector while naming a few of its characteristics and what its future is holding.

In recent years, the retail sector has undergone a digital transformation, aligning itself with innovative practices that have reshaped its operational landscape. This shift holds immense significance for the retail industry, as the increasing viability of digitalization plays a pivotal role in influencing its developmental trajectory (Hagberg et al., 2016). The retail sector is one of the largest economies in the world, growing around 4,8% each year and having an expected sales value of around 27 trillion EUR by the end of 2024 while being estimated to be worth around 30 trillion EUR by 2026 (Statista Search Department, 2023). Within the global retail sector, the online food delivery market had a revenue of 200bn EUR in 2023 in the United States, from which 70bn EUR was from the meal delivery segment alone, and 78bn EUR in Europe, which is expected to reach 161bn EUR by 2027. Its compound annual growth rate is around 10.06%, which projects a market volume of 1.64tn EUR by 2028 (Statista Search Department, 2023).

The Restaurant-to-Delivery market is a segment within the online food delivery industry called "Meal Delivery", which includes services where restaurants deliver prepared meals to customers. These services are usually facilitated by third-party or in-house delivery services, which take care of the logistics operations from the restaurant to the customer's locations. The specific restaurant delivery market in Portugal is expected to reach 87m EUR in 2024, with a compound annual growth rate of 5.45% and a projected market volume of 108m EUR by 2028 (Statista Search Department, 2023). In Portugal, the Meal Delivery Market is expected to have a revenue growth of 12.7% in 2025- while having an expected number of users of 3.2m by 2028, and its major players are Uber Eats, and Glovo (Statista Search Department, 2023). The growing scenario of the food delivery picture highlights the acceptance and growth of food delivery apps, which might have been accelerated by the 2019's pandemic (Madinga et al., 2023), where customers were required to stay on lockdown and order food at their convenience. Now, besides convenience, other factors like comfort, flexibility, time saving, and ease of use have enhanced the customer experience, showing that this market is here to stay (Reddy & Aradhya, 2020). However, the food industry is already a saturated market (Yeo et al., 2017), and *"To succeed in the future, retailers will need to evolve at pace"* (KPMG, 2021, "Future of Retail", p.6). The need to evolve comes as one of the driving forces of implementing "Retail 4.0 technologies" and innovating ongoing processes in retailers (Har et al., 2022), which can help improve the performance of businesses and overall customer experience, ultimately allowing them to remain competitive (Sakrabani & Teoh, 2020).

2.2. PROCESS DEFINITION

The project's aim is to strategically redesign the store management process for this food delivery chain operating across Portugal. The key objective is to standardize and innovate this process to ensure uniform performance across all six open locations and foster consistency and improvement to achieve comparable results in each one.

By standardizing the store management process, the company expects to achieve a harmonized operational consistency. This entails establishing uniform procedures for inventory management, order processing, and hygiene protocols, creating a cohesive operational framework that transcends individual store locations. Such concepts directly correlate with the company's existing challenges: costs, waste management, hygiene compliance, and the predictability of daily orders. To address these challenges, this project work aims to reduce costs, by streamlining day-to-day operations to correct inefficiencies. To reduce waste, the aim is to enhance inventory management, optimize order processes, and reduce unnecessary resource utilization. For hygiene compliance and alignment with HACCP (Hazard Analysis and Critical Control Point) regulations, the project work emphasizes improving hygiene practices, specifically within Mise-en-place and order preparation tasks, which ensures consistent implementation of food safety measures across all stores. Finally, the project work aims to minimize discrepancies, enabling more accurate forecasting of daily orders.

This comprehensive approach will holistically address the challenges faced by the company, integrating new measures, strategies and enhancing its current Store Management process. The BPM principles will help to foster a culture of innovation, encouraging ongoing refinement and adaptation to evolving industry standards and customer expectations.

2.3. THE CONCEPT OF BPM

As commonly defined, BPM is a fundamental discipline for organizations that analyses, designs, implements, and continuously improves organizational processes at their core (Brocke & Rosemann, 2015a). Jan vom Brocke et al. (2015) also highlight BPM's six core elements, which make it an *"integrated set of corporate capabilities related to strategic alignment, governance, methods, technology, people, and culture" (p. 1).*

As Dumas et al. (2018) state, *"processes are everywhere"* (p. 1), which means that no matter the size or sector in which a company is performing its activity, all must always manage business processes. BPM is described as a skilful practice of overseeing how work is executed within an organization, with the aim of ensuring consistent outcomes while seizing opportunities for process improvement by reducing costs, execution time and error rates. The authors also state that the improvement of entire chains of activities, decisions, and events- which form business processes- is what BPM is fundamentally about, as it brings value to the organization and its customers.

According to Kaniški & Vincek (2018), business processes are a set of activities conducted in a specific order that use resources from an organization with the goal of producing outputs that bringing value to it. They are essential as they are the basis of the work organization for all businesses and must be monitored and analysed constantly to keep the company efficient and alive and continuously updated and improved.

To take advantage of the improvement opportunities BPM creates, many organizations enhance their business processes through innovation- usually by establishing and increasing the efficiency of organizational processes (Schmiedel et al., 2014), and applying methods and techniques like Six Sigma, business process reengineering, lean management, and others (Linderman et al., 2010). Also, according to Dumas et al. (2018), the improvement of these processes through BPM can be of a single or continuous nature, as well as incremental or radical. However, it ultimately leads to value creation for the organization and its customers, which, by principle, allows companies to gain competitive advantages (Brocke et al., 2022). To conclude, Brocke & Mendling, (2018) say BPM has emerged as a "*consolidation of disciplines that leverage process-orientation to increase performance*" (p. 2). Some of these disciplines are Total Quality Management (TQM), which focuses on continuous improvement, Operations Management, which focuses on managing physical and technical functions of an organization, Lean, which focuses on the elimination of waste, and Six Sigma, which focuses on minimization of defects (Dumas et al., p. 7-8, 2018). The authors state that BPM inherits all the principles and techniques from these disciplines and leverages modern information technology (IT) to optimally use them to *"align business processes with the performance objectives of an organization"* (p. 8).

The expected outcomes of this philosophy are enhanced operational efficiency, streamlined business processes, continuous improvement, risk mitigation, enhanced visibility and control of processes, better compliance levels, higher agility for adaptation and innovation, and finally, value for the organization and its clients.

2.4. PREVIOUS RESEARCH ON BPM

The field of BPM stands at the intersection of IT and management sciences, leveraging insights and combining knowledge from both fields to streamline operational workflows (Aalst, 2013; Weske, 2007). In recent years, BPM has captured significant attention for its potential to greatly enhance productivity and reduce costs, which is achieved through a combination of "*models, methods and tools that support the design, enactment, management and analysis of business processes*" (Recker & Mendling, p. 1, 2016). However, as per Aalst (2013), it is challenging to pinpoint the start of BPM, given its roots in computer science and management science. The author claims that various experts in the field were responsible for the increase of technical innovations, improvement of organizational work and use of information technology, with their cumulative contributions regarding the advantages of the division of labour (Adam Smith, 18th century), the principles of scientific management (Frederick Taylor, 19th, and 20th centuries) and the concept for mass production in production lines (Henry Ford,

19th, and 20th centuries). As per Aalst (2013), BPM can be considered an extension of classical Workflow Management (WFM) systems and approaches. These disciplines share a common foundation in making operational processes cheaper, faster, more efficient, and automated. However, historically, many WFM projects turned out to be too challenging and eventually failed, ultimately being replaced by BPM, which focused more on management-related opportunities (Aalst, 2022). Nevertheless, the author also emphasized BPM's "*disconnect with reality*" when relying on modelling alone and steered the focus to process improvement instead. This shift in perspective coincides with the observed trends in BPM evolution, such as the move from data-centric to process-centric approaches and the transition from carefully planned designs to embracing redesign and organic growth (Aalst, 2003).

In the 1970s and 1980s, IT focused on storing and retrieving data, relying on data modelling for building information systems. Unfortunately, the modelling of business processes was frequently neglected, resulting in processes having to adapt to the constraints of technology. Concepts like business process reengineering (BPR) emphasized the necessity of prioritizing processes, prompting a shift towards a more process-driven approach among system engineers (Aalst, 2003). The concept of BPR was pioneered by scholars such as Michael Hammer (1990), Thomas Davenport (1993), and Peter Drucker (1998), who emphasized the imperative of prioritizing processes, advocating for radical redesigns of existing workflows to drive organizational transformation, through reengineering, application of IT capabilities and business innovation. Hammer and Champy (1993) define BPR as an approach to change management that focuses on the rethinking and radical redesign of business processes. Its aim is to achieve breakthrough improvements in critical performance measures such as cost, quality, service, and speed. However, author Bhaskar (2018) alerted to the fact that more than 70% of BPR implementations never achieve the expected results due to a lack of suitable framework and methodology, poor technology, lack of resources and commitment to culture, and highlights the importance of following BPR best practices for a successful implementation. In sum, it is fundamental that BPR is integrated with other aspects of management, managers understand the current business processes, and that information technologies are used in enhancing the performance of systems (Oneill & Sohal, 1999).

As per Ho et al. (2009), BPM comes as a broader research domain that has evolved from BPR over the years, and it is not to be confused with other process-oriented improvement methodologies such as business process redesign, business process improvement, BPR and business process innovation that only change in "mission", "scope", and "approach". BPR varies from BPM in scope since it is mainly focused on planning and organizing the process itself, while BPM provides concepts, methods, techniques, and tools that plan, organize, and monitor processes (Dumas et al., 2018). In sum, BPM comes as a collection of all these methodologies and techniques, and it provides a general framework for studying and improving business processes (Elzinga et al., 1995).

In recent years, Dumas et al. (2018) and other authors have massively contributed to the innovation and development of the BPM discipline, namely by providing an end-to-end framework known as the BPM lifecycle, a set of tools, methodologies and techniques that enable the capture, analysis, and redesign of business processes, as well as barriers and factors for success. Other authors, namely Aalst (2011), have also tried to bridge the gap between BPM and new technologies such as Business Process Intelligence- by utilizing Process Mining (PM) to combine both process models and creating new forms of process-centric analysis- to help keep it up-to-date, and lay a foundation for future work in an ever-evolving technological world.

3. BPM LIFECYCLE

The BPM lifecycle is defined by Dumas et al. (2018) as a framework that provides a structured view of the various stages of a business process lifecycle. Other authors define it as a systematic lifecycle that standardizes the implementation and management of business processes in an organization (Szelągowski, 2018), or even as a business process modelling modeling activity of synthesizing and improving an enterprise's processes (Mohapatra, 2013).

To better understand the slightly different approaches to the BPM's lifecycle definition, Morais et al. (2014) studied and analysed seven different models of the BPM lifecycle to identify if they are similar in any way. The authors ended up identifying that the analysis, design, modelling, implementation, and monitoring stages were the most common in all the definitions, which were also the most popular in the study made by Ruzevicius et al. (2012).

As per Dumas et al. (2018), the BPM lifecycle encompasses the following phases: (1) Process Identification, (2) Process Discovery, (3) Process Analysis, (4) Process Redesign, (5) Process Implementation, (6) Process Monitoring and Controlling. In this BPM implementation, the focus will be on the first four stages of the BPM lifecycle, as the process implementation and process monitoring and controlling phases will not be part of the project. Each stage can be visualized through the following section with the proposed BPM lifecycle framework by Dumas et al. (2018) (please see Figure 1 below).

