NOVA IMS Information Management School

MEGI

Master Degree Program in

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Operational Risk Management in a Shared Service Center

And a Business Intelligence Dashboard

Isabel Martins Saraiva

Project Work

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

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

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Operational Risk Management in a Shared Service Center

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Project Work presented as partial requirement for obtaining the Master's degree in Statistics and Information Management, with a specialization in Risk Analysis and Management.

Supervised by

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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, 12th July 2024]

DEDICATION

This project work is dedicated to my Father, my Brother and my Grandparents who, despite not being able to see me finish this stage, always believed that I would be able to make it to the end.

ACKNOWLEDGEMENTS

I would like to thank all the people who accompanied me throughout this year while I was developing this project, which represents the end of a cycle. Each one of them played an important role.

Thank you, Mother and Grandmother, for always showing me that, despite all the adversities, it is possible to overcome them and keep going without ever giving up. I would also like to thank all my family for their unconditional support.

Thank you to all my friends who always supported me and gave me the motivation to carry on despite the tiredness and obstacles I had to overcome, especially Soraia, Inês and Paula, who were always by my side.

Finally, I would also like to thank Prof. Afshin who helped me to be on the right track in carrying out this project.

ABSTRACT

In recent times, the importance of operational risk has increased, and there has been great progress in managing and quantifying it. Operational risk is present in all the company's activities and cannot be separated from the business or the company's objectives, so assessing its impact and how it influences the company's results is important.

This project presents the case study of a Shared Service Center where the implementation process is analyzed as well as the operational risk present in each operation. The challenges and some of the solutions already implemented are presented, and there is still room for improvement. As we can observe during this project some changes in different parts of the process had a significant impact in the company's results.

KEYWORDS

Operational risk management; Shared service center; Operational Risk; Artificial Intelligence

Sustainable Development Goals (SDG):

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LIST OF ABBREVIATIONS AND ACRONYMS

BCBS	Basel Committee on Banking Supervision
BI	Business Intelligence
EEM	Employee and Expense Management
ERP	Enterprise resource planning
FTE	Full-Time Equivalent
IP	Invoice Processing
SSC	Shared Service Center
StS	Source to Settle
SLA	Service Level Agreement
KPI	Key Performance Indicator
PO	Purchase Order
GR	Goods Receipt
IR	Invoice Received
OCR	Optical Character Recognition
POT	Paid on Time
HCP	Healthcare Provider

1. INTRODUCTION

A Shared Service Center plays an important role in the operations of various organizations, offering a variety of services, including Source to Settle (StS). The StS department covers activities related directly to the company's suppliers, from the acquisition of goods and services to their payment. One problem this department faces is the operational risks that can exist throughout the process and this project consists of analyzing the operational risks of the processes in order to make improvements and make it more efficient.

The company on which I am basing my research started operating as a Shared Service Center about a year ago, so we still have some improvements to make. The main objective of this research will be to analyze existing operational risks in order to optimize operations to reduce operational and/or financial risks to improve the efficiency and quality of the services provided by the department.

We need to understand how operational errors can directly impact financial risk and identify the main operational errors in the StS department so that we can develop or find solutions to reduce operational errors/risks.

Also, it would be important to provide a BI dashboard to show the employees the impact of their work in the company so that they can better understand the impact of what they do.

Therefore, this project's primary objective is to develop a BI dashboard that concisely illustrates operational risks and their impact on the company's financial risks.

The research questions for this project are as follows:

1. What types of operational risks are associated with the operations of a Shared Service Center, particularly in the Source to Settle department (StS)?
2. How might these operational risks translate into various forms of financial risks?
3. What Key Performance Indicators (KPIs) are suitable for assessing bot operational risks and the associated financial risks?
4. In what ways does a Business Intelligence (BI) dashboard present information to two distinct levels: managers and employees?

2. LITERATURE REVIEW

We commenced this report by conducting a comprehensive literature review of prior papers and research works. Then we will continue with more details about the business and our real experience with the company. We expect that with a combination of theory and experience, we will be able to offer a robust system and solution. This serves to establish a solid foundation for our subsequent actions and to address the research inquiries of this project scientifically. The systematic nature of this literature review will be the basis of the forthcoming chapters of this report.

To search the relevant papers and literature, the most used databases were Google Scholar and Scopus. The keywords used were: Operational Risk, Shared Service Center and Risk Management.

The main purpose of this combination of keywords is to find relevant research to understand the concepts of shared service center and types of operational risk associated with its operation. This will allow us to perform a correct analysis of the operational risk in the StS department of a Shared Service Center and present solutions to reduce and mitigate relevant risks.

2.1. SHARED SERVICE CENTER

2.1.1. CONCEPT OF SHARED SERVICE CENTER (SSC)

Shared Service Centers consist of bringing together various business units and departments of a given company in a single location, with the main objectives of reducing costs, improving the efficiency of all operational processes, and standardizing them. There is still no concrete definition for Shared Service Center, although many have similar aspects, we find a greater emphasis on reducing costs and increasing the quality of the service provided, for Schulman's view, we find a greater emphasis on reducing costs and increasing the quality of the service provided, while for Quinn the shared service centers serve to eliminate duplicate functions by promoting specialization. Bergeron's definition of a shared service center combines Schulman's and Quinn's concepts.

Below are the definitions of each author:

- Schulman et al. (1999: 9 "Shared services promote the concentration of resources that were previously dispersed throughout the organization, with the aim of serving multiple internal customers at a lower cost and with higher levels of service, with the ultimate goal of increasing the organization's corporate value and satisfying external customers".

- Quinn et al. (2000: 7) states that "shared services refer to the practice of sharing within an organization a set of common services, rather than having these same functions spread out within the organization, generating duplication".
- Bergeron (2003: 3defines a shared service center as "a collaborative strategy in which a set of existing business functions is concentrated in a new semi-autonomous business unit, which has a management structure designed to promote efficiency, generate value, reduce costs and improve service for the organization's internal customers, like a company competing on the open market".

Due to the existence of various interpretations for the concept of a shared service center, Schulz & Brenner (2010) drew up a definition, concluding that a shared service center is an organizational structure with the following characteristics:

- Consolidation of an organization's processes to reduce duplicate functions/processes.
- The main function is to provide support services.
- It is aligned with external competitors.
- Its main objective is to reduce costs.
- The focus is on internal customers.
- They are managed by a private company.

Still in the same study, Schulz & Brenner (2010) point out that the variety of definitions for this concept can be influenced by differences in the sectors in which they operate, the professional backgrounds of the different authors and the characteristics of the definition, which may be more suited to some contexts than others.

2.1.2. IMPLEMENTATION OF A SSC

As we saw in the previous section, one of the main features of an SSC is that it reduces costs, but if the company's internal processes are not well designed, this advantage can be compromised.

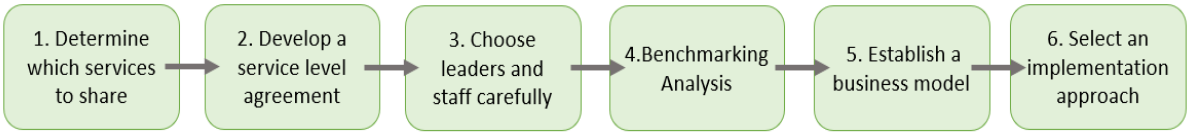

Figure 1 - Principles of Implementation, PWC 2015

As shown in the figure above (Figure 1), according to Pricewaterhousecoopers (2015), there are six fundamental principles for implementing a shared service center. The first principle is associated with the variety of services available and the need to choose organization’s desired service. It is also necessary to define the Service Level Agreement (SLA), which defines which services will be provided, according to the requirements, the quantity, the frequency, the costs for this activity, the time they will be provided and so on. This agreement between customers/suppliers and the company, in this case the service provider, is important to align

the interests of both. The success of a shared service center is directly linked to the quality of the services provided, which in turn is interlinked with the capabilities of the existing resources. In the third principle we address the importance of selecting your team leaders and managers, since they will be the ones who will have the most contact with the company's customers and suppliers and will play a fundamental role in the success of a shared service center. In order to analyze success in these dimensions, comparisons are often made with the market and known best practices. Benchmarking analyses examine performance indicators that are identified, used uniformly and shared with the entire organization, making it possible to harmonize the interests and motivations of all parties involved. There are various approaches to shared service center business management models. While some opt for a structure with just one defined leader, others prefer to distribute power among several managers, while responsibilities follow the same approach, some are centralized in just one person and in other cases there are policies for distributing responsibility. Finally, according to PWC's implementation principles, we have the choice of the process(es) to be implemented in the center. Once the decision has been made to implement the project, many organizations consider the correct procedure to follow: whether they should first implement the shared service center and then adapt the structure according to needs, or whether they should first design the entire structure and only then proceed with the implementation. We can therefore conclude that the implementation of a shared service center is very complex due to all the factors listed above (Pricewaterhousecoopers, 2015).

2.1.3. THE SUCCESS FACTORS OF A SSC

The success of a shared service center is directly related to its greater or lesser capacity to generate added value (Forst, 2001).

There are several success factors when implementing a shared service center, such as: management commitment, leadership power, technology to be implemented, trust, the people hired for the project, problem-solving capacity, objectives, continuous improvement, teamwork, change management, company culture, employee training, cost control, among others (Seixas, 2014). According to the same author, the factors that have the most impact are the commitment of management, the technology used, the people and the trust between project collaborators. Management must have the necessary skills and knowledge about the services provided by the shared service as well as all the processes and must look for the best technological tools to implement so that their employees can perform their duties well. It is also crucial to promote a positive, helpful, and productive organizational culture so that employees can feel safe and confident when carrying out their duties.

