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## **Information Sharing: The Pillar of Collaboration**

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Technology  
ISCTE Business School

October, 2020



BUSINESS  
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Department of Marketing, Operations and General Management

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## **Resumo**

Hoje em dia, devido ao aumento da complexidade do ambiente competitivo nos mercados empresariais, as empresas devem ter parcerias colaborativas, pois estas são fundamentais para alcançar vantagem competitiva, uma vez que melhora a agilidade e eficácia da gestão da cadeia de abastecimento (Singh, Garg & Sachdeva, 2018). A partilha de informação, além de permitir a integração nos sistemas, tornou-se o pilar da colaboração na cadeia de abastecimento devido aos avanços da tecnologia.

Transbase, S.A. - Transportes e Logística é a empresa de logística em Portugal que fornece as insígnias (Intermarché, Bricomarché e Roady) de um grupo na área do retalho – “Groupement Les Mousquetaires”. Este projeto foi executado no departamento de Fluxos e nos processos de receção e encomenda e foca-se no principal desafio na relação entre a Transbase e os seus fornecedores: falta de partilha de informação.

Neste estudo, foi feita a caracterização da colaboração existente com os fornecedores. Em seguida, foi definida a proposta de solução e feita uma avaliação dos seus impactos, através de uma análise a KPIs e um questionário aos colaboradores da Transbase. Por fim, foram feitas recomendações para melhorias futuras.

**Palavras-chave:** colaboração na cadeia de abastecimentos, partilha de informação; sistemas de informação

**Códigos de Classificação JEL:** M11; M15



## **Abstract**

Nowadays, given the increase of complexity in the competitive environment in business markets, companies must have collaborative partnerships as it is crucial to achieve competitive advantage since it improves agility and effectiveness of supply chain management (Singh, Garg & Sachdeva, 2018). Information sharing, besides allowing system integration, has become the cornerstone of supply chain collaboration due to advances in technology.

Transbase, S.A. – Transportes e Logística is the logistics company in Portugal that supply the insignias (Intermarché, Bricomarché and Roady) of a large retail group – “Groupement Les Mousquetaires”. This project was executed in the Logistical Flows department and in reception and order processes and focuses on the main challenge of Transbase and the suppliers’ relationship: the lack of information sharing.

In this study, a characterization of the existent collaboration with suppliers was made. Next, the solution proposal was defined and an evaluation of its impacts was studied, through an analysis of KPIs and a questionnaire to Transbase’ collaborators. To finalise, recommendations were given for future improvements.

**Keywords:** supply chain collaboration, information sharing; information systems

**JEL Classification System:** M11; M15





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## **Glossary**

ASN – Advance Shipping Notice

CPFR – Collaborative Planning, Forecasting and Replenishment

DC – Distribution Centre

DYI – Doing Yourself In

EAN - European Article Number

ECR – Efficient Consumer Response

EDI – Electronic Data Interchange

ETA – Estimated Time of Arrival

GR – Goods Receipt

IS – Information Systems

IT – Information Technology

KPI – Key Performance Indicators

PDF – Portable Document Format

PO – Purchasing Order

RFID – Radio-Frequency Identification

SSCC – Serial Shipping Container Code

TAM – Technology Acceptance Model

VMI – Vendor Managed Inventory





# **1. Introduction**

This chapter will present the theme of this investigation and the respective research question. Afterwards, the main objective is defined, along with the specific objectives that are needed to achieve the main goal. The steps of the methodology will also be presented as well as the scope of this project and, finally, its structure.

## **1.1. Problem Statement**

Nowadays, with a more and more challenging business environment, companies must create and maintain collaborative partnerships in their supply chain to remain competitive. Collaboration is crucial to achieve competitive advantage, as having a collaborative partner increases the efficiency and responsiveness of the supply chain (Ma, Pal & Gustafsson, 2019; Singh, Garg & Sachdeva, 2018). Due to the need for higher efficiency and performance improvement, supply chain managers must find new strategies to create value that require integration and collaboration (Soosay & Hyland, 2015). Information sharing, besides enabling supply chain integration, is essential for companies to survive because, if there is a lack of information sharing, it results of inefficiency in company's performance (Lotfi *et al.*, 2013).