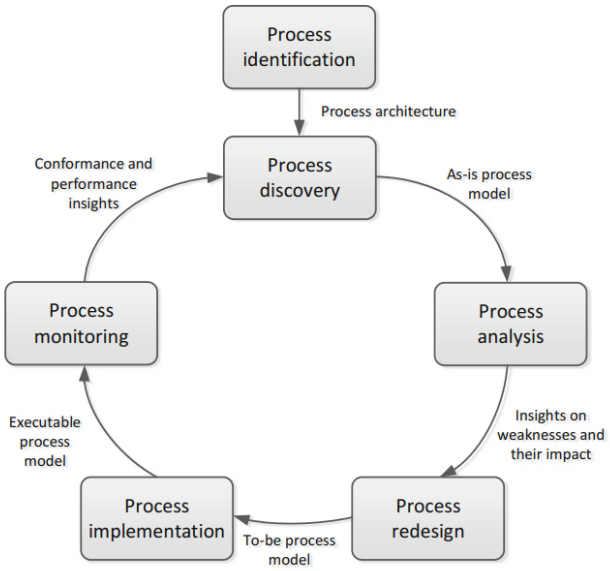

Figure 1 - The BPM Lifecycle (Dumas et al., 2018, p.23)

3.1. First Phase: Process Identification

The first phase of the proposed BPM lifecycle is the Process Identification phase, which is where business problems are presented, and the processes that are more pertinent in addressing such problems are identified, defined, and interconnected (Dumas et al., 2018).

This phase is categorized as one of the most important phases of the BPM lifecycle (Hammer & Champy, 1993), as its outcome is a new or updated process architecture- plays a pivotal role in guiding the organization's strategic decisions (Dumas et al., 2018). The authors add that this architecture offers an overview of the organization's processes and their interconnections. It serves as a guiding framework for selecting which processes or groups to prioritize throughout subsequent lifecycle phases.

The authors Dumas et al. (2018) stated that this phase encompasses two main stages, namely process architecture definition (designation phase), which focuses on creating an initial roster of processes along with their overarching architecture, and process selection, where appropriate criteria are deliberated to establish priorities among the processes when defining a process portfolio.

For the process architecture definition stage, the goal is to represent the processes within an organization. However, crafting such an architecture involves grappling with the intricate nature of the entire organizational structure. To systematically tackle this complexity, the authors Dumas et al. (2018) adopt a threefold approach:

(i) Categorize processes to provide clarity.
(ii) Delineate the various interconnections between processes, crucial for a comprehensive process architecture.
(iii) Introduce a methodology for defining the process landscape, offering a high-level overview of the process architecture.

As per Dumas et al. (2018), the development of a process architecture typically follows a top-down approach, depicted metaphorically as a pyramid. At Level 1, we begin with the process landscape, which delineates the company's value chains. Level 2 entails breaking down each business process within these value chains. Moving deeper to Level 3, processes are further decomposed into sub-processes and individual tasks. Arrows in the illustration signify these hierarchical decompositions (please see Figure 2 below).

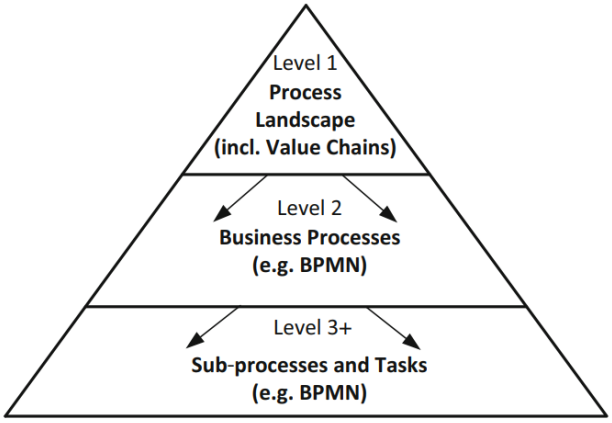

Figure 2 - The three levels of process architecture. (Dumas et al., 2018, p.44)

For the process selection stage, the objective is to establish criteria to evaluate the performance of identified business processes- usually time, cost, quality, and flexibility, and define which will be part of the scope of the BPM project. The business processes are also attributed to a process portfolio and prioritized by process owners through the evaluation of their importance, health, and feasibility of improvement, and only then can they proceed to the next steps of the lifecycle (Dumas et al., 2018).

The success of this BPM lifecycle phase is very important for the implementation of BPM, as the selection and prioritization of suitable processes is crucial (Cho & Lee, 2011), since it sets the stage for subsequent analysis and improvement in an efficient way, enabling the potential of saving time, energy, and other resources of the company (Davenport, 1993).

3.2. Second Phase: Process Discovery

The previous subsection delved into creating process models. However, according to Dumas et al. (2018), a model must not only be theoretically and syntactically correct but also precisely reflect the actual business process being modelled. This demands a profound understanding of the business context and operations, coupled with modelling skills to represent it meaningfully through a BPMN (Business Process Management and Notation) model.

The second phase of the BPM lifecycle, known as Process Discovery, aims to gather pertinent details of an existing business process and organize them into an "*as-is process model*". (Dumas et al., 2018).

BPMN is presented as a standard business process modelling language that has received broad industry support and is subjected to extensive adoption and use (Aagesen & Krogstie, p. 2, 2015). After a series of revisions and evaluations, the Object Management Group (OMG) decided to release in 2011 a second version of this language, which notation and structure will be used in this project's work.

As per Dumas et al. (2018), this phase is much more complex than the identification phase, as there is a need for the organization to gather all information about a process in a detailed and meaningful way- which is not always available in every organization- and then organize it clearly and concisely, to prepare it for modelling and creation of the "*as-is*" model. The authors also emphasize the importance of obtaining a minimum amount of information necessary for meaningful modelling and analysis, given that, despite being very time-consuming, the Process Discovery phase greatly benefits from collecting the most amount of information possible, as it enhances the quality of the model in a great manner.

Dumas et al. (2018) describe the four tasks of process discovery, that help make this practice as efficient as possible:

(i) *Defining the setting*- involves assembling a dedicated team within a company to undertake process-related tasks.
(ii) *Gathering information*- focuses on building an understanding of the process using various methods of discovery.
(iii) *Conducting the modelling task*- involves systematically creating the process model with guidance from a modelling method.
(iv) *Assuring process model quality*- ensures that the resulting process model meets predefined quality criteria, establishing trust in its accuracy and reliability. This process is made iteratively and ensures quality standards for any future model.

The authors Dumas et al. (2018) also add that there are two main roles in the process discovery phase responsible for the information gathering and modelling: Process Analyst and Domain Expert. Although with different responsibilities, both are fundamental for the process discovery stage, as the process analysts have the responsibility of conducting the modelling task based on their BPMN skills and information gathered from the process itself, as opposed to the domain experts, who don't have modelling skills or BPMN knowledge but possess a vast familiarity with the business process and extensive knowledge of its characteristics. This disparity in knowledge of different fields is highlighted by the authors Leopold et al. (2012), who state that the real challenge and consequent success factor of a BPM implementation can be based on the ability to converge both areas of expertise and translating them into an accurate, understandable, and syntactically correct process model.

For the process discovery methods of gathering information about processes, Dumas et al. (2018) highlight the three main segments of discovery methods, which are: (i) *Evidence-based discovery*, conducted with document analysis, observation and automated process discovery; (ii) *Interview-based discovery*, conducted through a series of domain experts interviews about how a process is conducted and its performance; (iii) *Workshop-based discovery*, conducted through workshops that gather multiple process participants at the same time and quickly collects their information.

All these methods have their own advantages and disadvantages in terms of objectivity, richness, time consumption, and immediacy of feedback (please see Table 1), so it is up to the context of the organization and the business processes to define which is more fitting (Dumas et al., 2018).

Table 1 - Relative strengths and weaknesses of process discovery methods (Dumas et al., 2018, p.175)

Aspect	**Evidence**	**Interview**	**Workshop**
Objectivity	High	Medium-High	Medium-High
Richness	Medium	High	High
Time consumption	Low-Medium	Medium	Medium
Immediacy of feedback	Low	High	High

Dumas et al. (2018) emphasize that modelling a business process is a complex task that needs to be structured and planned in a systematic way, namely through the following steps:

(1) *Identify the process boundaries*, to understand the scope of the process, namely the events that trigger its start and completion.

(2) *Identify activities and events*, which are the step-by-step activities and intermediate events that give a sense of flow to the business process.

(3) *Identify resources and their handoffs*, which defines responsibilities for participants and resource allocation.

(4) *Identify the control flow*, which identifies when and why activities and events will be executed.

(5) *Identify additional elements*, where additional elements bring context to the process model and make it easier to understand for its users through data objects, notes, and other data artifacts.

To finalize, Dumas et al. (2018) present *process model quality assurance* as the last stage in the process discovery phase. The authors state the role of (i) *syntactic quality*, (ii) *semantic quality,* and (iii) *pragmatic quality* in process conformance, associated with the modelling language of BPMN, the adherence of the process model with the process that happens, and the usability of the process model, respectively.

3.3. THIRD PHASE: QUALITATIVE PROCESS ANALYSIS

After the process discovery phase, the organization has an "as-is" process model ready to be analysed through qualitative process analysis methods, which was conducted for this project.

For the qualitative process analysis, Dumas et al. (2018) suggests the main techniques that help identifying and eliminating waste, such as *value-added analysis* and *waste analysis*, and that help identify and prioritizing problems, such as *issue register* and *root-cause analysis.* For this project work specifically, the *value-added analysis*, the *waste analysis* and the issue register analysis were performed.

The authors Eakin & Gladstone (2020) state that the concept of "value-adding" analysis is adopted from economics, where it signifies the augmented worth of a product throughout its production stages. However, within the realm of qualitative process analysis, the knowledge that results from process analysis is recognized as being more valuable, as it doesn't rely on interpretations of data or common-sense explanations, but it delves deeper, uncovering insights and providing value from exploring beyond surface-level of information.

Dumas et al. (2018) define *value-added analysis* as a technique whose aim is to detect unnecessary steps in a process and further eliminate them. This means that all activities in business processes are analysed and broken down into various process tasks- namely preparation, execution, or handoff tasks- which are later analysed and classified into one of three categories: (i) *Value Adding* (VA), if they directly contribute to positive outcomes for the customer; (ii) *Business Value Adding* (BVA), if, although not adding direct value for the customer, they are fundamental for the business to run smoothly and generate value; (iii) *Non-Value-Adding* (NVA), if they fall into neither categories. The objective, then, is to minimize the BVA steps and fully eliminate the NVA, as they do not help the business flourish.

The other type of waste-eliminating analysis is the *waste analysis,* which is categorized by Dumas et al. (2018) as the “opposite” of the *value-added analysis*, as instead of looking for and identifying value-adding steps and later removing or reducing the remaining steps, the *waste analysis* looks directly for waste in every process.