Other authors have identified the same or other essential factors for success (ACCA, 2002):

- **Communication skills**: these are necessary to involve and align all the parties involved in the whole process. Each party needs to understand all the information clearly to be able to carry out their roles successfully.

- **Levels of motivation**: This is a constant challenge, where it is important to keep everyone motivated.
- Building **team spirit** based on mutual trust between the parties.
- **Committed management focused** on quality service.
- **Investing in change and evolution** is essential to keep up with technological advances to provide high-quality services.
- **Employee skills and competencies** it is necessary to implement a process of continuous training, evaluation, and development of the staff, equipping them with the fundamental skills for the jobs they do.
- **Location** of the shared service center, due to factors such as access to qualified talent, value of operating costs, and time zone compatibility, among others.
- **Quality** of services provided;
- **Continuous process of reviewing**, updating, and adapting internal processes.

2.1.4. PROBLEMS AND DIFFICULTIES OF A SSC

During the implementation of a shared service center, the main problems and difficulties arise, which are usually related to technology, human resources, or sometimes the company's own culture. With regard to problems of human nature, a recurring difficulty is resistance to change on the part of employees who have been with the organization for longer and usually don't accept or understand change at an organizational level. The tasks that employees use to perform are changed or abolished in order to standardize and standardize tasks. Because of these changes, the older employees often don't take kindly to all these changes.

Another challenge lies in the ability to communicate, i.e. failures in communication or the inability to understand are often sources of problems throughout the organizational structure, preventing information from flowing clearly (Boroughs & Saunders, 2007).

Problems related to technological factors are concerned with the choice and correct use of enterprise resource planning (ERP). The purpose of choosing a particular ERP is to boost the efficiency, speed and simplification of all processes. Nowadays, this type of technology is built in a way that is adapted to each company so that each company can maximize the use of each technology (Boroughs & Saunders, 2007).

With regard to the difficulties related to the shared service itself, the most common is the definition of boundaries between the different departments in the organization. Duplication of tasks caused by the fact that sometimes the same process is carried out by two different teams with exactly the same objective or because the process is not correctly allocated to a particular department, and it is, therefore, unclear who is responsible for it. Situations can also arise in which a particular task or process requires the collaboration of other departments, and if the procedures are not well defined, each of them can carry them out autonomously, and the result can be incoherent (Fenema, 2014).

The quality of the services provided by the company is directly related to people management. If the company's employees are dissatisfied and unmotivated, the quality of the services provided will decrease, thus impacting the future of the company. Another difficulty is keeping people in the company because as tasks are very repetitive and learning opportunities are reduced, there are fewer possibilities for growth. With these conditions, we can say that the main challenge in people management is how to keep employees motivated (Lawler & Mohrman, 2003). Another problem is that as these costs are associated with cost-cutting, salary prospects are often reduced. To compensate for reduced salaries, centers often try to compensate for this "shortfall" with non-financial compensation such as flexible working hours, the company's own environment, or contractual security (Deloitte, 2007).

As in other companies, the first challenge of a shared service center is the idea of change, which leads to alterations in processes and routines and includes overcoming risks and complexities. The management of change must be very thoughtful, and the managers of each team must try to manage the expectations of their employees through clear and open communication, with training projects for the new tasks and consolidation of skills (Ernest & Young, 2013).

Table 1 - List of the main difficulties found in the literature.

Resistance to change	(Schulman, Harmer, Dunleavy, & Lusk, 1999), (Bergeron, 2003), (Boroughs & Saunders, 2007), (McCracken & McIvor, 2013), (Ernest & Young, 2013)
Standardization	(McIvor, McCracken, & McHugh, 2011), (McCracken & McIvor, 2013)
Quality of service	(Janssen & Joha, 2006)
Key Performance Indicators (KPI)	(Reilly, 2009)
Instability of steering	(Schulman, Harmer, Dunleavy, & Lusk, 1999), (McIvor, McCracken, & McHugh, 2011), (Quinn, Cooke, & Kris, 2000), (Reilly, 2009)
Employees	(Ulrich, 1995)
Resources used	(McIvor, McCracken, & McHugh, 2011)
Positioning and adaptation	(Goh, Prakash, & Yeo, 2007)
Implementation phases	(Bergeron, 2003), (Deloitte, 2014)
Process innovation	(Bergeron, 2003)
Lack of skills	(Ulbrich, 2006)
Communication deficit	(Schulman, Harmer, Dunleavy, & Lusk, 1999), (Boroughs & Saunders, 2007), (Ernest & Young, 2013), (McCracken & McIvor, 2013)
Reducing the company by eliminating functions	(Schulman, Harmer, Dunleavy, & Lusk, 1999), (Bergeron, 2003)
Staff rotation	(Fahy & Donovan, 1999)
Retaining talent	(Bergeron, 2003)
Mistakes made during implementation	(Boroughs & Saunders, 2007)
ERP selection mistakes	(Schulman, Harmer, Dunleavy, & Lusk, 1999), (Linde, Boessenkool, & Jooste, 2006), (Boroughs & Saunders, 2007), (Pinto J. , 2009), (Ernest & Young, 2013)

2.2. CONCEPTS OF RISK

2.2.1. DEFINITION OF RISK

As we observed with the shared service center concept, there is still no single definition for risk; the definition depends on the context in which it is inserted and the purpose for which we want to formulate the concept of risk (Chernobai, Rachev & Fabozzi, 2008).

While Gallati (2003) defines risk as a condition that is exposed to adversity, or an event where there is a possibility for a change in the expected outcome, Geiger (2002), defines risk not only as an "uncertainty about the future" or a "probability of sustaining a loss", but as "an expression of the danger that the future outcome will deviate from the expected behavior", as such, risk is measured by the probability and impact of a negative deviation.

Since there is no general definition of risk, we can only conclude that it varies according to the situation we are analyzing. However, we can also conclude that the definitions have elements in common, such as the possibility of there being more than one outcome and the loss it can generate.

2.2.2. OPERATIONAL RISK

Before determining the requirements to cover possible losses from operational risk and developing contingency plans, we need to understand the definition of operational risk (Pezier, 2003).

We cannot separate operational risk from the rest of the business, as it is related to all the organization's activities and can lead to financial risks, depending on the type of operational error.

According to the Basel Committee, operational risk is defined as the "risk of financial loss resulting from inadequate or deficient internal processes, people and systems, or from external events" (BCBS, 2006). And according to Mestchian (2003), it is necessary to specify which risks make up operational risk:

- **Process risks:** These relate to failures in the company's operating procedures and cover all the company's operations, from sales to product development, technology, human resources, etc.
- **People Risks:** related to human error on the part of employees, disabilities during the process, illnesses or absences of employees, and problems with compensation and contract terminations.
- **Risks of the system:** includes all system failures, degradation, information quality, and the integrity of existing data.

- **External Risks:** These are related to the risk associated with losses caused by the actions of third parties, such as socio-economic factors, changes in regulations and the behavior of competitors.

As we don't have a formal, agreed definition of risk, the same applies to the definition of operational risk. King (2001) says that operational risk is associated with the way the company conducts its activities and not with the way it finances them; Moosa (2007) says that operational risk consists of the possibility of losses due to a wide variety of events; Chaudhury (2010) points out that it is specific to each company and, unlike market risk or interest rates, greater exposure to operational risk does not mean that you will be rewarded with a higher return. Culp (2002) also points out that this is such a broad concept that it can be found anywhere. Therefore, the best strategy is not to identify all operational risks, but rather to recognize the most significant risks that could impact the company's value.

Although there are many possible definitions of operational risk, in this thesis, we will use the definition of the Basel Committee on Banking Supervision (BCBS), already mentioned above: "risk of financial loss resulting from inadequate or deficient internal processes, people and systems, or from external events".

The Basel II Accord defines the guidelines for determining the cost of capital based on direct losses, considering indirect losses as opportunity costs. They also indicate the degree of expectation of each loss: **expected** or **unexpected**. Expected losses are those that happen more frequently, such as employee errors, and unexpected losses are those that, as the name suggests, are not easily predictable, such as a war or a financial crisis. They also give importance to the type of danger, event, and loss, distinguishing them as follows: the **danger** is the factor that increases the likelihood of a particular event happening, the **event** refers to a single incident that causes one or more losses and the **loss** is the amount of financial damage that a particular event has caused. Finally, they also talk about the **severity and frequency** of the loss, which can be classified into four main categories, as can be seen in the figure below (Figure 2).

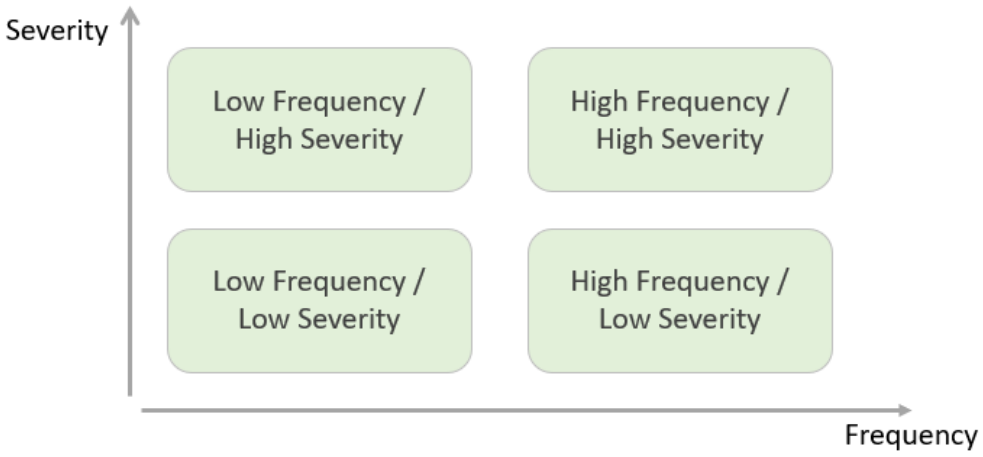

Figure 2 - Relation between frequency and severity.