The issues that occur with lack of supply chain collaboration can be difficulty in planning; inaccurate forecast; lack of communication; lack of knowledge of the processes, both internally and from partners; dependency on delegation tasks; lack of performance measurement; poor decision making due to inaccurate information technology; and obsolete reports (Barratt, 2004). Salam (2017) identified as outcomes of collaboration better relationships, communication and visibility, higher levels of trust and long-term commitment, real-time information sharing, willingness to change and a problem-solving environment.

This research will focus on the relationship between Transbase – Transporte e Logística, S.A. (from now on, it will be referred as “Transbase”, logistics company of “Groupement Les Mousquetaires” in Portugal) and its suppliers. Having a universe of more than 1000 suppliers, collaboration is a difficult task, therefore, in most cases, contact is very limited. Currently, Transbase is managing its relationships with the suppliers using monthly reports that are automatically generated and sent by e-mail. Those reports contain information related to the service level and calculates financial penalties, that allows Transbase and suppliers to control their contractual obligations and review their performance every month. However, they lack the ability to provide information in real-time, which sometimes makes those reports obsolete/outdated. Moreover, there is a lack of information sharing which leads to problems

like ruptures, delays and damaged goods that affect Transbase's performance and service level to its clients.

An effective supply chain requires an integrated information system for sharing information on various activities along the supply chain (Hudnurkar, Jakhar & Rathod, 2013). By using an information system and involving suppliers, information shared will increase and be presented in real-time. Thus, uncertainties will decrease that will lead to an improvement in overall performance of the supply chain.

In the context presented above, this project aims to present a solution that will allow Transbase and its suppliers to benefit from mutual information sharing. To this end, a characterization of processes will be presented, with the intent to describe the current collaboration and evaluate the possible positive impacts that can arise from the implementation of this solution.

## **1.2. Research Question**

Based on the context presented above, this project will be guided by the following research question: *"How to make Transbase's operational performance both more effective and more efficient through better collaboration with its suppliers?"*.

## **1.3. Generic Objective**

The main goal of this project is to propose solutions to improve collaboration between Transbase and its suppliers, particularly by improving information sharing between both sides. These solutions will be achieved analysing critically the existing relationship and identifying the weaknesses in this process.

## **1.4. Specific Objectives**

To achieve the generic objective, some milestones must be fulfilled. Such as:

- Characterization of the actual collaboration between Transbase and suppliers;
- Proposal of solution to improve the way information is shared between Transbase and suppliers;
- Evaluation of proposed solution;
- Final recommendations for the company.

## **1.5. Methodology**

This investigation is based on a case study research (Yin, 2018) because it answers to the research's three conditions in the following manner:

1. "How" or "Why" question;
2. No control over behavioural events;
3. Focuses on contemporary events.

It follows both a descriptive and an exploratory strategy and it is based on a single-case study.

It will include the following research steps:

Step 1 – Collaboration characterization

Step 2 – Solution proposal/implementation

Step 3 – Proposal evaluation

Step 4 – Final recommendations

## **1.6. Scope**

The research will take place at Transbase distribution centre in Alcanena, mainly in the Logistical Flows department.

Taking the objectives into consideration, this project will focus on the relationship with the suppliers. The processes that will be analysed are order and reception.

## **1.7. Project Structure**

The structure of this project is divided into the following chapters:

### **Chapter 1: Introduction**

Includes a contextualization of the problem that will be studied, the research question, the objectives, the methodology used, the scope and the structure of the project.

### **Chapter 2: Literature review**

Presents a conceptual approach to the topic under study through the analysis of previous investigations and existing literature.

### **Chapter 3: Methodology**

Explains the method adopted and the steps of the investigation.

#### **Chapter 4: Case study**

Presentation of “Groupement Les Mousquetaires”, their presence in Portugal and respective insignias and, finally, Transbase; Collaboration characterization between Transbase and suppliers, including as-is process mapping; Presentation and implementation of the solution and to-be process mapping; Evaluation of solution with a KPI measurement and comparison after and before implementation and a questionnaire; finally, final recommendations to the company.

#### **Chapter 5: Conclusions**

Presents the conclusions, answers to the research question, as well as a reflection of the proposed objectives. It also highlights the limitations of the results.

## 2. Literature Review

This chapter will present the concepts that support this research. The present chapter starts with a small introduction to the concept where this research is executed— supply chain management. Following is introduced the notion of collaboration within supply chain, followed by one of the main themes addressed – information sharing. Finally, is presented the concept of information systems in supply chain.