The authors highlight the importance of the contributions of author Ohno (1988) in identifying the seven types of waste, or *muda*- the Japanese term for waste used by the author- , and later incorporated them into three different higher-level categories, such as (i) *Move*, which is waste related to movement; (ii) *Hold*, which is waste related to holding something; (iii) *Overdo*, which is waste related to doing more than necessary to deliver the same value for customers or the business. The seven types of waste are represented in the table below:

Table 2 - The seven types of waste

Category	Type of Waste	Description
Move	Transportation	Encompasses the avoidable transportation of process-related parts of production
	Motion	Relates to the unnecessary movement of human resources in production
Hold	Inventory	Encompasses the inventory being held that needs to be finished or dispatched
	Waiting	Relates to the unnecessary waiting intervals people or products take on before the next steps can be performed
Over-do	Defects	Embodies products with defects
	Over-production	Relates to tasks that are executed but not needed to create value

For identification and prioritization of problems, Dumas et al. (2018) define the *Issue Register analysis* as a fundamental analysis tool that maintains, organizes, and prioritizes weaknesses inherent in any business process, while providing a "*detailed analysis of each issue and its impact in the form of a table with a predefined set of fields*" (p.229). The fields used in this project work are (i) *Name of the issue*, which should be understandable by all stakeholders in the process; (ii) *Priority*, which states how important this issue is relative to other issues (in a scale from V*ery-Low* to *Very-High*, in this project); (iii) *Description*, which describes the issue in a simplified way; and (iv) *Qualitative impact*, which describes the qualitative impact of the issues on customer and employee satisfaction, company's reputation or other types of impact which are difficult to measure and quantify (Dumas et al., 2018).

While building on the assessment of issues provided by the *Issue Register analysis*, a Pareto analysis follows with the ambition of prioritizing the resolution of said issues. As authors Dumas et al. (2018) mention, this analysis is based on the fact that more often than not, *"a small portion of factors are responsible for the largest share of a given effect"* (p.232). This analysis is commonly associated with the 80-20 principle, where 20% of issues usually contribute to 80% of the effects.

As per Dumas et al. (2018), the *Pareto analysis* is known for its ability of assessing the monetary impact of addressing an issue. However, it only focuses on this single dimension. To better understand which issues are more valuable for correction, another dimension should

be considered. This dimension regards the difficulty of addressing the issues, and only after taking both dimensions into account (*payoff* and *difficulty*), it is possible to define the priority of resolving issues. In this scope, the *PICK chart analysis* comes as the natural tool that complements the *Pareto charts* and addresses both dimensions. *PICK* is an acronym that stands for *Possible*, *Implement*, *Challenge* and *Kill*, which represent each of the four quadrants of a *PICK* chart. In the horizontal axis, the *difficulty* dimension is split between *Easy* and *Hard*. In the vertical axis, the *payoff* dimension is split between *Low* and *High*. To understand where an issue should be placed in this chart, it has to be classified based on its payoff-difficulty relationship, as follows: (i) *Possible* (Low payoff, easy to do) – issues that are simple to address that require low resource utilization; (ii) *Implement* (High payoff, easy to do) – issues that should be resolved with highest priority as their resolution can bring great benefits in an affordable way; (iii) *Challenge* (High payoff, hard to do) – issues that should also be prioritized although needing a significant amount of effort and resource utilization; (iv) *Kill* (Low payoff, hard to do) – issues that are probably not worthy of addressing, since it brings little to no value for a significant cost (Dumas et al., 2018).

The final analysis of this project work is the Root Cause analysis, which is a collection of principles and techniques that help analyse, identify, and understand the causes for issues to take place. The *Cause-Effect* diagram is the Root Cause technique that will be discussed in this project work, as it contributes significantly for process analysis given its nature of portraying the relationship between negative effects and preceding causes. According to Dumas et al. (2018), in the context of business process analysis, the distinction between contributing or causal factors is not relevant and they should only be addressed as *factors*, since both either cause or increase the chances for issues to occur, and they should be corrected either way.

The *Cause-Effect* diagram, also known as the Ishikawa (or Fishbone) diagram, categorizes causes for issues according to 6 sub-categorizations: the *6 M's*, namely *Machine*, *Method*, *Material*, *Man*, *Measurement*, and *Milieu*. (i) *Machine*- factors that come from the underlying technology being used; (ii) *Method*- factors that come from the way a process is designed, understood, and performed; (iii) *Material*- factors that come from materials used in production, consumables in processes or data that feeds tasks within the processes; (iv) *Man*- factors that come from incorrect human behaviour, mostly human error or under-performance; (v) *Measurement*- factors that come from incorrect measurements or calculations made during a process; (vi) *Milieu*- factors that come from the surrounding environment of the process that are outside of control of process participants (Dumas et al., 2018).

3.4. FOURTH PHASE: PROCESS REDESIGN

After performing a thorough analysis of a business process, issues and opportunities for improvement may arise, which trigger the need for redesign. However, Dumas et al. (2018) suggest that the redesign of business processes should not only be made for processes performing badly- on an *ad hoc* basis-, but should be performed systematically, to take

advantage of all possible redesign opportunities that can go under the radar if they are overlooked.

Grover et al. (1995) define business process redesign as an analysis and redesign tool that improves the performance of business processes. Jansen-Vullers et al. (2007) add that the redesign itself can be either revolutionary, if it is made from scratch, in a radical way, or evolutionary, if it expands the concept and complexity of an existing business process.

Through research on several business process redesign projects, authors Jarvenpaa & Stoddard (1998) discovered that although the redesign involves the design and implementation of "change", it is beneficial to add radical elements to it as opposed to only taking an evolutionary approach, given that the combination of revolutionary and evolutionary change drives organizations to gain effective results in a "harmonious" way.

Dumas et al. (2018) introduce a framework based on the four dimensions of performance, namely *time*, *cost*, *quality,* and *flexibility*, to be named as the *Devil's Quadrangle*, with the objective of providing tangible metrics that analyse exactly what is being or can be achieved through process redesign. The authors add in a suggestive way that, for a successful implementation of business process redesign, the *time* required to perform an activity should be *decreased*, the *cost* of executing a process should be *reduced*, the *quality* of service should be *improved*, and the resilience or *flexibility* of a process should *increase*. The authors also point out that improving the performance of one dimension can have an impact on the performance of other dimensions, suggesting that sometimes, organizations must make trade-offs and clearly define what is most relevant for improvement and what sacrifice can be made to compensate for it.

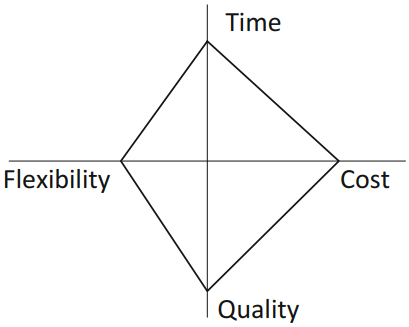

Figure 3 - The Devil’s Quadrangle (Dumas et al., 2018, p.304).

Dumas et al. (2018) also introduce the concept of *The Redesign Orbit* as a spectrum that consists of the redesign methods of business processes with quadrants that contain methods that vary in *ambition, nature,* and *perspective*. The authors delineate both axes into two distinct segments each. They define the vertical axis, with *transactional* methods on the left and *transformational* methods on the right. Meanwhile, the horizontal axis is characterized by creative redesign methods at the top, more focused on creativity, innovation and

imagination, and analytical redesign methods at the bottom, more focused on mathematical, statistical, and quantitative analysis. The authors also define methods that are *inward-looking*, if the perspective of the organization is assumed, and *outward-looking*, if the perspective is from outside of the organization.

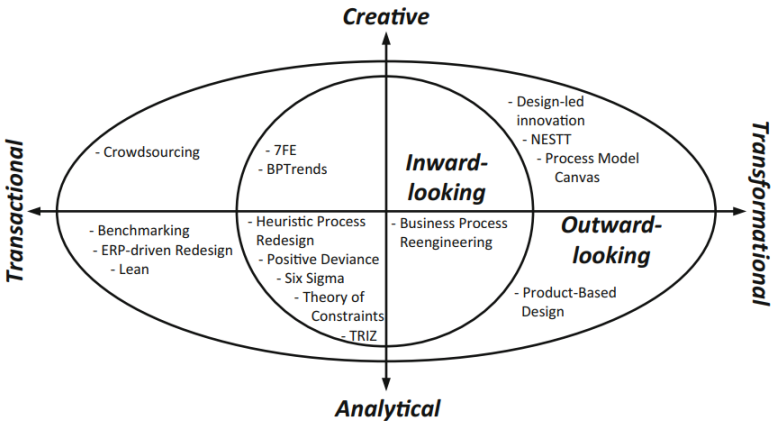

Figure 4 - The Redesign Orbit (Dumas et al., 2018, p.306)

This project work will be inspired by a *transactional*, *analytical*, and *inward-looking* approach for the process redesign phase, more specifically, by using the *Heuristics Process Redesign* method, as it is a collection of 29 redesign heuristics that come from successful past redesign projects and are defined as "*rules of thumb for deriving a different process from an existing one*" (Dumas et al., 2018, p. 316). The authors emphasize that it is important to consider that each heuristic improves one dimension at the expense of other dimensions, and that different heuristics can have specific impacts on each of the four performance dimensions of the *Devil's Quadrangle- time, cost, quality,* and *flexibility*. Some examples can be: (i) "*task elimination*", when NVA steps that are isolated or performed manually are removed, decreasing the time and cost at the expense of less flexibility; (ii) "*triage*", when tasks are either specialized (divided into two or more tasks) or generalized (integrated into one single general task), increasing the quality of the process, while lowering the time and cost at the expense of having less flexibility; (iii) "*parallelism enhancement*", where tasks are re-organized in a parallel way when possible to reduce the cycle-time of the process, with the possible trade-off of higher cost, lower flexibility and lower quality; (iv) "*task automation*", where tasks that are information processing are automated with an automation BPM system to decrease time and possibly increase the quality of the process, at the expense of less flexibility (Reijers & Mansar, 2005, p. 285-291).

4. RESULTS

This section will explore the results of implementing the previously mentioned BPM framework in a food delivery company for the process of Store Management, which consists of the "backbone" of the company, combining all the daily activities the main process participants endure to complete the food delivery service. All the process participants were systematically consulted to ensure the As-Is modelling was done according to reality. As for the modelling of the To-Be process, the improvements made were presented and their execution was confirmed to be possible by the same participants, who were eager for their implementation to come.

The solution provided in this section was made with the Sap Signavio Process Manager business process modelling tool, which is a comprehensive platform that facilitates clear visualization, analysis, and optimization of processes, while providing a collaborative environment for modelling business processes using diverse notations. Moreover, it streamlines the implementation of best practices by automatically validating processes and generating comprehensive documentation and reports. This dual functionality enhances efficiency and ensures adherence to industry standards, making it an ideal choice for process management implementations.

4.1. PROCESS IDENTIFICATION

This project work started by conducting several interviews with the process participants as well as the board of the company to better understand the day-to-day activities that were being performed by the team, as well as getting a grasp on the organizational structure.

Although there was already an established process architecture (See Figure 5), the first goal was to improve the Operations Management core process- more specifically, the Store Management process- to truly represent the daily processes of the organization. To achieve that, a pragmatic approach was taken, and the BPM implementation was based on the daily activities observed at the highest-earning and busiest store. This strategy allowed to capture and replicate the operational practices that occur continuously, ensuring that meaningful information is noted and categorized to provide clarity and serve as a foundation for the BPM model that is intended to facilitate the standardization of performance across the restaurant chain. After gathering all the information available and later building a first model for the Store Management process, the board of the company and the process participants were consulted in an iterative way to continue providing valuable feedback and ensure the model is accurate. Both the board and the process participants were also instrumental in providing insights into their main challenges and aspirations at the operational level, mostly highlighting their desire for more automation of repetitive tasks, improved hygiene in the workplace and expressing their need for better predictability of daily orders.