2.2.3. OPERATIONAL RISK MANAGEMENT

Operational risk management is not an end to achieve a means, but rather a management support tool to help the company achieve its objectives (Christl & Pribil, 2006).

Risk management should be an active, strategic and integrated procedure, that includes risk assessment and mitigation, in order to optimize the value of an institution while reducing financial risk (Schroeck, 2002). The objectives of operational risk management should focus on preventing, reducing, and transferring risk (Kingsley, Rolland, Tinney & Holmes, 1998). The BCBS (2021) also suggested **twelve Principles** for good operational risk management, of which we highlight the four most important:

- An effective leadership structure is fundamental, as they are responsible for implementing and changing risk management policies, processes and systems and must demonstrate commitment to a risk management culture.
- Organizations must create and implement effective internal controls and strategies to reduce exposure to operational risks.
- Organizations must be able to identify, assess and manage operational risk events in order to avoid significant adverse impacts.
- Organizations must also ensure that everything is done in compliance with existing laws and regulations and be transparent about operational risk management practices to maintain stakeholder confidence.

In short, an effective risk management process should help the company to establish an overall risk policy in which it identifies which risks are accepted by the company, identifies which risks are real and which are potential risks in the future, assesses the likelihood and impact of the risks identified and determines which risks the company should avoid (Roggi, Damodaran & Garvey, 2012).

2.3. IDENTIFYING RISKS IN THE STS DEPARTMENT

Hull (1992) states that it is important to identify risks before any kind of action is taken, i.e. during the implementation phase of a given project. He also points out that it is important that this identification also takes place at a later stage of the project to develop contingency plans for the risks that may exist.

In this project, we're going to take a more specific look at the operational risks in the Source-to-Settle (StS) department of a Shared Service Center that is about two years old and won't complete its migrations until April 2024. Before moving on to identify possible risks in the StS department, it is important to note which part of the process this department is. The StS department is subdivided into 3 teams, Invoice Processing, Payments and Employee and Expense Management, which essentially deals with the entire process related to the acquisition of materials and services needed for production.

Operational risks can be defined as the probability of losses resulting from failures in internal processes, people, systems and even external events. As in this case we're talking about operational risks in the StS department, these can manifest themselves as errors in the purchase of material from suppliers, delays in payment, incorrectly processed invoices, and so on.

The risk factors in this department include:

- Human errors: the possibility of human errors must always be considered, such as errors in entering or not entering the material, errors in processing the invoice or even incorrect approvals.
- Supplier risks: Dependence on certain suppliers can create significant risks, such as delays in delivery, price fluctuations and sometimes, due to a previous error that has not been resolved, the stoppage of production.
- Technologies and systems used: Failures in the system used to process invoices or purchase orders, failure to integrate the two systems which often leads to delayed payment of invoices.

In a shared service center, the operational risks can be translated into various forms of financial risks since the main role of the center is to provide critical services to all the stakeholders of the company. Bellow we have listed some of them:

- Service Disruptions: Operational disruptions, like system failures, can lead to the interruption of services, resulting in financial penalties or loss of revenue.
- Errors and Inaccuracies: Operational errors in transaction processing can lead to financial discrepancies. These can result in customer disputes, potential losses or regulatory fines.
- Process inefficiencies: Inefficient processes can increase operating costs, reduce profitability, and hinder cost-saving initiatives.
- Vendor risks: Dependency on external vendors can expose the center to service interruptions or supply chain disruptions, affecting service delivery and financial performance.
- Resource management challenges: Staffing issues or turnover can increase recruitment and training costs and have an impact on operational efficiency and financial performance.
- Technology Obsolescence: Obsolete technology can reduce efficiency improvements and drive up IT expenditures, which in turn can affect competitiveness and overall financial results.
- Business continuity risks: Disruptions from natural disasters or pandemics can lead to downtime, lost revenue, and recovery costs.

The management of the operational risks is crucial to maintain the financial health of the company and ensure the success in the long term of a shared service center.

Overall, mitigating operational risk is essential to protect the financial health of an organization and to sustain long-term value creation. By proactively identifying and addressing operational risks, organizations can minimize the likelihood and impact of associated financial risks.

2.4. KEY PERFORMANCE INDICATORS (KPI'S)

In any team of a Shared Service Center, it is also important to the develop measures to assess the performance of the team and the employees; the more important ones are the Service Level Agreements (SLA) and the Key Performance Indicators (KPIs).

The SLA is a contract or agreement between the service provider (the SSC) and its customers. The SLA should include what services are provided and under what conditions, as well as the quality dimensions agreed between both parties. Examples of these service quality dimensions that are regularly included include the frequency of service delivery, response time or compliance with deadlines (IMA, 2000).

On the other hands, develop process performance measures is a key aspect of any system or project that has the continuous improvement of behavior and performance as one of the foundations of its existence. These performance measures help to develop the SLAs and price agreements with customers, and also make it possible to measure the success of the SSC and the performance of its employees.

So, the base to develop process performance measures are the KPIs that are used to communicate the results of the company or its employees and to understand if the SSC is creating any added value and if it's aligned with the strategy of the company. It is, therefore, essential that this process is carefully designed and managed to ensure that the KPIs selected are capable of truly reflecting the SSC's objectives and strategy.

Ante et al (2018) states that: "KPIs are a set of quantifiable and strategic metrics in a performance measurement system that reflect a company's critical success factors". For them, the appropriate selection and a better understanding of the KPIs can help the company to achieve the desired success.

Parmenter (2007) believes that KPIs are a set of metrics focused in critical aspects of the company's performance that are essential to its success. He stated that KPIs inform about what needs to be done to increase the performance and that these need to be reviewed on a daily or weekly basis.

For Parmenter (2007) the KPIs have the following characteristics:

- Non-financial metrics (not expressed in any type of currency).
- Used by the leadership teams.
- Helps the employees to understand how their tasks are measured and what needs to be done to achieve better outcomes.

- Assign responsibilities.
- Have a significant impact (for example, that affects the majority of the critical factors);
- Have a positive impact (that affects all the metrics in a positive way).

To conclude, Parmenter's performance indicators should be simple, non-financial, and reviewed on a regularly.

With this literature review, we can recognize the following KPIs as suitable for assessing both operational and financial risks:

Operational Risk KPIs:

- Errors Frequency Rate: number of operational errors in a determined period.
- Process Accuracy Rate: Percentage of transactions processed accurately without any kind of errors.
- SLA compliance: Percentage of transactions completed within the agreed SLA.
- Employee Training Hours: Number of hours spent on training related to risk management, compliance, and operational procedures.
- Process Complexity Index: Measures the complexity of operational processes, which can increase the possibility of errors or delays.

Financial Risk KPIs:

- Cost per Transaction: Average cost to process each transaction.
- Revenue Loss Rate: Percentage of potential revenue lost due to errors during the processing transactions.
- Cash Flow Accuracy: Accuracy of cash flow forecasts compared with the actual cash flows.
- Accounts Receivable days outstanding: Average number of days it takes to collect payments from customers.
- Accounts Payable Turnover: Average number of times accounts payable are paid during a specific period, indicating the liquidity and financial health.

Operational and Financial Risk KPIs:

- Error Cost Analysis: Calculation of the financial impact of operational errors.
- Risk-Adjusted Cost Efficiency: Efficiency of operations considering the costs and the associated risks.
- Control Effectiveness: Assessment of the effectiveness of internal controls in mitigating operational and financial risks.
- Process Resilience Index: Measurement of the ability of processes to withstand disruptions and minimize financial impacts.

By monitoring these KPIs in a shared service environment, organizations can better understand the relation between operational and financial risks and implement targeted risk management strategies to enhance performance and reduce potential negative impacts.

3. METHODOLOGY

To continue answering our research questions and find the best solutions, we need to understand how operational errors can directly impact the financial risk and identify the main operational errors in the StS department so that we can develop or find solutions to reduce or mitigate the operational errors/risks.

Also, it would be important to show the employees the impact of their work on the company accounts so that they could understand better the impact of what they do.

So, we need to know the answer to the following questions:

- What are the main operational errors in the StS department?
- How the financial risk can be directly impacted by operational errors?
- How the technologies used impact the department and its operations?
- What strategies does the department need to adopt to mitigate the operational risk?
- How can the company/managers promote awareness of operational risks and implement training to reduce them?

In order to answer these questions and provide a possible solution to reduce the operational risk, the methodology approach used in this project will be a root cause analysis to identify the main operational errors of this specific StS department, applying Risk Mapping, SWOT Analysis, and suggesting a risk mitigation framework with the employing of new technologies.

Before the analysis of the measures, it's important to give a context about the company in the study for this project.

The Shared Service Center in question belonged to the portfolio of another company in the same area, and in June 2022, they started to prepare the split between the two. Like in all the splits, it was necessary to hire new people and re-allocate the ones who were already working there before the total split.

Before each deployment[1] is important to do prepare the migration of data and the processes to the new system. Between June 2022 and April 2024, we were able to migrate 118 entities to this new shared service center in 4 different moments:

- Pilot: 18 entities in February 2023.
- D2: 48 entities in July 2023.
- D3: 18 entities in November 2023.