This review used the following databases: B-on, Google Scholar, ResearchGate and ScienceDirect while using as keywords “supply chain collaboration”, “information sharing” and “information systems”.

### 2.1. Supply Chain management – key concepts

According to Chopra & Meindl (2016, p.13), “*supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves*”. Supply chain is “*a network of connected and interdependent organisations mutually and cooperatively working together to control, manage and improve the flow of materials and information from suppliers to end users*” (Aitken, 1998, p.2).

The term supply chain management was created in the 1980s and became widely used in the 1990s (Hugos, 2018; Jain *et al.*, 2010).

However, the principles of this practice are not new and have been around throughout mankind’s history, since the construction of the pyramids to the multiple wars that existed until the present day (Hugos, 2018; Christopher, 2011).

Christopher (2011, p.3) adopted the definition that supply chain management is “*the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole*”.

Supply chain consists in a network of companies and the management of existing relationships is crucial to provide a greater product/service to the customer, thus Singh, Garg & Sachdeva (2018) mentions that supply chain collaboration is an important instrument to improve the agility and effectiveness of supply chain management. Thus, supply chain collaboration is explored in the following section.

**2.2. Supply Chain Collaboration**

According to Cao *et al.* (2010), supply chain collaboration started being more addressed by researchers in the 1990s.

There are various, although similar, definitions of supply chain collaboration in the literature. Fawcett, Magnan & McCarter (2008, p.93) affirms that collaboration is “*The ability to work across organizational boundaries to build and manage unique value-added processes to better meet customer needs*”. Cao and Zhang (2011, p.166) defines collaboration as “*a partnership process where two or more autonomous firms work closely to plan and execute supply chain operations toward common goals and mutual benefits*”.

**2.2.1. Types of collaboration within supply chains**

Supply chain collaboration can be obtained both in the form of intra-organization and inter-organizational collaboration (Ho & Lin, 2004; Alves, Segatto & De-Carli, 2016). Barratt (2004) also refers to these terms of collaboration but as internal and external collaboration, respectively, and as part of the “scope of collaboration” that he identifies as vertical and horizontal collaboration (see Figure 2.1).

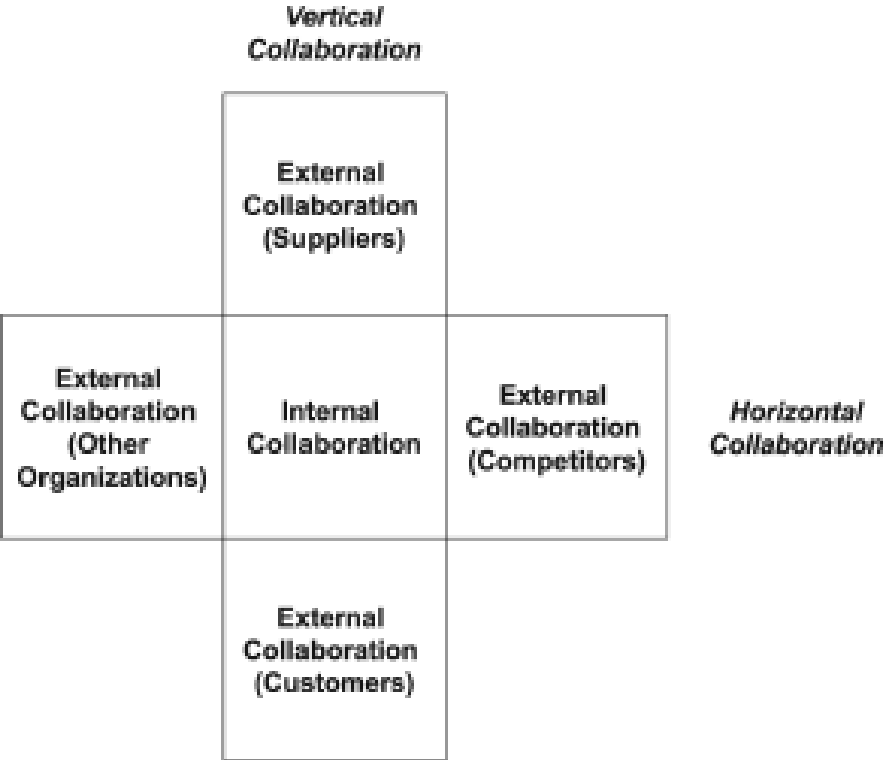


Figure 2.1 - Scope of collaboration (Source: Barratt, 2004)

Internal/intra-organizational collaboration happens when two or more departments in the same company work together, have mutual understanding and common vision, share resources and achieve collective goals. External collaboration is defined similarly, however, instead of departments, the collaboration happens between two or more firms (Sanders & Premus, 2005).