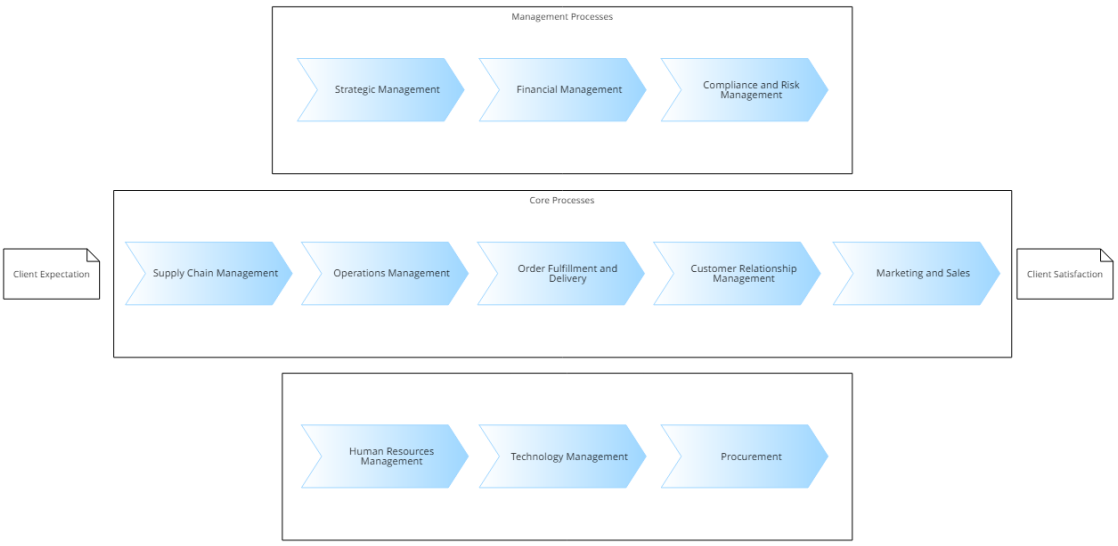

Figure 5 - Value Chain Architecture (source: Authors)

4.2. PROCESS DISCOVERY

The *process discovery* phase is much more complex than the identification phase. The authors provide a step-by-step guide for this phase which starts by defining the setting, where a dedicated team is assembled to undertake all the process-related tasks. Therefore, the Table 2 presents the involved stakeholders in this process, as well as their roles and functions.

Table 3 - Stakeholders of the Process

Stakeholder	**Role**	**Function**
Managing Director	Management Team	
Store Manager	Management Team	Domain Expert
Chef	Process Participant	Domain Expert
Front-of-House Staff Representative	Process Participant	Domain Expert
Delivery Coordinator	Process Participant	Domain Expert
Inventory Manager	Process Participant	Domain Expert
Customer Service Representative	Process Participant	Domain Expert
IT Support	Technology Management	Process Analysts
BPM Analyst	Process Analysts	Process Analysts
Customer	Client	

For the next step, the authors propose that information is gathered to have a clear and concise understanding of the process. For this purpose, as mentioned before, the project work started by conducting an *interview-based discovery*, where several interviews were conducted with various domain experts to have a good understanding of how the store is theoretically performing. Additionally, an *evidence-based discovery* was performed, which encompasses a *document analysis* and *observation* phase. For the first phase, all the documents and excel files where information about daily operations is stored were made available to provide a clear view of the metrics and current state of the company. Secondly, the process participants were observed while performing their activities. During this phase, an *interview-based discovery* was performed again, to better understand their main issues, struggles, and challenges faced during the process in an empirical and "now" practical context. Lastly, a *workshop-based discovery* was conducted in addition to the several interviews, where all the process participants were gathered at the same to provide insights and share their personal viewpoints of certain aspects and characteristics of the process. This allowed for the creation of a solid foundation with enough information for the process modelling phase, where a "current state" model- *As-Is* model- can be created with the *Signavio Process Manager* tool, using the BPMN 2.0 convention.

This first model was subject to a *syntactic verification, semantic validation,* and *pragmatic certification,* and it was ensured to be understandable by domain experts while complying with modelling regulations provided by the *Signavio Process Modeler* tool, as proposed by authors Dumas et al. (2018).

Lastly, a further verification and validation was made by the relevant stakeholders, including the process participants most involved in the Store Management process, which are the Chef and Store Manager. The process model has two levels of detail, where in the first level a high-level overview of the process is provided (see Figure 6), and in the second level, each subprocess is depicted in further detail. The subsequent subprocesses can be observed in Appendix A.

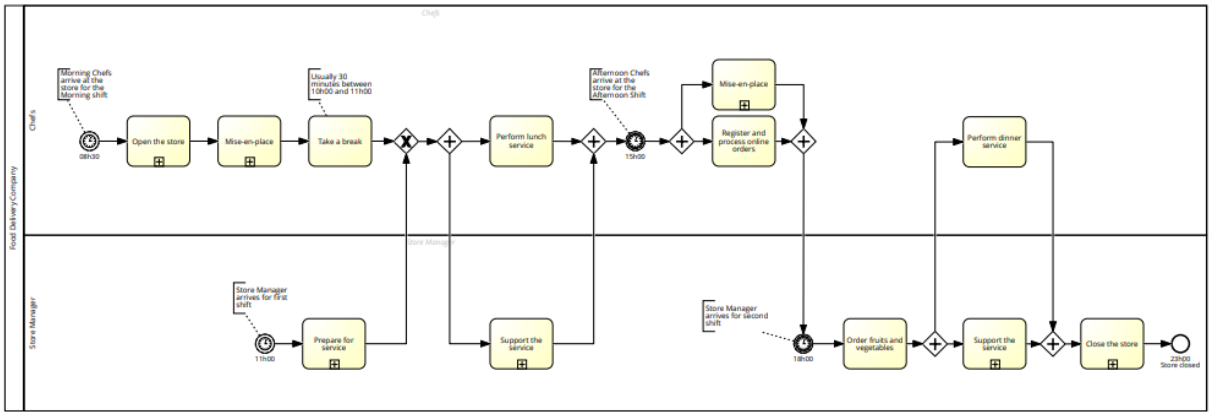

Figure 6 - "As-Is" Process Model: *Store Management* (Level 1)

4.3. QUALITATIVE ANALYSIS

For the Process Analysis phase, the focus is on the qualitative analysis, where four techniques will be utilized to identify waste and how activities are performing for the creation of value for the business. These techniques will be: *Value-Added Analysis*, *Waste-Analysis*, an *Issue-Register* Analysis and a *Cause-Effect* Analysis.

4.3.1. Value-Added Analysis

The *Value-Added Analysis* is a technique that meticulously evaluates each activity within a business process and categorizes the based on their contributions to customer value and business necessity. By distinguishing between Value-adding (VA), Business Value-adding (BVA) and Non-Value-Adding (NVA), organizations can identify inefficiencies and improvement opportunities very intuitively, and quickly become leaner. The following tables will provide the classification of each activity in every level of the selected business process, starting with the Level 1 process and following with every Level 2 subprocess.

The following conclusions provided for every process will be made for the most relevant activities in the process, or where an additional explanation may be needed to justify their classification. The classification will also consider the analysis objective of fully eliminating the NVA activities (Dumas et al., (2018).

Table 4 - *Value-Added Analysis*: *Store Management* (Level 1)

Activity	Performance	Classification
Take a break	Morning Chef	BVA
Perform lunch service	Morning Chef	VA
Enter the store	Morning Chef	BVA
Give the incoming Afternoon Chefs a briefing	Morning Chef	BVA
Leave the store	Morning Chef	BVA
Prepare for mise-en-place	Afternoon Chef	BVA
Register and process online orders	Morning Chef	VA
Order fruits and vegetables	Store Manager	BVA
Perform dinner service	Afternoon Chef	VA

For the Store Management (Level 1) process, the activities *Take a break*, *Enter the store*, and *Leave the store* were considered to be BVA, for the following reasons:

(i) *Take a break* (BVA) - believed to be essential for employee well-being and productivity, indirectly supporting the primary value-adding activities.

(ii) *Enter the store* and *leave the store* (BVA) - necessary for employees to start or end their work cycle and perform their daily duties, which translates into indirect value for the customer.

(iii) *Perform lunch service*, *Register and process online orders*, and *Perform dinner service* (VA) - These activities were classified as VA since they bring direct value to the customers by performing the *order-to-cash* service.

Table 5 - *Value-Added Analysis*: *Open the store* (Level 2)

Activity	**Performance**	**Classification**
Open and enter the store	Morning Chef	BVA
Register time of entry	Morning Chef	NVA
Confer shipment arrival notes of fish, fruits, and vegetables	Morning Chef	BVA
Contact supplier	Morning Chef	NVA
Schedule new delivery date	Morning Chef	NVA

For the subprocess *Open the store* (Level 2), the activities *Register time of entry*, *Contact supplier*, and *Schedule new delivery date*, were classified as NVA, based on the following considerations:

(i) *Register time of entry* (NVA) - This activity involves Morning Chefs manually recording on paper their arrival time based on the store clock, which is prone to inaccuracies and potential manipulation, thereby failing to reliably contribute to operational efficiency or value delivery.

(ii) *Contact supplier* and *Schedule new delivery date* (NVA) - Both activities stem from an undesirable path in an XOR gateway, resulting from the issue of receiving incorrect shipments. These activities do not add direct value to the customer and signify inefficiencies that ideally should not occur.

Although this subprocess does not have any VA activity, it is fundamental for the initiation of the Chef's work cycle and represents around 15 minutes of their workday.

Table 6 - *Value-Added Analysis*: *Mise-en-place* (Level 2)

Activity	Performance	Classification
Cook rice	Chef	BVA
Cool down cooked rice	Chef	BVA
Mix cooked rice with Su	Chef	BVA
Mix cooked rice periodically	Chef	BVA
Weight fish (Gross weight)	Chef	BVA
Register fish's gross weight	Chef	BVA
Prepare the fish for utilization	Chef	BVA
Register the waste	Chef	BVA
Wash fruit and vegetables	Chef	VA
Prepare fruit and vegetables for utilization	Chef	BVA
Organize the food exhibitor	Chef	BVA
Prepare sushi-rolls and miso soup	Chef	BVA

The *Mise-en-place* (Level 2) subprocess is based around the cooking and preparation of essential ingredients for use during lunch and dinner service. The activities presented are all BVA given their nature, except for the *Wash fruit and vegetables* activity (VA), as it directly enhances the quality and safety of the food served to customers by removing dirt, pesticides, and potential contaminants from food, ensuring that the meals are hygienic and safe to consume.