D4/D5: 34 entities in April 2024, these 2 deployments were at the same time.

[1] Deployment is the term used to define the implementation of processes, systems, or solutions within the centers.

For this specific project, we will only analyze the European entities that are in total 69 and that were migrated in all the deployments. In the graph below (Figure 3) we can see the number of entities per deployment:

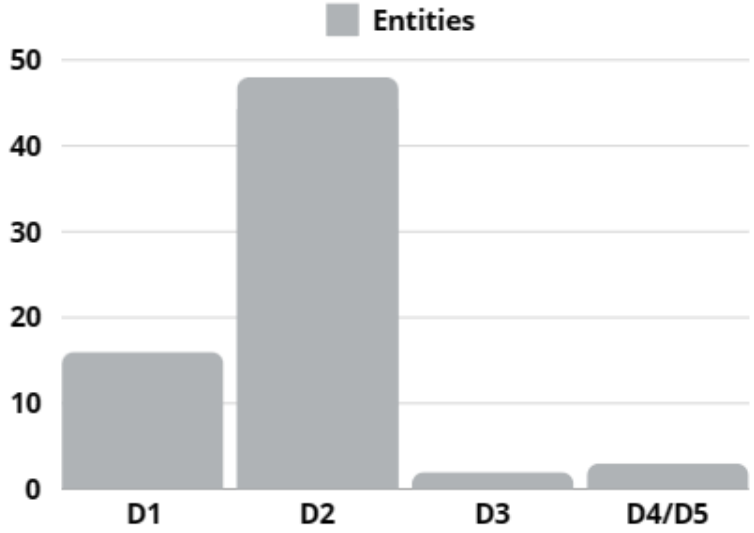

Figure 3 - Number of entities per deployment.

3.1. MEASURES USED TO IDENTIFY THE OPERATIONAL RISK

As already mentioned above, the risk factors for the StS department are divided into three: Human errors, supplier risks and the technology and systems used. In the company in study, we can find two different systems when we talk about invoice processing, one of them in only used to process all the invoices of each entity and manage purchase orders related with services and indirect material and the other is SAP where we have all the invoices and purchase orders approved and integrated from the system previously mentioned.

To measure these three factors, we will use the following variables:[2]

- Human errors: The number of invoices that are posted with errors that need to be corrected in the future.
- Suppliers risk: Critical vendors and how often the invoices are submitted late because the supplier didn't send them in time to be processed before the payment date.
- Technology and systems used: The quantity of integration errors of invoices.

3.1.1. HUMAN ERRORS

In the company in study, the team that submits the documents to be approved and paid is an outsourcing team that was contracted to provide that service.

We have two methods of invoice submission: manually or by a supplier. In both cases the invoice submission is a manual process in which the user needs to fill in all the necessary fields,

[2] The data to measure these variables is from the 1st quarter of 2024.

such as invoice number and date total amount, currency, PO number, quantity (if it's a document related to goods) to be invoiced or base amount (if the document is related with services), tax code and tax rate as well as attach the pdf file of the document that is being processed. In the case of the outsourcing team, they also need to fill in the supplier and the entity number.

As the name indicates, human errors are related to user errors. As this is a very manual process, it is very likely that there will be errors during processing. The most common are typing errors, especially in the invoice number, the quantity invoiced and the invoice date. Since this field is filled in automatically, and if it is not changed to the correct invoice date, the payment date will not be calculated correctly.

To correct the fields mentioned above, we need to do an internal correction, which consist of re-posting the same document but doing the opposite accounting movement (i.e., if the incorrect document is an invoice, to reverse it, we need to post a credit note and vice versa) and then re-posting the initial document correctly.

In this topic, we will analyze the number of internal corrections made during the first quarter of 2024 to try to measure this risk.

Any document that had to be posted twice due to some kind of processing error is designated an internal correction. There are some reasons that could lead to an internal correction, but before enumerating them, it is important to note that sometimes, depending on the method of entry of the document into the system, we are unable to edit the information to the correct one, so that an internal correction would be necessary.

The main reason for the internal correction is that some invoices are approved or submitted with wrong details, and they are only noticed after the document is fully approved and integrated into SAP.

During the first quarter of 2024, 30 000 documents were submitted to the processing system. The total number of corrections found, only represents 2% of the total number of documents submitted that were approved, rejected or disputed to the supplier. From this sample, we are excluding all the documents that, have not yet been submitted to the approval process despite being in the system.

In Figure 4, we can see the number of invoices submitted versus the corrections found in each month.

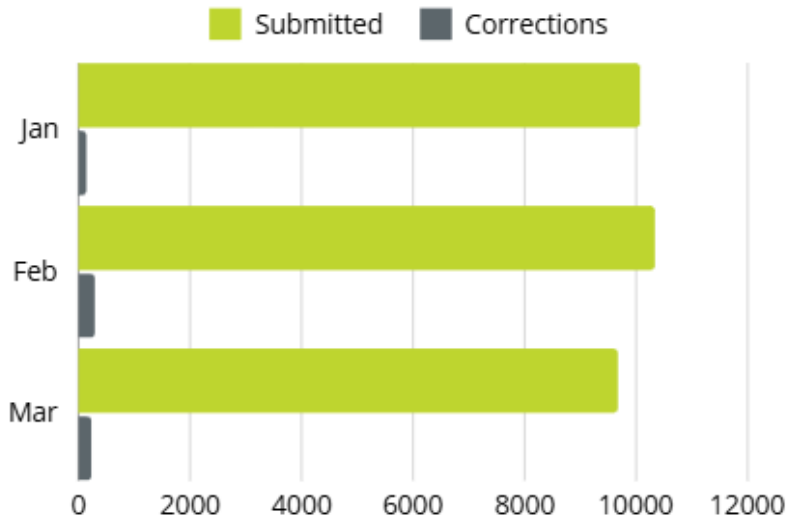

Figure 4 - Documents submitted vs the number of corrections.

Although the number of corrections is not very significant when compared to the total number of documents, as it is a completely manual activity, it can be very laborious and time-consuming.

Reversing incorrectly accounted for documents is a necessary activity to ensure that, in terms of auditing, the documents are properly processed on the company's side, and that the accounting movements are properly recorded so that they are correctly reflected in the company's accounts.

This is an activity that must be done carefully and correctly as there are operational risks associated with it, such as:

- Possibility of additional errors, since each reversal represents a new document and therefore represents another opportunity for new errors to be introduced, especially if the process is not well designed and controlled.

- Inconsistency in the entries in the supplier's account if the reversals are poorly done or poorly documented, which makes it difficult to reconcile and audit the documents.

- Loss of confidence on the part of the market or the supplier in the case of recurring reversals.

As such, although it may seem like a simple task, extra attention needs to be paid when it is being carried out.

3.1.2. Suppliers Risks

In the company we are analyzing, suppliers can register on our system, and instead of sending us the document by email, they can submit it themselves and see its status in real-time.

Besides that, we have some suppliers designated as ‘critical suppliers’ who, if anything fails with them, can prejudice the production of the company’s products. So, to prevent this from happening, we need to give more attention to these suppliers in order to prevent a possible stop in production.

When discussing suppliers’ risks, we cannot limit ourselves to a possible stop in production. If the documents are paid consistently after the payment date, we can lose the supplier’s trust, and they may extinguish the contract with us.

To ensure the payment date is according with the contract, all the supplier’s information and documents need to be in concordance. It’s important to have the information of the suppliers the most updated to the date, the most important ones being the IBAN account to perform the payment, the VAT registration to have a correct tax treatment, and if a supplier changes their name, this change needs to be reflected in the company’s system.

Although all the information described above is the most up-to-date, sometimes it doesn't go well, and sometimes it doesn’t go well due to the processing of the documents to be paid that are late or incorrect. The reasons the payment didn’t occur as planned are: the invoice was sent without enough time to be processed, the invoice had an integration error and the invoice is not integrated so it can’t be paid, or there was a posting error that needs to be corrected before the payment (these errors could be related with the quantity invoiced, the date of the document that leads to a wrong payment date or even the payment terms were not accurate between the two systems).

In the graph below (Figure 5) we can see the number of documents paid that arrived in our system overdue and on time, leading to payment delays and complaints via email or tickets from the supplier or the local market:

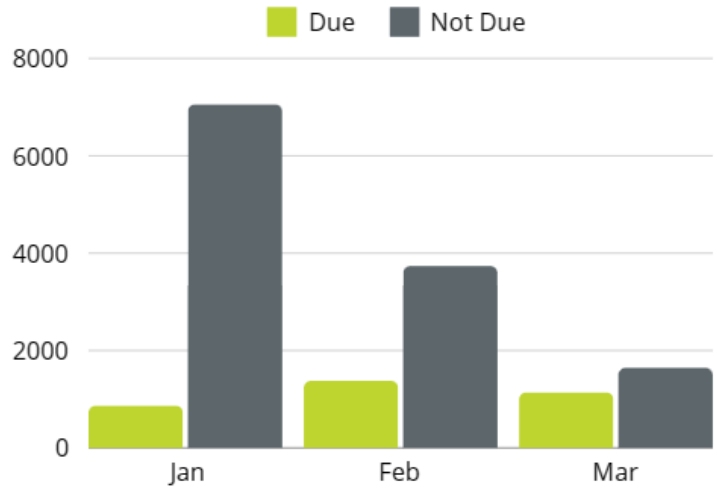

Figure 5 - Number of documents processed during the 1st quarter of 2024.

During the first quarter of 2024, almost 16,000 documents were paid, and less than 4,000 arrived after the due date. When we look at the overall picture, it doesn't seem like a bad

metric, but in fact, it represents 25 per cent of the documents that were paid during the first three months of 2024, which is not good.