Table 7 - *Value-Added Analysis*: *Prepare for service* (Level 2)

Activity	Performance	Classification
Open the store	Store Manager	BVA
Connect and turn on systems	Store Manager	BVA
Turn on TVs with menu displays for walk-in customers	Store Manager	BVA
Validate orders received	Store Manager	BVA

Insert invoices from suppliers in the system	Store Manager	BVA
Check emails	Store Manager	BVA
Check inventory	Store Manager	BVA
Call the supervisor	Store Manager	NVA
Ask for resource transferring between stores	Store Manager	NVA
Order necessary stock	Store Manager	NVA

The *Prepare for service* (Level 2) subprocess does not directly have VA activities for the customers. Most activities are BVA, since they are routine for the Store Manager, which is essential for the beginning of the daily lunch service. The NVA activities presented are *Insert invoices from suppliers in the system*, *Call the supervisor*, *Ask for resource transferring between stores*, and *Order necessary stock*, based on the following considerations:

(i) *Insert invoices from suppliers in the system* (BVA) - The activity involves administrative tasks that are necessary for record-keeping, therefore, providing some value for the business.

(ii) *Call the supervisor*, *Ask for resource transferring between stores*, and *Order necessary stock* (NVA) - All these activities stem from an undesirable path in an XOR gateway, resulting from the issue of not having enough inventory stock in store. These activities do not add direct value to the customer and signify inefficiencies that ideally should not occur.

Table 8 - *Value-Added Analysis*: *Support the service* (Level 2)

Activity	**Performance**	**Classification**
Confirm items in each food box match the order	Store Manager	VA
Close food boxes for delivery	Store Manager	BVA
Hand boxes ready for delivery to the courier	Store Manager	BVA

This subprocess, although extremely simple, is a very important step in value creation for the customer, as it represents the first point of contact of delivering the order to the customer. The activities were classified as presented for the following reasons:

(i) *Confirm items in each food box match the order* activity (VA) - The Store Manager makes sure that the customer's order is accurate and complete, directly

contributing to customer satisfaction by guaranteeing that they receive exactly what they ordered.

(ii) *Close food boxes for delivery* (BVA) - This activity ensures that the food remains secure and uncontaminated during delivery. While not directly adding value to the customer, it supports the value-adding activity of delivering a complete and accurate order.

(iii) *Hand boxes ready for delivery to the courier* (BVA) - Although possible to make the argument of being an NVA activity, since it does not create value for the customer, it was classified as BVA, as it creates value for the business by facilitating the courier's job, making it a necessary step for the logistics of getting the order delivered.

Table 9 - *Value-Added Analysis*: *Close the store* (Level 2)

Activity	**Performance**	**Classification**
Receive cash payments and sales receipts	Store Manager	BVA
Turn off portable ATMs	Store Manager	BVA
Check cash values	Store Manager	BVA
Resolve the situation with the couriers	Store Manager	NVA
Order fish	Store Manager	BVA
Export Grids to an Excel file	Store Manager	BVA
Fill in "Sold Boxes Control" file	Store Manager	BVA
Register food waste for the day	Store Manager	BVA
Fill in the "Couriers Statistics" file	Store Manager	BVA
Fill in "Daily Sales" file	Store Manager	BVA
Fill in "Excel Cash" and "Excel Card" files	Store Manager	BVA
Fill in "Cash register" file	Store Manager	BVA
Turn off TVs and all the systems	Store Manager	BVA
Clean the store	Store Manager	BVA
Close the store	Store Manager	BVA

In the *Close the store* (Level 2) subprocess, most of the activities are BVA. Although very manual, repetitive, and prone to error, they are performed to ensure the store is properly shut down and prepared for the next day. These activities range from financial reconciliations and administrative record-keeping to physical cleaning and securing of the premises. The activities were classified as follows based on these considerations:

(i) *Resolve the situation with the couriers* (NVA) - This activity stems from an undesirable path in an XOR gateway, resulting from the issue of having received incorrect cash values from the couriers. This activity does not add direct value to the customer and signifies inefficiencies that ideally should not occur.

(ii) *Export Grids to an Excel file* & *others* (BVA) - The activities related to record-keeping are necessary for maintaining accurate records and facilitating reporting, which supports business operations. While not directly contributing to customer satisfaction, they play a vital role in internal processes, decision-making, and compliance. Although the process could benefit from automation and system integration to reduce unnecessary labour and improve efficiency, their classification as BVA acknowledges the importance of supporting business functions and ensuring data integrity.

4.3.2. Waste Analysis

The *Waste Analysis* focuses on eliminating waste from a negative perspective, Dumas et al. (2018). The following analysis was inspired by the principles laid out by the author Ohno (1988), who outlined several types of waste and emphasized the importance of identifying and eliminating it.

For the Store Management process, the activities that most represented waste were the following: (See Table 9 below)

Table 10 - Waste Analysis: *Store Management* process

Category	Type of Waste	Activity
Move	Transportation	The Store Manager fills documentation to send to Management at Store Closing
		The Store Manager receives Cash Payments and Sales Receipts from the Couriers
		The Store Manager requests inventory transfers between Stores due to missing stock
	Motion	Daily movement of the Store Manager in the store
		Daily movement of the Chefs in the kitchen

Hold	Inventory	The customer waits for the order to arrive
	Waiting	The Store Manager waits for the Couriers to arrive
		The Couriers wait for the orders to be ready to deliver
		The store waits for the stock to arrive
Over-do	Defects	The food products were poorly cooked or prepared
		The food products were poorly labelled
		Error in stock management
		Error in order processing
		The Store Manager cleaned the store poorly
		The Chefs washed ingredients poorly
		Correcting the situation of receiving wrong cash values from the Couriers
		Re-weighting fish and other products to register manually on paper
	Over-production	Food waste from unsold products
		Inventory costs with unsold products
		Food waste in order preparation
		Food waste of prepared orders that were cancelled by customers

The *Waste Analysis* of the Store Management process reveals inefficiencies regarding the *Move* category, namely *transportation* and *motion*. Specifically, the documentation prepared by the Store Manager for management at closing time, the receipt of cash payments and sales receipts from couriers, and the requests for inventory transfers due to stock shortages represent significant waste. These tasks involve unnecessary movement of information and resources, which could be streamlined through better inventory management and automated reporting systems. Additionally, the daily movement of the Store Manager within the store and the Chefs in the kitchen- although mandatory for the service to be conducted- highlights motion waste, where possible inefficient layouts and workflows can lead to physical fatigue. To address this waste, the store layout should be investigated to understand if it has margin

for optimization. Also, implementing more effective stock management practices and automating administrative tasks can be an important step to enhance overall operational performance.

Regarding the category *Hold* the analysis identifies significant inefficiencies related to *inventory* and *waiting*. More specifically, customers waiting for their orders to arrive, the Store Manager waiting for couriers, couriers waiting for orders to be prepared, and the store waiting for stock deliveries all contributing to waste. These delays end up disrupting the workflow, increasing the lead times, and reducing customer satisfaction. The waiting periods have a negative impact in all the process participants, and customers, making it very important that the Management Team tries to implement solutions, i.e., through real-time tracking systems that give a live feed of information to process participants, as well as a system that automatically receives the address of a customer from either the website or the *OutdareGo Delivery* system (or others) used in the store, and sends it to the assigned courier, reducing significantly the time it takes to start delivering orders, which is currently significant.

Lastly, the *Waste Analysis* uncovers issues related to the *Over-do* category, highlighting the *defects* and *over-production* inefficiencies within the process. The d*efects* arise from poorly cooked or prepared food, improper labelling, errors in stock management and order processing, insufficient cleaning by the Store Manager, inadequate washing of ingredients by the chefs, and the need to correct cash value discrepancies and manually re-weigh and record fish and other products. These *defects* lead to inefficiencies and rework, detracting from operational effectiveness and customer satisfaction. The *Over-production* waste is seen in food waste from unsold products, high inventory costs of unsold items, waste during order preparation, and food waste from cancelled orders. There is a great margin for improvement through training, better quality control measures, and inventory management optimization to significantly reduce defects and over-production waste and lead to more efficient operations, lower costs, and a better customer experience.

4.3.3. Issue Register

The *Issue Register Analysis* is a fundamental tool that provides a structured examination of key inefficiencies and challenges within a business process and prioritizes problems based on their importance for the business (Dumas et al., 2018).This analysis serves as a crucial step in identifying areas for improvement and guiding the implementation of targeted solutions to drive positive outcomes. (The Table 10 below will provide an “Issue Number” which will be helpful in the following analysis).

Table 11 - Issue Register Analysis: *Store Management process*

Issue Number	Problem	Priority	Description	Qualitative Impact
1	Errors in Shipment Orders of products	Very High	Frequent errors with supplier orders necessitate constant rectification	Operational delays, disrupted supply chain, and potential shortages of key ingredients, leading to decreased service quality and customer satisfaction
2	HACCP norms not respected	Very High	Non-compliance with food safety procedures, lack of labelling, verifying, or poorly labelled products	Severe health risks for customers due to potential contamination, legal repercussions for the business, loss of customer trust, and potential fines or shutdowns by health authorities.
3	Manual Data Entry and Documentation	High	Manual insertion of supplier invoices, exporting grids to Excel, and filling out daily performance documents	Manual task prone to errors, very labour-intensive, always extends the employee's remunerated working hours
4	Missing cash values	High	Discrepancies between received cash values delivered by the couriers and the invoices	Financial discrepancies, potential for fraud, and time-consuming reconciliation processes
5	Errors in Stock Management	High	Failures in inventory management of quantity and quality of products, leading to stock shortages and emergency cross-store transfers	Stockouts and overstock situations, resulting in lost sales, increased operational costs, and reduced customer satisfaction due to unavailability of products.

6	Waste from Over-Production and Defects	Medium	Unsold products, products with defects in preparation, and cancelled orders from customers	Increased operational costs due to wasted ingredients and resources, negative environmental impact, inefficiencies in production processes, and monetary loss from over-purchasing and improper demand forecasting.
7	Errors in the Weighting of Fish	Low	Inaccurate weighing of fish and other products	Reduced ability to accurately track and manage inventory, difficulty in assessing and optimizing the performance of chefs, potential for increased food waste, and inefficiencies in kitchen operations
8	Excessive Movement of Staff	Low	Inefficiencies in store layout and workflow design result in unnecessary daily movement of the Store Manager and Chefs	Increased staff fatigue, reduced productivity, and potential for errors in task execution

This analysis highlighted several key areas of inefficiency and waste and the qualitative impacts that arise from them in the *Store Management Process*. These issues should be addressed based on their level of priority and importance for the business, with targeted improvements and automation (where possible), to drive the company forward and enhance its operational efficiency.

To prioritize the implementation of solutions for these issues, a Two-Dimensional tool known as the *PICK* Chart will serve as guide. This analysis tool prioritizes the resolution of issues based on their *payoff-difficulty* relationship, which will make the next steps clearer for improving the day-to-day performance of the company.