Efficient and timely handling of all documents is very important for the good functioning of the financial and operational processes of a shared service center, as well as any other type of organization. The following aspects need to be considered:

1. Impact on operational efficiency: Delays increase the total processing time, which negatively affects the rest of the process.
2. Compliance Risks: Depending on the type of documents, delays can result in non-compliance with the contracts established, which can result in fines or other penalties.
3. Financial impact: Processing delays can affect the company's cash flow and its ability to make certain payments or even receive revenue on time.
4. Customer satisfaction: The delay in processing documents, in a majority of times, also means a delay in paying for them, thus affecting customer satisfaction as they are not receiving payment on the agreed dates.
5. Perception of professionalism: Consecutive delays can give suppliers the impression of a lack of organization and efficiency, which ultimately affects the organization's reputation.

To improve this situation, it is important to identify the causes of the delays and implement corrective measure.

As mentioned earlier, the documents to be processed reach the processing system in two ways: via the supplier, who registers on our system and can submit their documents via a specific platform, and they are automatically stored in the processing system, or via email, which directs these documents to a specific inbox, where an outsourcing team will submit all these documents manually.

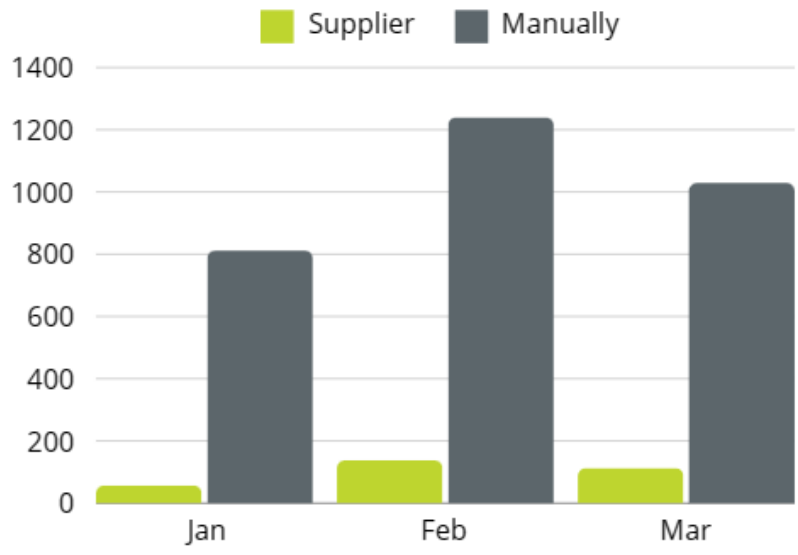

Figure 6 - Documents already due by type of entrance method.

In the graph in the figure above (Figure 6), we can see that the majority of documents that came in overdue were submitted manually, which could mean two things: the team doesn't have enough capacity to submit all the invoices that arrive in the inbox every day or that the supplier is sending documents that are already overdue.

In short, although most invoices processed late are submitted manually, the supplier itself is also submitting invoices late and should be warned in order to avoid delays in processing and, consequently, in payment. Regarding the team that is responsible for submitting all invoices that arrive via email, it is important to implement some measures to improve this process to avoid further delays, such as:

- Training and awareness: Ensure that this team has the necessary knowledge to carry out this task and understands the importance of meeting deadlines.

- Tracking and metrics: Implement monitoring methods to identify problem areas or underperforming employees within the team.

- Process automation: Study the possibility of developing software using AI to automate part of the process and speed it up to reduce existing delays.

3.1.3. TECHNOLOGY AND SYSTEMS

To measure this risk variable, we analyzed the quantity of integration errors during the first quarter of 2024.

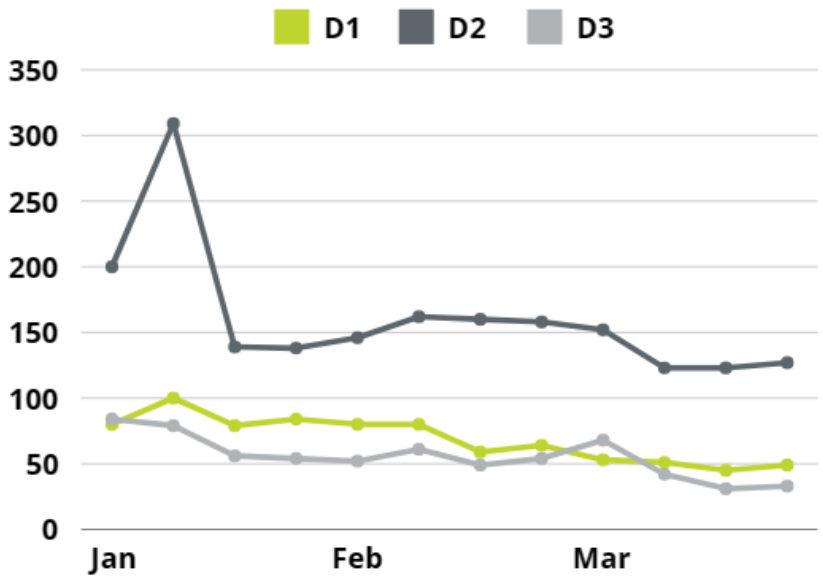

Figure 7 - Evolution of Integration errors during the 1st quarter of 2024.

The graph above (Figure 7) represents the number of integration errors of the entities of each deployment.

We can observe that the numbers of deployments one and three are very similar however the number of entities in both deployments is very different. The number of entities in deployment one is sixteen, and for deployment three, we are only analyzing the integration errors of two entities, so doing the proportion of errors we can conclude that the number of integration errors per company is higher in the third deployment, when comparing it with the first.

About the second deployment, the amount of integration errors is very high when compared to the other two deployments. However, there are two factors that contribute to it: the number of documents processed is bigger, and the total of entities is much more than in the other deployments. In this deployment, we count almost fifty entities, and in the other combined, we only count with twenty entities; this is one of the reasons why the numbers are so different. As the number of entities is higher than in the other buckets of countries, the number of documents processed is higher as well, so this could be another reason to justify the difference between deployments.

We have several types of integration errors: tax-related, the budget of the orders, credits processed before the invoice or allocated to the wrong line items due to the order having the integration error as well, and the IBAN field not correctly populated, among others.

During this first quarter of 2024, we had a change in the system and due to that there was an increase in the errors related to tax, because the commodity that defines the tax rate and tax code of the posting is not correctly chosen or because the system is not catching the tax code in the moment of the posting. The main reason this happens is the chosen commodity in the purchase order, which in most of the time is not the correct one. In this case, if commodity is not correctly chosen we have two different situations that could happen: the tax rate and the tax code are not the correct ones, so before being approved, pass by the tax team, and in the majority of the time is solved and does not result in integration errors or the tax rate is correct but the tax code is missed by the system, and these cases do not pass by the tax team and result in integration error.

Also, the errors related to the budgets of the orders have been increasing during this time because the forecasting of the items ordered was not correctly done, so the requesters have not considered some price increases or the correct quantity to be ordered during the all year, besides that as the year of 2024 had just started some of the budgets haven’t been updated in the proper time to processed the documents. There is also another reason that relates to the fact that some documents from 2023 haven’t been processed during the year, so when we pass to 2024, some of those orders have been closed when the document arrives in our system, it will fail because the budget is not available anymore.

The majority of the cases related to credit documents are due to the fact that some invoices are allocated to old purchase orders that are not present in the current system, so when the credit is submitted and allocated to a new purchase order, it will fail the integration. The other

reason is the cases related to price differences, which, due to a limitation of the system, we are not able to process in the same way as the invoice. Lastly, we have some cases in which the credit was not allocated to the same lines of the purchase order as the invoice, so if those lines don't have enough amount to deduct the credit, it will fail as well.

The errors related to the IBAN not being correctly populated are specific to one entity that has a specific payment method. To these invoices be paid, two fields need to be correctly filled in when the invoice is submitted; if these two fields have fewer characters than are supposed to, the system will recognize it, and it will fail the integration. Most of the time, this kind of errors are made by the outsourcing team hired to submit the documents or by the supplier that forgets some digits or does not know how to field it in the submitting time correctly. This integration error is directly related to human error because, depending on the submission method, this can lead to an internal correction, and the invoice needs to be submitted again.

3.2. THE IMPACT OF THE ERRORS IN THE IP TEAM

As we have already identified, there are three variables to measure operational risk: human errors, supplier risks, and system and technology. All these errors and risks have a major impact on the Invoice Processing team at the Shared Service Center under study, as all problems go to this team to be resolved as quickly as possible.

As such, all operational errors can lead to tickets for the invoice processing team at a shared servicing center. Delays in processing can result in additional contacts from suppliers, while processing errors and regulatory non-conformities can generate complaints and audits, leading to more tickets. Just as delays in processing lead to more tickets, documents with integration errors also generate a lot of tickets as the invoice is not fully processed and does not go out for payment.

All these tickets impact the entire team's daily tasks, as they need more time to respond to all the requests that appear daily.

4. RESULTS AND SOLUTIONS

4.1. DUPLICATE PAYMENTS

Because we are always in a time of transition and data migration, we encountered the problem of duplicate payments. Some documents were not being picked up in the control previously done. To solve this problem, we created a new BOT[3] with more evaluation parameters, to catch more documents that could be potential duplicates.

Besides the duplicate documents (which were submitted twice), we were having another problem with urgent payments. An urgent payment is only made when a document is needs to be paid but it's not yet integrated into SAP. This type of payment is only made in very specific cases, such as overdue documents from utilities, rents, payroll and any invoice that has been overdue for a long time and is not yet in SAP due to integration errors.