4.3.3.1. PICK Chart Analysis

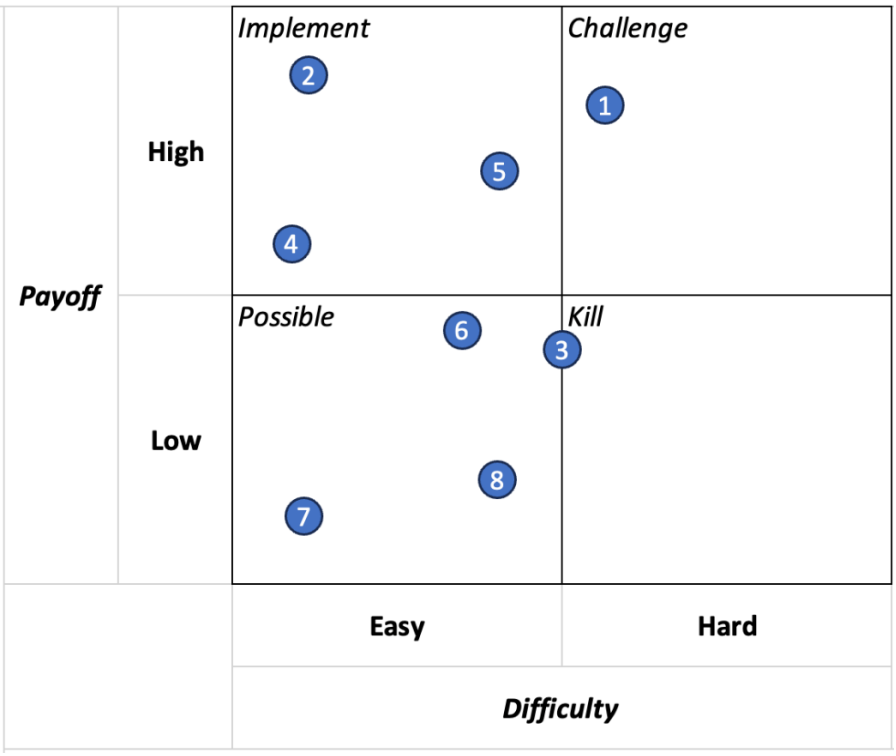

Figure 7 - *PICK Chart Analysis*

Figure 7 above demonstrates the relationship between how difficult it is to correct issues and the payoff potential that can be achieved from it. The issues are labelled below, and their distribution was made taking the following considerations into account:

1- **Errors in shipment orders of products:** This issue is very impactful, heavily disrupting the operational landscape of the company. Since one wrong shipment can ruin a whole day/week of production, fixing this issue would have a *very high payoff*. It would also constitute a *challenge*, as it is rather unpredictable and could mean it is necessary to change suppliers, which impose a risk on their own as they are not easy to find.

2- **HACCP norms not respected:** This issue is very impactful, as it poses a severe health risk for customers and is susceptible to legal repercussions. Fixing this issue would have a *very high payoff*, as the constant quality of products and services imposes great customer trust and retention overtime, and it is *quite easy* to do, focusing mainly on procedures to follow.

3- **Manual data entry and documentation:** This issue is impactful, as it poses unnecessary remunerated workload for the Store Manager and is very prone to errors. Fixing this issue would have a "medium" *difficulty*, as it only needs the integration of a system that can automate the procedures, although possibly expensive or hard to incorporate.

The *payoff* would be related to an increase in employee satisfaction and overall efficiency and consistency.

4- **Missing cash values:** This issue is impactful, as it happens somewhat frequently and leads to monetary problems. Fixing this issue is *very easy* to do by imposing more control and implementing a courier reward system. The *payoff* would be *good*, as it simplifies operations and reduces risk of fraud.

5- **Errors in stock management:** This issue is impactful, as it occurs occasionally but has very high logistical costs to correct. Fixing this issue would be *somewhat easy*, as it only requires better planning and management. The *payoff* would be *very relevant*, as it reduces waste, operational costs, and keeps products always available for customers to order.

6- **Waste from over-production and defects:** This issue is fairly impactful, as it represents waste of products and revenue. Fixing this issue would be *somewhat easy*, however, it is susceptible to production quality and customer's order cancelling rates. The *payoff* would be *relevant* for the business for increased efficiency.

7- **Errors in the weighting of fish:** This issue is slightly impactful, as it represents loss of efficiency and waste. Fixing this issue would be *very simple*, by purchasing better scaling systems and creating a grid system that stores the data retrieved. The *payoff* would be *low*; however, it can help measure performance metrics for each Chef based on their skills and how much waste they produce.

8- **Excessive movement of staff:** This issue is slightly impactful, as it represents physical fatigue for process participants and cumulative waste overtime. Fixing this issue would be *simple* in theory, by creating specific paths for each participant and coordinating their activities, however, in practical terms it could be *harder* to achieve due to the store layout. The *payoff* would be *low*, as it only contributes to some productivity improvements.

Taking the previous annotations and Figure 7 into account, it is clear that all but one issue is fairly easy to improve. The issues "2", "4" and "5" should have changes *implemented* right away due to their *payoff-difficulty* relation. The issues "6", "7" and "8" are *possible* and recommended for correction, as the cumulative improvement from "small" adjustments really pays off over time. The issue "1" is the hardest to correct, and it constitutes a *challenge* for the company that is unpredictable and subject to several factors. However, the relationship between the company and its suppliers can play a significant role in simplifying this improvement. Lastly, the issue "3" represents a trade-off between automation and its cost. Its correction could become *possible* or unfeasible ("*killed*") depending on those factors.

4.3.4. Root-cause Analysis

The *Root-cause analysis* is a critical methodology in process improvement designed to identify the fundamental causes of problems within a system (Dumas et al., 2018). As also mentioned previously, one of the most effective tools for root cause analysis is the Ishikawa (Fishbone) diagram, also known as the *Cause-Effect Diagram*. This tool visually maps out the potential causes of a specific issue and categorizes them into 6 groups: *Machine*, *Method*, *Material*, *Man*, *Measurement*, and *Milieu*.

In the context of the Store Management process, eight central issues were identified. However, this analysis will focus on the three hardest issues to overcome, as they are the ones benefiting the most from conducting a deeper analysis: Errors in Shipment Orders of Products, Manual Data Entry and Documentation, and Errors in Stock Management. The remaining five issues, although important, do not present significant barriers to improvement and can be addressed with less intensive interventions.

Although usually associated with the Ishikawa (Fishbone) diagram, this analysis will not use illustration representations to reduce visual cluttering and maintain clarity and conciseness. Instead, the focus will be placed on providing a written analysis which will address each identified cause of issues.

4.3.4.1. Cause-Effect Analysis

It is important to state that for each issue, there is no obligation for all proposed *6 M's* to be present, as sometimes only some factors contribute to making a process performed under expectations. The following analysis will provide several *causes* (or *factors*) that contribute to the respective issue (*effect*) to take place.

Errors in Shipment Orders of Products (Issue "1")- Errors in shipment orders that significantly disrupt store operations, leading to stock shortages, delayed deliveries, and customer dissatisfaction.

- *Method*:
    - Lack of a standardized ordering procedure.
    - Manual entry prone to errors.
- *Man*:
    - Inattention to detail.
    - Inadequate training on inventory systems.
- *Material*:
    - Outdated order forms.
    - Incorrect data from stock records.
    - Low-quality communication tools.
- *Machine*:
    - Inneficient ordering and inventory management software.

    - Lack of integration with inventory systems.
    - Frequent software malfunctions.
- *Measurement*:
    - Lack of inventory accuracy metrics.
    - No regular audits of stock levels.
    - Poor feedback mechanisms on inventory performance.
- *Milieu*:
    - Delays caused by supplier production or transportation issues.
    - Issues regarding missed pickups or delivery scheduling conflicts.

Manual Data Entry and Documentation (Issue "3")- Manual data entry and documentation inefficiencies can cause errors, wasted time, and operational delays which reduce productivity and increase the risk of inaccuracies in critical business records.

- *Method*:
    - Inefficient workflows.
    - Lack of standardization in data entry procedures.
    - Redundant manual processes prone to error.
- Material:
    - Outdated documentation tools.
    - Inadequate quality of data from forms and paperwork.
- Machine:
    - Inneficient software.
    - Lack of integration between systems.
    - Poor User Interface design.
- Measurement:
    - Lack of data entry accuracy metrics.
    - Lack of auditing of documentation processes.
    - No tracking of documentation errors.

Errors in Stock Management (Issue "5")- Errors in stock management lead to stockouts, overstock situations, and increased operational costs which disrupt the supply chain and impact customer satisfaction.

- *Method*:
    - Lack of a standardized inventory procedure.
    - Inadequate verification steps in stock management processes.
- *Man*:
    - Inattention to detail.
    - Miscommunication between staff regarding stock levels and safety procedures.
    - Lack of training on inventory management.
- *Material*:

    - Inconsistent use of inventory materials.
    - Incomplete or outdated inventory lists.
    - Inaccurate stock records.
- *Measurement*:
    - Lack of inventory management metrics
    - Inaccurate tracking of inventory discrepancies.
    - Poor feedback mechanisms on inventory performance.

The *Cause-effect analysis* identified several critical *factors* across multiple categories. Key issues mostly included inadequate training and miscommunication among staff, lack of standardized procedures, reliance on manual processes, inaccurate stock records, use of inefficient software or lack of an implemented software, disorganized storage areas, and poor management practices. To address these "root causes", the organization should implement comprehensive training programs, establish standardized inventory procedures, update inventory management tools and materials, improve storage area organization, enhance management oversight and support, and invest in better software and management procedures for optimal and efficient integration of their systems.

4.4. PROCESS REDESIGN

After conducting several qualitative analyses, various insights were gathered. These insights will serve as a foundation for improvement throughout subsequent redesign efforts. This chapter will regard the *Heuristics Process Redesign* methodology. During the redesign phase, the current state of the process, known as the "*as-is"* process model, will be transformed into a more efficient and improved business process, known as the "*to-be*" process model, which will be the point of focus for the rest of the document (please consult Appendix B).

4.4.1. Heuristics Process Redesign

During this chapter, several redesign heuristics will be mentioned, as well as their purpose and expected outcomes. The first heuristic applied to the "*as-is*" model regards the *task-level* of the business process, and it is called "task elimination", which focuses on eliminating tasks that are redundant or not needed in a business process (Reijers & Mansar, 2005). Every activity related to manually filling out documents in the "*Close the store*" subprocess was eliminated, given their exposure to errors and unconformities, as well as time consumption and fatigue for the Store Manager performing them. Eliminating these activities is expected to result in significant time savings, an increase in conformity with the company's data records, and reduced exposure to human error.

The second heuristic applied was "*parallelism*" (or parallelism enhancement), which regards the *flow-level* of the business process and encompasses the execution of activities in parallel when possible (Reijers & Mansar, 2005). During the *"Mise-en-place"* subprocess, despite

having several available chefs, the preparation of products for service was made sequentially, which meant every process participant was conducting the same tasks at the same time. These tasks were parallelized into three categories: "*Rice cooking*", "*Fish preparing"*, and "*Vegetables and Fruit preparing"*. This change meant that each of the chefs could perform a different task at the same time, as they did not depend on each other, allowing them to save significant amounts of time. Consequentially, the preparation of these items did not have to be repeated as often during service, meaning that the store was better prepared for lunch and dinner service, allowing for an also smoother and faster level of service for customers.

The third and last heuristic applied was "*process automation"*, which regards the *process-level* of the business process and encompasses the automation of manual and/or repetitive tasks to increase performance and reliability, as well as reduce cost and time of execution (Reijers & Mansar, 2005). The "*Open the store*" subprocess was initiated by chefs manually introducing personal information and time of entry by hand in two different sheets, one after another. By introducing a biometric system, the chefs only have to place their index finger in the device, which is already associated with their personal information and records (i.e., arrival time, departure time, average shift time). This information would be automatically fed to the store's system, allowing for tracking of performance, preventing fraudulent inputs, and increasing time savings for chefs, who will perform their duties with less contingencies.