In this new program, we added parameters such as: document date and value are the same (negative or positive amount), the result is a possible duplicate, if the document reference has 3 or more of the same characters, it is a possible duplicate, and if the values are the same, the program also recognizes it as a possible duplicate.

This program runs daily, and the file with the potential duplicates is sent to the invoice processing team at the shared service center to be analyzed. Once all the lines have been analyzed, the file is saved in a specific folder where the program will read the comments column. If this is marked as 'not a duplicate', the program will no longer mark those documents as possible duplicates the next time it runs.

With the implementation of this new control and this program in production environment, we have managed to reduce the number of duplicate payments to practically zero.

4.2. PAID ON TIME REPORT (POT)

The Paid On Time Report is a monthly report in which we can we can analyze the percentage of payments made within the payment date.

In addition to showing the percentage of documents paid, we can compare the previous months and analyze whether there are any disparities or significant changes between them, finally concluding whether we are complying with the pre-established contracts with suppliers.

In the previous chapter, we only analyzed paid invoices that arrived in the system after the due date, while in this report, we analyze all invoices that were paid after the due date.

[3] A BOT, short for robot, is a software application that performs automated tasks over the internet.

However, there are more reasons why payment is processed after the due date. We can find listed below the reasons for a payment to be processed after the due date:

1. Human errors: Just as there can be errors in the processing of documents, payment terms can also be wrong in the PO used in posting, or even if the contract has been updated and no one has made the change request in the supplier account.
2. Workload: Due to excessive workload, many documents cannot be processed in time, which consequently leads to payment delays.
3. Technical problems: As mentioned above, integration errors also tend to lead to delays in payments. The very functioning of the system used to run payment proposals can lead to delays in payment since if, for some reason, this program fails to run, it can lead to certain documents being paid late**.**
4. Delays in approval: Some entities require additional approval from the market for the documents to be paid with each payment proposal, and they often ask for certain documents not to be paid in the correct period, which also contributes to late payments and an increase in open documents on the supplier's account.
5. Payment Policy: Internal policies that prioritize or withhold payments of documents at certain times of the year for presentation of results and also the fact that certain payment terms are not flexible, i.e., documents with immediate payment are almost impossible to process and pay for exactly on the day they are issued.
6. Parameters established for the payment proposal: in the SSC in study, when the payment proposal is run, documents that are due that day and documents that are due two days later are picked up. If a document is due at the weekend and the last proposal is on Wednesday, the document that is due on Saturday will already be due when it enters the payment proposal.
7. Inadequate communication: Lack of effective communication between the Shared Service Center and the Local Market or suppliers can also lead to invoices not being received or paid after the due date.
8. Rejection of payments: Once the proposal has been made and approved, the payment can still be rejected due to inconsistencies in the supplier's account (i.e., Payment method defined), bank audits, and the bank's own policy.

The implementation of automation solutions, continuous staff training and improved communication both internally and with suppliers are essential steps to mitigate these problems.

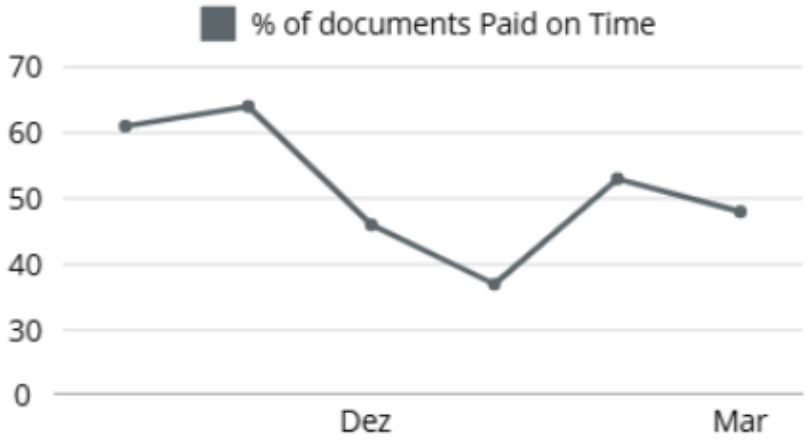

Figure 8 - Variations of POT

In the graph above (Figure 8), we can see the variation in the POT over the last two quarters, from October 2023 to March 2024. Throughout these six months, the percentage of payments on time has undergone several changes, with a sharp drop being observed from November to January.

In November, a parameter was changed in the payment proposals, and we went from picking up documents that were due up to 8 days after the day of the payment proposal to up to 2 days after the day on which the proposal runs. Bearing in mind that in this shared service center, payment proposals only run on Mondays and Wednesdays, with this change we will only pick up documents that are due by Friday of that week, so anything due over the weekend, for example, will already count as paid out of time. This change was reflected in the POT for December, so we see the first big drop.

In December, payments were only made for 15 days to very specific suppliers of utilities, rent, government and HCP. This halt in payments was due to working capital, which aims to improve forecast the organization's capital inflows and outflows in order to better manage the company's monetary resources. Because of this brief stoppage, many documents became overdue and were subsequently paid out, so there was a further decrease in documents paid out on time.

During the 1st quarter we also saw a slight increase, as payments resumed as normal, and the invoice processing team was more concerned about processing everything on time. However, in February, the invoice processing team started spending more time on documents with integration errors and managed to resolve many of them, which consequently affected the POT, as most documents entered the system overdue.

These figures are impacted by several factors, already mentioned above, and despite them this metric should ideally be around 80% to 85%.

4.3. BLOCKED FOR PAYMENT FUNCTION

During the first quarter, together with the BT team, the block for payment function was studied and implemented directly in the processing system so that when it is integrated into SAP, the block is already applied and does not enter the payment proposal.

This development has been implemented for use mainly with invoices paid by urgent payment so that they don't enter the payment proposal and get paid twice. Now, whenever an urgent payment is made, one of the mandatory verifications is to check if this block is done in the processing system.

With this development, the team have been able to better control the invoices that are paid via urgent payment and ensure that the same document is not paid twice.

4.4. MULTIBANK ACCOUNT SELECTION

Another concern about paying for documents was that you couldn't choose your bank account in the processing system. Often what happened because the bank account could not be chosen when processing the document was that it ended up being paid into the wrong account, which led to returned payments, an increase in the number of tickets and consequently a delay in payment.

To solve this problem, a new field has been implemented where we can see the last 4 digits of the IBANs and choose the one that appears on the invoice. With this new implementation, we can guarantee that all documents are paid into the correct account.

4.5. DASHBOARD

As already mentioned above, in the company in study we have a system to process all the invoices and only after being approved by all the approval chain the invoices are integrated in SAP so that can be paid accordingly with the net due date.

As we were having a lot of tickets for the majority of the entities, asking for the status of the invoices and if they were paid or integrated in SAP, the Invoice Processing Team, together with the IT team, developed a dashboard in Power BI with the status of all invoices that are still pending in Coupa, which are, the ones that for some reason are still pending approval by someone on the approval chain, or that got rejected by requester or disputed directly to supplier.

In this dashboard, the market can search by entity, reference, and supplier and can see if the document is still pending approval, rejected, or directly disputed with the supplier.

In this dashboard leadership teams can get an overview of the number of documents being processed during chosen time intervals and make informed decisions to improve the team's

functioning and performance. Some of the points that the leadership team can observe in the dashboard:

1. Overview of the main KPIs for all companies, regions, or entities, enabling real-time monitoring.
2. Informed decision-making with clear information, leaders can make decisions more quickly based on observed facts and trends.
3. The leadership team can identify problems more quickly, such as delays in processing, as well as opportunities for improvement.
4. Facilitate communication within the leadership team with stakeholders, presenting transparent and visually intuitive data.
5. Monitor progress in relation to the targets set and adjust strategies as necessary to ensure that objectives are achieved.

However, we still haven't managed to get this dashboard to update automatically, which requires some manual work that, although not difficult, takes a lot of time since the number of lines to update is quite high.

As this dashboard was taking a lot of time for the team, we improved the dashboard in Power BI to a tool that is available to all the company employees. This tool is a webpage that was launched in January 2024 that connects both systems, the invoice processing system and SAP, and allows any employee to see the status (draft, pending approval/receipt, rejected, disputed, approved and paid) of each invoice in real-time, simply by filling in the document reference.

With these two tools, we've reduced the number of tickets that come into our team and the teams before us, asking only for the status of a particular document and the payment date.

4.6. OCR TO REDUCE POSTING ERRORS

We are now developing an OCR[4] in order to automate some repetitive tasks while following the business guidelines. This OCR is still at a very early stage, and the invoice processing team together with the BT team is still studying how to do it and what tools will be needed to put this tool into practice.

The aim of OCR is to reduce human errors, especially in documents submitted manually by the outsourcing team. For this OCR, Certain fields have been defined to be filled in automatically to avoid any kind of error during processing.

This OCR will read, the PDF and fill in certain fields directly in the processing system, such as Document number, invoice date, PO number, total amount, Supplier name and VAT ID. This

[4] OCR stands for Optical Character Recognition.

will not only reduce processing errors but also cut down on the time it takes the outsourcing team to submit each document since most of the fields will already be filled in.

4.7. INTEGRATION ERRORS

As mentioned above, the company under study uses two systems: one used solely for processing invoices and purchase orders for services or indirect materials, and SAP, where we have all the documents once they have been fully approved and all the purchase orders.

Integration errors happen after full approval when the document is trying to move from one system to the other.