In the "*Close the Store*" subprocess, the elimination of manual tasks was substituted by the integration of one of the most efficient cloud-based *ERP* systems, *PHC Go*, which allows for automatic invoicing, registration of sales data, tracking of courier's and supplier's delivery performance, client's and product's relevant information, monetary and financial records (among others), ultimately resulting in better stock management, sales performance tracking, and integration with accounting.

4.4.2. Other solutions

The Heuristics Process Redesign also served as a foundation for additional solutions, which aimed to further enhance the overall performance of the *Store Management* business process, by tackling issues found in the *Issue Register* analysis.

In the "*Store Management"* process, several changes were made, including the addition of a hygiene check before opening for service, a briefing for afternoon chefs to keep them updated with relevant information, and a checking of inventory status to better understand stock needs for dinner service. These changes aimed to increase conformity with HACCP norms and to reduce errors in stock management. Additionally, a new subprocess was created: "*Check Product Labels*", which aimed to verify if the products in stock were correctly labelled, stored, and still within desired levels of quality. This change meant that HACCP safety protocols and procedures were respected, allowed for fewer errors in stock management, as it was verified every day, and allowed for a reduction of financial- through fines during authority check-ups, or product waste- since poorly labelled products had to be thrown out to reduce risks of

contamination, as they are highly perishable in the context of this company. The subprocesses "*Mise-en-place*" and "*Prepare for service*" were also improved by adding hygiene procedures to make sure there are no nonconformities with levels of service and food safety. Additionally, the "*Support the Service*" subprocess saw an increase in efficiency and reduction in time of order preparation and delivery, as the store manager was attributed additional roles. Whether by adjusting in-store routes for process participants, assisting in handling orders from chefs to couriers, verifying invoices of orders before they are shipped to reduce errors and maintain customer satisfaction, or even providing a delivery address to the courier while they prepare for delivery, the store manager was able to provide more value to the process and help tackle previously existing issues. Lastly, the subprocess "*Close the store*" saw additional improvements (besides elimination and automation of tasks as mentioned above), to combat the issue of missing cash values through the implementation of a rewards system for couriers. The aim was to motivate them to comply with financial procedures and help track fraudulent events and personal performance. Additionally, a verification of existing stock and registered stock in the system was added every day, so the store starts tracking inventory performance and is better prepared for unforeseen events.

5. DISCUSSIONS OF FINDINGS AND IMPLICATIONS

After providing an analysis and subsequent redesign of the existing *Store Management* process through a qualitative approach, a fitting "*to-be*" was produced. This improved version of the process focused on correcting specific characteristics of the existing "*as-is*" process that were underperforming or negatively impacting the company. This BPM initiative provided extensive value for the organization, allowing it to overcome the complexities of the day-to-day business operations in an efficient and flexible way.

Similar to this BPM implementation, there are an abundance of BPM cases that showcase the benefits of this approach, and several resemblances are shared. Take, for example, a commonly known implementation of BPM in the world-renowned company SAP, which constituted a vital and essential step towards tackling the complexities that hinder its business operations, turning out to be fundamental not only for SAP but also for its customers (Reisert et al., 2018)The authors also revealed that the key success factors for a BPM implementation do not depend solely on how well it is made (although this is extremely important). They state that it also must be strategically aligned with top management support and understood among the organization from the bottom up for it to succeed.

Other BPM implementations seem to share similar insights. For instance, Czarnecki & Dietze (2017) conducted a BPM project at a leading Telecommunications Operator in the Middle East and identified additional critical factors. Besides process content and stakeholder involvement, the authors defend that it is very important to consider various BPM elements in process ownership and align them with a fact-based decision-making approach. Lastly, the case stated that general BPM governance and BPM methods are vital for achieving performance enhancements and leading to operational process improvements.

As observed by authors Leitz et al. (2018) in *The Case of Adler, a European fashion retail company*, several theoretical implications emerge that can also be applied to food delivery companies in the retail context. The case underscores the importance of setting realistic goals to manage expectations and highlights how constant support and involvement of process specialists ensures project alignment and success. Additionally, it reveals the necessity of balancing technological adoption with employee engagement, emphasizing a process-oriented perspective to gain employee buy-in and enhance overall BPM effectiveness. Furthermore, the authors alert that the adoption of new technologies (i.e., automation) should be done in a meticulous way, considering the economic viability of the change, and accounting for diverse factors such as risks and adoption by participants. In sum, the insights affirm that a strategic BPM implementation can lead to significant process optimizations and better service delivery.

Although not having a quantitative analysis, along with the many theoretical implications for the business, this project work also included some quantitative implications based on industry

benchmarks and information provided by the Management Team (including remuneration rates, number of users, wasted hours, and number and value of fines).

Table 12 - Quantitative Impact

Problem	**Solution**	**Investment**	**Quantitative Impact of solution**	**Result** **(QI-Investment)**
HACCP norms not respected leading to fines	Compliance with HACCP norms	-	**3500€ loss/year**	Around **3500€/year saved**
No standardized processes in operations lead to overtime remuneration	License acquisition and integration of an *ERP* System, *PHC Go Enterprise*	170€ * 12months = **2040€/year** (Allows for 8 users)	10€/h * 8h/week * 44 weeks = **3520€ loss/year**	3520€-2040€= **1480€/year saved**
Monetary losses through fraud of couriers	Implementation of a rewards program	100€ * 12 months = **1200€/year**	8€/day * 26 days = 208€/month 208€ * 12 months= **2496€ loss/year**	2496€ - 1200€ = **1296€/year saved**
Delays in store opening	Purchase of a biometric system with scanner, clock and integrated software	**150€ + 250€/year license**	1h/week * 10€ * 12 months = **480€/year**	480€ - 400€ = **80€ saved** in **first year**, 480€ - 250€ = **230€/year saved** onwards
Total Average Savings				**6506€/Year + 80€**

5.1. LIMITATIONS AND FUTURE WORKS

In the context of this food delivery company, it is natural to anticipate that the proposed changes might create some resistance at first, since some process participants have their own personal way of doing their tasks. This was first encountered during the discovery phase, where process participants conducted some tasks in an ad-hoc way without standardization or procedures to follow. In addition to not speaking a common language, which made it difficult to communicate, the employees also did most of their tasks manually, which lost significant amounts of time. The cumulative inefficiencies would always result in the declaration of an "emergency scenario" by most stores, which was caused by too many orders being stacked and inventory being sold out, mostly due to lack of preparation and standardization, resulting in delayed or cancelled orders, lost revenue, and last-minute stock transferring requests between stores.

Relatively to this project's scope, it is worth noting that it did not include the implementation and monitoring phases of the BPM lifecycle, nor a quantitative analysis- which was based on several factors. Firstly, there is no clear instance that triggers the start of the process, since almost every task is performed independently of orders being received throughout the day, meaning that without instances running, there is no process simulation. Secondly, its operational characteristics of having around 8-hour workdays meant that employees are required to be present for the entire duration of their shift, which imposes that efficiency gains are less impactful in reducing overall working hours since it mostly increased idle time outside of service hours or when orders were not being received.

The store faced several additional constraints that hindered an effective process simulation. For example, the store depended on external suppliers and randomly assigned couriers from food delivery companies whose performance couldn't be influenced or controlled. Additionally, the chefs' performance depended solely on their individual capabilities and skills, which couldn't be enhanced by the company, meaning that underperforming chefs were simply replaced. These limitations suggested that most process participants could not provide consistent data to conduct a relevant process simulation and therefore, an adequate quantitative analysis. Furthermore, even the only participants whose daily performance was relevant to simulate for quantitative purposes- Store managers- did not benefit as much from it, as they were expected to work their entire shift no matter how efficient they were. Therefore, this process benefited more from a detailed qualitative approach focused on the exploration of human interactions and behaviours, decision-making, operational nuances and quality of life improvements. These factors could all benefit the participant's working hours and were possible to control, translating into potential increased efficiency and revenue from processing more orders without issue.

In sum, the limitations of the company did not mean that it was pointless to conduct an analysis and redesign of its daily process. On the contrary, they enhanced how important it is to apply qualitative analysis methods that can identify controllable issues and correct them,

since it ultimately enhances the productivity and output of process participants by helping them conduct their responsibilities with better conditions efficiently and reliably.

Therefore, to achieve these improvements and make this redesign successful, it is fundamental that this BPM initiative sees a further process implementation phase and is constantly monitored to ensure that the proposed redesign recommendations and solutions are imposed and respected. Through involvement of process participants and iterative improvements, the *Store Management* process has every tool to become optimized.

6. CONCLUSIONS

In conclusion, this project work aimed to serve as one of the first applications of BPM in the retail industry, more specifically, the food delivery sector. This was conducted by utilizing an end-to-end BPM framework to optimize and improve one of the core processes of a Portuguese food delivery company. The specific Portuguese company was struggling with standardization, efficiency and flexibility, which led to the recognition of the need for process improvement in their challenging day-to-day store management process.

With the aim of discovering, analysing, and redesigning the company's business process, an accurate "As-Is" process model that described the current reality was designed. This process model was later analysed and reshaped to a "To-Be" model, representing the potential reality of a much better process model, including several redesign and improvement solutions with real-life implications. The proposed solutions considered the business limitations while providing both qualitative and quantitative value. This value will end up being as significant and relevant as the company desires, heavily relying on the commitment of process participants to being involved and taking the initiative further through implementation and monitoring. These last two phases of the BPM Lifecycle are proposed by Dumas et al. (2018), remain essential for a successful long-term BPM initiative, as their iterative nature of analysis and conformance checking allows for continuous adaptation of businesses to their ever-changing environment.