Until the beginning of January, these documents were not being tracked, and it was the SSC StS team that had to open an incident for the IT team to analyze and resolve.

Since January, in order to keep track of all the documents that have not been integrated into SAP, the IT team extracts a report every two days from the invoice processing system. This report is first analyzed by this team and, depending on the type of error, the documents are assigned to the corresponding team, after which the report is sent to all the teams with the respective divisions.

Analyzing this report is still very manual because it's an Excel file in which we have to analyze each line and add a comment with the respective analysis if it hasn't been resolved.

At the moment, we have managed to reduce the number of integration errors since we have discovered the main cause of some of them and the reasons for them. We are collecting all the errors that appear and preparing a file with a description of them, why they happened, and what resolution should be used.

As we only finalized the migrations of all entities to the SSC and the new system in April, we are now improving the system and implementing improvements to make the processing system more efficient.

4.8. IMPLEMENTATION OF KPI'S

Until the beginning of 2024, the StS department's Invoice Processing team did not have implemented or well-defined KPIs, but they were designed and implemented during the first quarter of the year.

Four KPIs were then implemented to assess the performance of each team member according to the entities they were assigned, so that performance is measured in the same way across all employees depending on the volume of entities they are assigned.

To measure the performance of each employee with regard to invoices pending approval and/or rejected, an excel file was built, which is updated twice a week where we can see the progress of each team member. In this file, we can see the number of pending invoices

according to the entities assigned to each team member, as well as their progress throughout the week. It serves as a support for the team, as we can see which entity we need to focus on first due to the existing volume, and it's also good for the leadership team as they can see if the entities are well divided by the team or if there are employees who have entities with more volume compared to the rest of the team.

Another KPI that was implemented in this team was the number of tickets handled and closed by each employee. Tickets are records of orders/requests or tasks that have to be carried out by other teams and also provide support to guarantee an adequate response to the initial request. As such, they play a fundamental role when it comes to communication and collaboration between teams and suppliers/customers. As new requests come in every day, this is one of the daily tasks of the Invoice Processing team and is, therefore, a good way of measuring the performance of each individual and of the team in general.

Just as entities and operations were migrated to the shared service center, all the documents that were already posted and/or blocked in the system used previously were also moved to the new ERP that is used now. Due to the heavy workload, these documents from the other system ended up being left behind, and the number of open items increased over time. As this is a task that should be being carried out, they implemented a performance indicator that consists of dealing with the overdue open items by means of a target imposed by the Team Leader according to the existing time buckets and the entities allocated to each one.

There is also a KPI that ends up being exclusive to 'Specialists' because it is related to the GRIR activity carried out only by people in this hierarchical position. The GRIR activity consists of analyzing all the POs with GR's (material receipt) available and understanding why we still have that entry open. This can happen for various reasons: posting error, document integration error in SAP, document pending approval, or if the invoice is not yet in our system. As with the KPI mentioned above, in order to measure everyone's performance in this task, a target was set for each time bucket according to the number of open lines for each entity.

KPI's were also implemented in the outsourcing team hired to submit documents to the processing system to evaluate the tasks carried out by them and also to try to reduce errors.

The following KPIs have been implemented for this team:

- Average document processing time: to measure operational efficiency, the average time it takes this team to submit each document and the average number of documents submitted per day were measured.
- Processing Error Rate: To identify whether documents are being submitted correctly and the quality of the processes, a report was developed to audit around 15% of the documents submitted by this team.
- Cost per Transaction: To evaluate the financial efficiency of operations and to understand whether the cost vs. benefit of using this outsourcing team is favorable for the Shared Service Center.

With these KPIs implemented in the outsourcing team, the leadership team of the StS department and the SSC can see the operational efficiency of this team, assess the type of mistakes made by the team, for example, if the majority are making the same type of mistake, then training is needed, and also the quality of the work carried out by this team.

It is also possible to understand whether the existing FTE's[5] are sufficient for the existing backlog, assessing whether it is necessary to hire more employees and comparing the cost vs. benefit of using this team, determining whether the company's investment in the outsourcing team is justified and an added value for the SSC.

4.9. DASHBOARD WITH ALL THE RESULTS

Using a Power BI dashboard in a Shared Service Center (SSC) can bring several advantages in terms of visibility, operational efficiency and data-based decision-making.

This thesis is not only about operational risks in a shared servicing center, but also about how various systems work and are interconnected. In order to better analyze all the data collected, I built a dashboard[6] using Power BI, where we can analyze all the data in a more visual, interactive and easy-to-understand way.

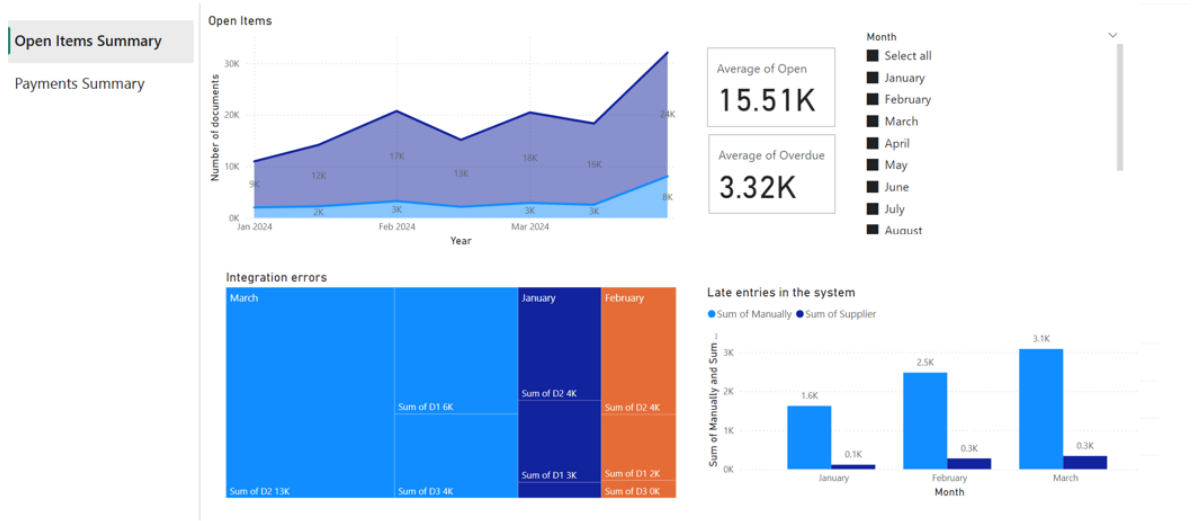

Figure 9 - Documents summary

This dashboard, which contains all the information on the KPIs established for the Invoice Processing team, is a useful tool for monitoring them and the work being done. It consists of

[5] FTE stands for Full-Time Equivalent; One FTE is equivalent to one employee working full-time

[6] https://app.powerbi.com/links/pqd7zRSoRC?ctid=e4bd69ff-e6f7-4c2e-b247-41b54ba2490e&pbi_source=linkShare

two pages, one related to the payment part of the documents while on the other we can see various pieces of information about pending documents, such as the number of integration errors, open documents that are already overdue, among others.

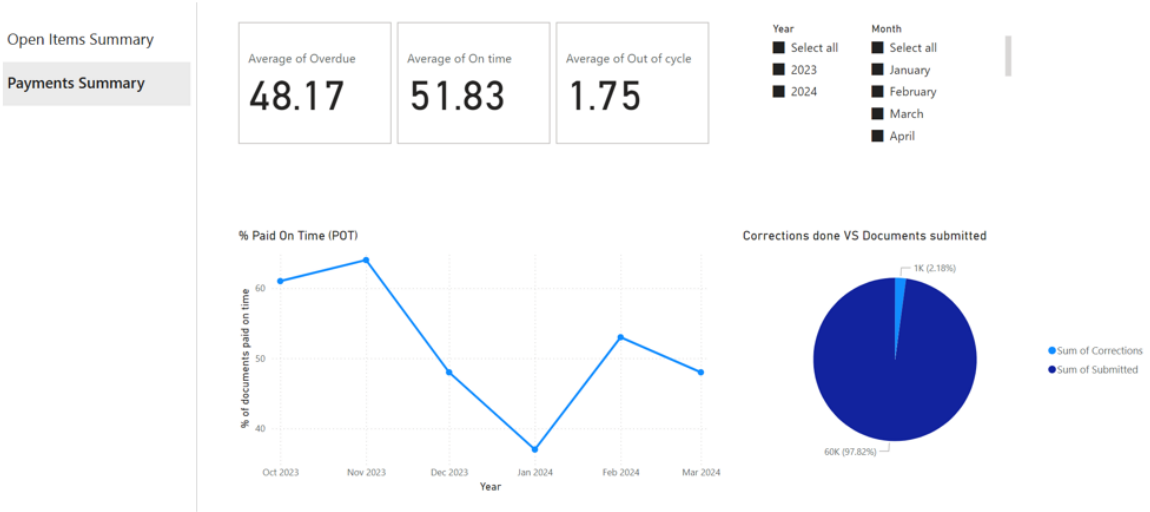

Figure 10 - Payments Summary

Implementing Power BI dashboards in a Shared Service Center can transform the way management and operations are conducted, providing valuable insights and improving efficiency. By following the steps of identifying objectives, collecting data, developing and distributing dashboards, and continuously monitoring their use, an SSC can achieve a higher level of transparency and performance.

5. CONCLUSIONS

This project explored the topic of operational risk in a Shared Service Center, with a particular focus on the Source to Settle department. Different research questions were addressed, such as which operational risks are present in StS, more specifically in the Invoice Processing team, how these risks can translate into financial risks, which KPIs are appropriate for assessing the different risks, and how a BI Dashboard can provide key information for both the leadership team and employees.

In this research, we concluded that the operational risks in the StS department are related to human errors, failures in the different systems and procedural inconsistencies. These risks most often lead to delays in processing documents, which in turn can compromise operational efficiency.

Operational risks are directly linked to financial risks since all kinds of errors during document processing can lead to late payments or even duplicate payments. Errors in the different systems can interrupt operations, causing conflicts in relations with suppliers and even in the company's cash flows. In addition, non-compliance with contracts established with suppliers can result in fines and financial penalties, as well as stoppages in the delivery of material.

In order to monitor operational errors and try to reduce these risks as much as possible, specific KPIs were developed for both the outsourcing team, which is responsible for submitting documents to the processing system and the SSC Invoice Processing team which deals with the approval of some of the documents submitted and all errors in the documents approved or under approval. Using the results of the strategically implemented KPIs, the leadership team can analyze the operations that need to be improved, reducing the risks associated with them, increasing the satisfaction of both markets and suppliers and consequently reducing costs.

The Power BI dashboard together with the tool developed to view the status of documents, offers a clear and user-friendly view of all documents and data in each company, market, or region and can be adapted to the needs of each user. In the case of the leadership team, they can get an overview of the KPIs implemented, which helps them make decisions and identify critical areas where they need to intervene, while for employees, they can access operational data relevant to most of their daily tasks, which allows them to better manage their working time.

Good operational risk management in an SSC, especially in the StS department, is fundamental to the organization's financial sustainability and operational effectiveness. Identifying the specific risks in this department's processes and operations, translating these risks into financial impacts, defining appropriate KPIs, and using technologies to monitor and analyze them are crucial steps in assessing the company's health. All these actions not only help to reduce risks but also promote a culture of continuous improvement within the organization.

This project work contributes to understanding how operational risks impact the operations of a Shared Service Center, especially in the StS department in the Invoice Processing team. It is necessary to improve operational risk management in this organization and to bear in mind that this type of risk exists and that it is directly linked to financial risk. It is important to emphasize that any decision-making must be aligned with the other teams and departments and must always be based on concrete data that is as update as possible. By implementing these practices, the StS department of the SSC under study, combined with the recent change in the head of the StS department, can achieve greater efficiency, reduce costs, and improve the quality of the services provided.

6. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE WORK

Since this project analyzed and studied a shared service center that is still in its infancy and has only been operating for about three years, it is difficult to analyze certain data accurately since we are currently starting to make improvements to both the system and the teams.

It is important to note that in this project, all the data analyzed refers only to Europe, which represents just one region in the SSC's area of operation. Although Europe is only one region, it has the most entities compared to the other two, Asia and America, and was the first to migrate to the shared service center, which is why it was chosen for this study.

As mentioned during this project, the migration of entities and activities to the Shared Service Center only ended in April 2024 with the entry of America into our scope. With the entry of new entities, we always see an increase in both integration and processing errors because each region has its own specificities that need to be considered. Otherwise, we will be faced with duplicate or late payments, which leads to complaints from markets and suppliers and often fines for late payments.

As a complement to this work, it would be interesting to analyze the before and after of the implementation of this project in all regions over a year, as these measures are transversal to all regions. KPIs have been implemented, and tools have been developed to avoid duplicate payments and delays, as well as forms of consultation, both for the markets and for any employee, which can avoid creating tickets and work without added value for the Invoice Processing team.

In addition, it would be interesting to analyze the operational risk of the other departments in a shared service center in future work. Although this type of company is already very present in Portugal, there are still not many studies about it or the risks present in its operations.

BIBLIOGRAPHICAL REFERENCES

ACCA. (2002). *Financial shared services centers: Opportunities and challenges for the accounting profession* (ACCA Research Report No. 79). Association of Chartered Certified Accountants.

Alamri, O., Abbasi, B., Minas, J. P., & Zeephongsekul, P. (2018). Service level agreements: Ready-rate analysis with lump-sum and linear penalty structures. *Journal of the Operational Research Society, 69*(1), 142-155.

Ante, G., Facchini, F., & Mossa, G. (2018). Developing a key performance indicators tree for lean and smart production systems. *IFAC PapersOnLine, 51*(11), 13-18.

Bergeron, B. (2003). *Essentials of shared services*. John Wiley & Sons, Inc.

BCBS. (2006). *International convergence of capital measurement and capital standards*. Bank for International Settlements. Retrieved from http://www.bis.org [Consulted in January 2024].

BCBS. (2021). *Revisions to the principles for the sound management of operational risk*. Bank for International Settlements. Retrieved from http://www.bis.org [Consulted in January 2024].

Boroughs, A., & Saunders, J. (2007). Shared services that work for the business: Implementing shared service models that realize genuine business benefits. *Strategic HR Review*.

Chaudhury, M. (2010). A review of the key issues in operational risk capital modeling. *The Journal of Operational Risk, 5*(3), 37–66.

Chernobai, A. S., Rachev, S. T., & Fabozzi, F. J. (2008). *Operational risk: A guide to Basel II capital requirements, models, and analysis* (Vol. 180). John Wiley & Sons.

Christl, J., & Pribil, K. (2006). *Operational risk management*. University of Vienna.

Culp, C. L. (2002). *The risk management process: Business strategy and tactics* (Vol. 103). John Wiley & Sons.

Deloitte. (2007). *Shared services centers: Trends in an increasingly common model in organizations*. Deloitte Limited.

Deloitte. (2014). *Implementation study of a shared service center development platform*. Deloitte Ltd.

Ernest & Young. (2013). *Delivering tomorrow's companies today*. EYGM Limited.

Fahy, M., & Donovan, M. (1999). Shared services centers: The benefits of SSCs. *Accountancy Ireland*.

Fenema, P. (2014). *Interorganizational shared services: Creating value across organizational boundaries*. Emerald Group Publishing Limited.

Forst, L. (2001). Shared services: A leg up on acquisition payoffs. *Business Europe*.

Gallati, R. (2003). *Risk management and capital adequacy*. McGraw-Hill.

Geiger, H. (2002). Regulation and supervising operational risks for banks. In *Future of financial regulation: Global regulatory reform and implications for Japan* (Conference presentation).

Goh, M., Prakash, S., & Yeo, R. (2007). Resource-based approach to IT shared services. *Industrial Management & Data Systems, 107*(8), 1083-1100.

Hull, K. (1992). Risk analysis techniques in defense procurement. In *IEE colloquium on risk analysis methods and tools* (pp. 3/1–3/17). Institute of Electrical and Electronics Engineers.

Institute of Management Accountants. (2000). *Implementing shared services centers*.

Janssen, M., & Joha, A. (2006). Motives for establishing shared service centers in public administrations. *International Journal of Information Management, 26*(2), 102-115.

King, J. L. (2001). *Operational risk*. Wiley.

Lawler, E., & Mohrman, S. (2003). *Creating a strategic human resources organization: An assessment of trends and new directions*. Stanford University Press.

Linde, V. D., Boessenkool, M., & Jooste, C. (2006). *Understanding shared services*. University of Johannesburg.

McCracken, M., & McIvor, R. (2013). Transforming the HR function through outsourced shared services: Insights from the public sector. *The International Journal of Human Resource Management*.

McIvor, R., McCracken, M., & McHugh, M. (2011). Creating outsourced shared services arrangements: Lessons from the public sector. *European Management Journal*.

Mestchian, P. (2003). Operational risk management: The solution is in the problem. In *Advances in operational risk: Firm-wide issues for financial institutions* (pp. 3–14). Risk Books.

Moosa, I. A. (2007). Operational risk: A survey. *Financial Markets, Institutions & Instruments, 16*(4), 235-270. New York University Salomon Center.

Parmenter, D. (2007). *Key performance indicators: Developing, implementing, and using winning KPIs*. John Wiley & Sons, Inc.

Pezier, J. (2003). A constructive review of the Basel proposals on operational risk. In C. Alexander (Ed.), *Operational risk: Regulation, analysis and management* (pp. 49–73). Prentice Hall-Financial Times.

Pinto, J. (2009). *Um novo modelo de implementação de serviços partilhados*. Universidade do Minho.

PricewaterhouseCoopers. (2015). *Shared services: Management fad or real value?* PricewaterhouseCoopers.

Quinn, B., Cooke, R., & Kris, A. (2000). *Shared services: Mining for corporate gold*. Financial Times Prentice Hall.

Reilly, P. (2009). The links effect. *People Management*.

Roggi, O., Damodaran, A., & Garvey, M. (2012). *Risk taking: A corporate governance perspective*. Retrieved from https://papers.ssrn.com [Consulted in January 2024].

Seixas, T. (2014). *Fatores críticos de sucesso no processo de implementação de um centro de serviços partilhados: Estudo de caso do Centro de Serviços Partilhados da BRF em Viena*. Departamento de Ciências Económicas e Empresariais, Universidade Autónoma de Lisboa.

Schulman, D. S., Harmer, M. J., Dunleavy, J. R., & Lusk, J. S. (1999). *Shared services: Adding value to the business units*. Wiley.

Schulz, V., & Brenner, W. (2010). Characteristics of shared service centers. *Transforming Government: People, Process and Policy, 4*(3), 210–219.

Schroeck, G. (2002). *Risk management and value creation in financial institutions*. John Wiley & Sons, Inc.

Ulbrich, F. (2006). Improving shared service implementation: Adopting lessons from the BPR movement. *Business Process Management Journal, 12*(6), 781-795.

Ulrich, D. (1995). Shared services: From vogue to value. *Human Resource Planning, 18*(3), 52-66.

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