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7. APPENDIX A

"As-Is" Process Model

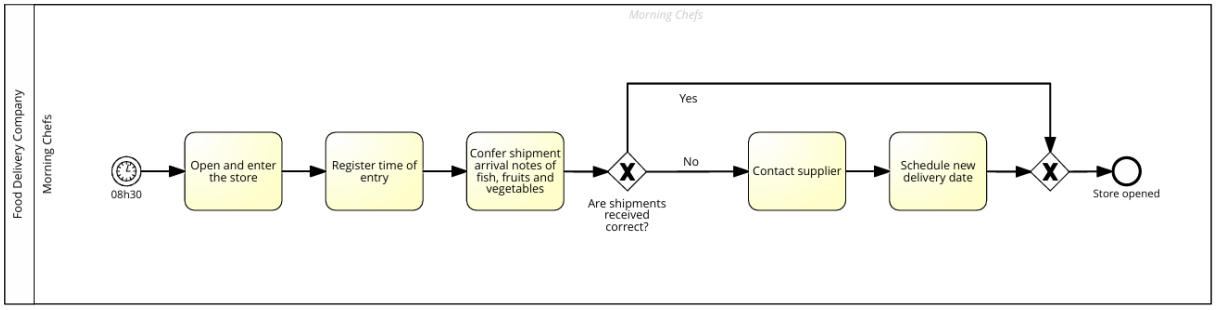

Figure 8 - *"As-Is"* Process Model: *Open the Store* subprocess (Level 2)

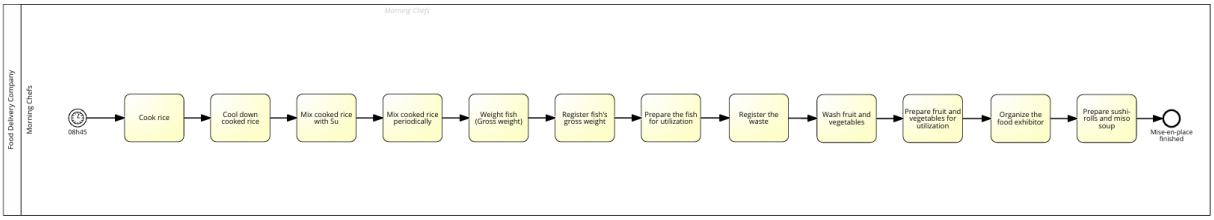

Figure 9 - *"As-Is"* Process Model: *Mise-en-place* subprocess (Level 2)

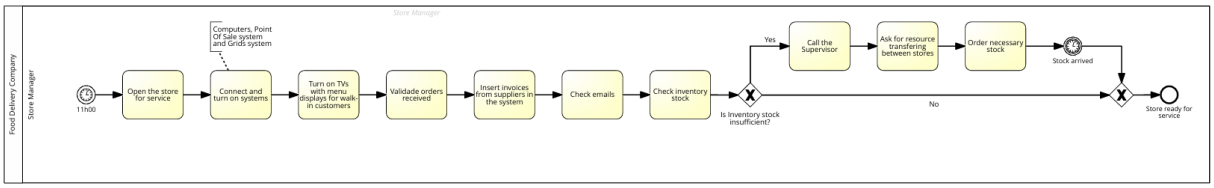

Figure 10 - *"As-Is"* Process Model: *Prepare for Service* subprocess (Level 2)

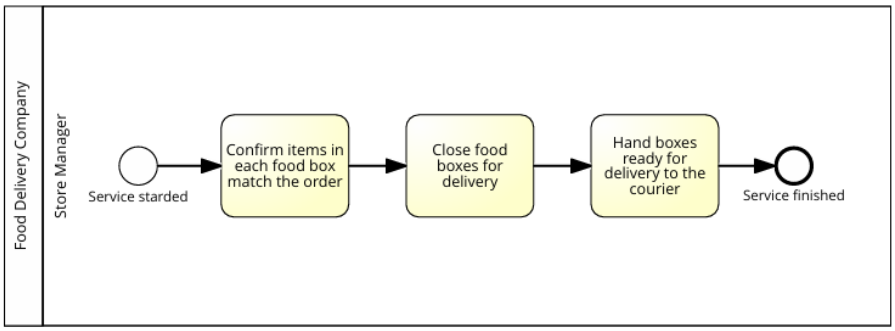

Figure 11 - *"As-Is"* Process Model: *Support the Service* subprocess (Level 2)

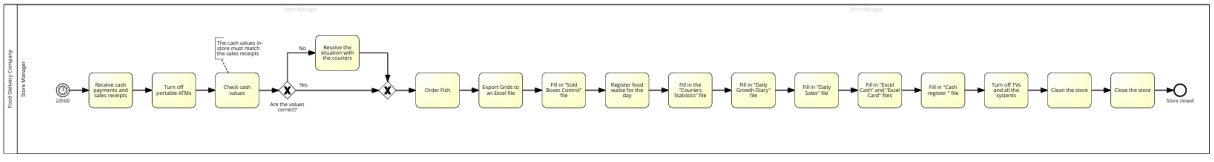

Figure 12 - *"As-Is"* Process Model: *Close the Store* subprocess (Level 2)

8. APPENDIX B

"To-Be" Process Model

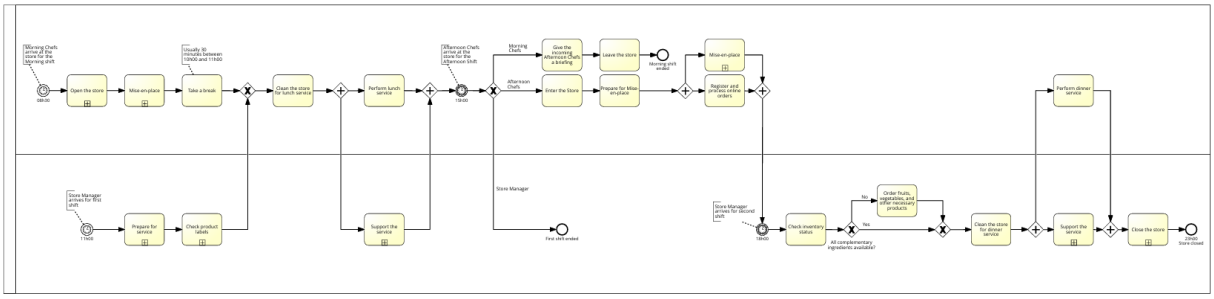

Figure 13 - *"To-Be"* Process Model: *Store Management* process (Level 1)

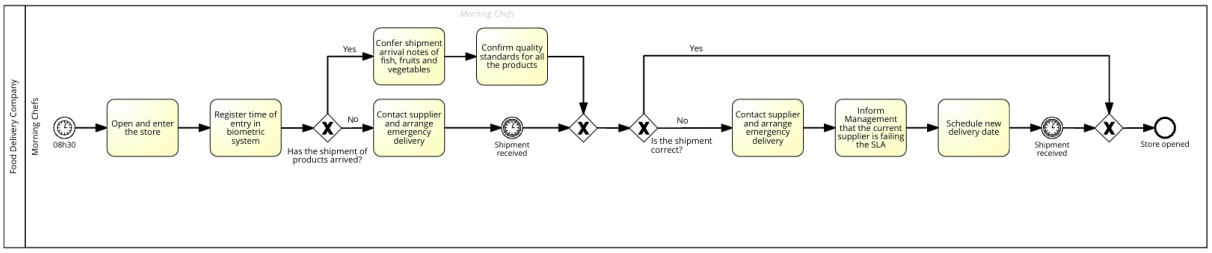

Figure 14 - *"To-Be"* Process Model: *Open the Store* subprocess (Level 2)

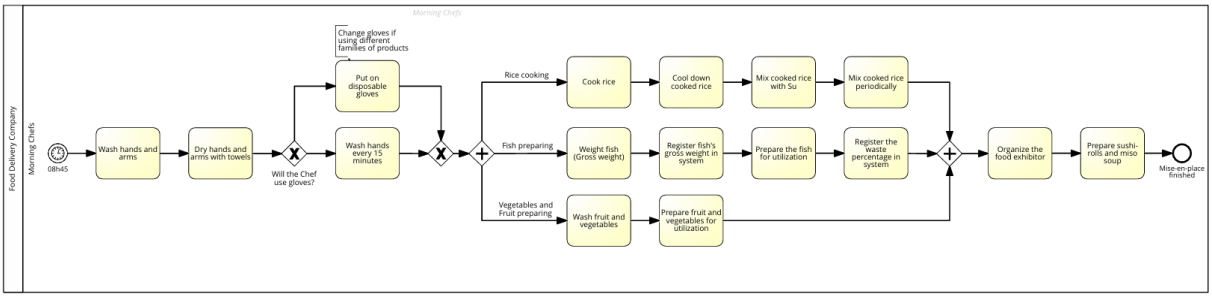

Figure 15 - *"To-Be"* Process Model: *Mise-en-place* subprocess (Level 2)

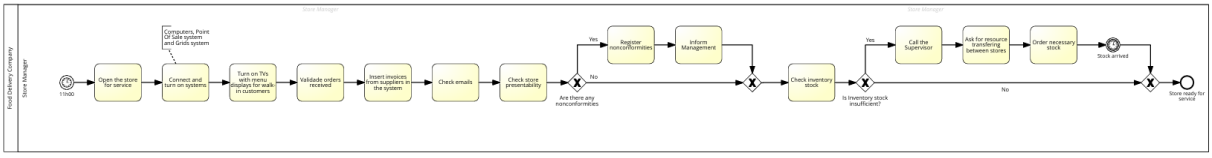

Figure 16 - *"To-Be"* Process Model: *Prepare for Service* subprocess (Level 2)

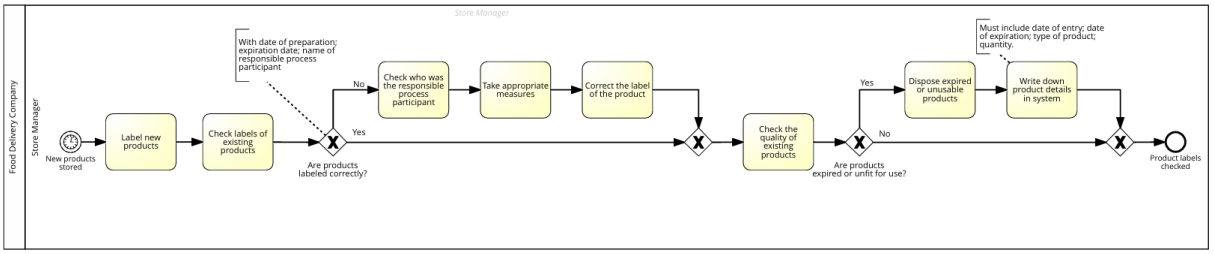

Figure 17 - *"To-Be"* Process Model: *Check Product Labels* subprocess (Level 2)

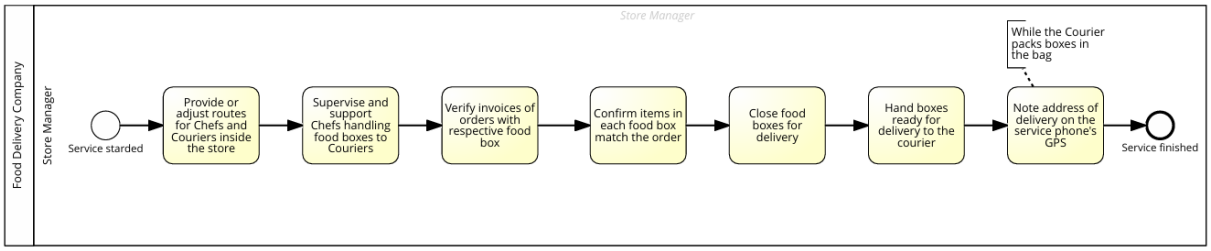

Figure 18 - *"To-Be"* Process Model: *Support the Service* subprocess (Level 2)

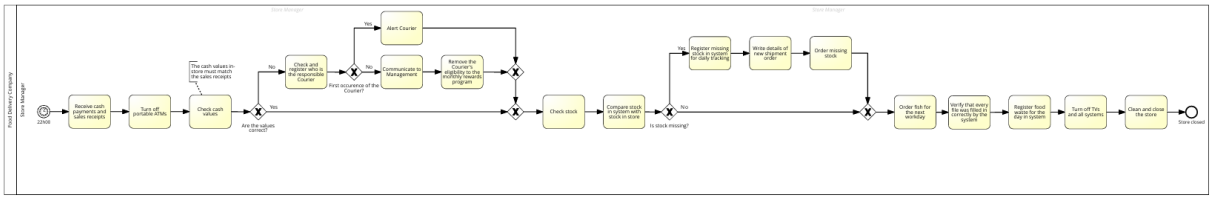

Figure 19 - *"To-Be"* Process Model: *Close the Store* subprocess (Level 2)

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