Vertical collaboration includes collaboration with suppliers and customers and internally across functions (Barratt, 2004). These are also described as buyer-supplier and processor-retailer collaborations (Soosay & Hyland, 2015).

Horizontal collaboration includes collaboration with competitors and non-competitors and within the company (Barratt, 2004). This form of collaboration happens between competing companies that produce similar products and belong to the same level of the supply chain (Ho, Kumar & Shiwakoti, 2019).

As mentioned before, this study will focus on the relation between Transbase and its suppliers, therefore, and as can be concluded from the text above and in Figure 2.1, this research will be mainly focused on vertical and inter-organizational/external collaboration. The principal themes of how to improve supply chain collaboration are presented below.

## 2.2.2. Methods to improve supply chain collaboration

Table 2.1 provides a summary of the main methods approached in the reviewed literature.

Table 2.1 – Main themes of supply chain collaboration

Articles \ Themes	Information Sharing	Incentive alignment	Resource sharing	Decision Synchronization
Min et al. (2005)	X	X	X	X
Simatupang & Sridharan (2005)	X	X		X
Fawcett, Magnan & McCarter (2008)	X	X		
Cao et al. (2010)	X	X	X	X
Nyaga, Whipple & Lynch (2010)	X			X
Scholten & Schilder (2015)	X	X	X	X
Ma, Pal & Gustafsson (2019)	X	X	X	X

Information sharing is at the centre of collaboration (Min *et al.*, 2005). Sharing information about plans, ideas and procedures of their supply chain in a frequent, accurate and timely manner allows firms to trust and commit to each other and enhance their overall performance by improving visibility and flexibility (Simatupang & Sridharan, 2005; Cao *et al.*, 2010; Nyaga, Whipple & Lynch, 2010; Scholten & Schilder, 2015).

Incentive alignment is the process of sharing revenues, costs, profits and risks between supply chain partners. Moreover, defining incentive schemes, for example royalty payment, is

also important to motivate them (Simatupang & Sridharan, 2005; Cao *et al.*, 2010; Ma, Pal & Gustafsson, 2019). This method is intrinsically connected with performance measurement as using metrics allows members to be closer between performance and incentives and, consequently, have a successful collaboration. Metrics like KPIs (key performance indicators) are a good option as they can typically trace and display the needed scores. (Min et al, 2005; Simatupang & Sridharan, 2005; Fawcett et al, 2008).

Resource sharing is the process of leveraging capabilities and assets from partners and investing in capabilities and assets with supply chain partners (Cao *et al.*, 2010). Besides allowing the utilization of slack resources, firms can leverage from physical and digital assets and capabilities and invest in financial and non-financial assets and capabilities (Min *et al.*, 2005; Cao *et al.*, 2010; Ma, Pal & Gustafsson, 2019).

Decision synchronization is the ability of supply chain partners to coordinate critical decisions in supply chain processes and break down boundaries, like different decision rights and conflicting goals, between themselves to optimize supply chain performance (Min et al, 2005; Simatupang & Sridharan, 2005; Cao *et al.*, 2010). The joint decision activities may include planning, procurement, distribution and replenishment (Cao *et al.*, 2010; Ma, Pal & Gustafsson, 2019).

In addition to being one of the major problems identified by Transbase, information sharing is one of the key themes of supply chain collaboration, as evidenced in table 2.1, and, for Cao *et al.* (2010), is the heart, lifeblood, nerve centre, essential ingredient, key requirement and foundation of supply chain collaboration.

Moreover, findings of the study to identify key themes on supply chain collaboration by Ma, Pal & Gustafsson (2019) provided four major clusters: information sharing paradigm; joint decision-making; resource sharing paradigm; and coordinating contracts paradigm (incentive alignment is included in this last cluster). In this study, information sharing is regarded as the cluster that presents the highest level of inter-organizational supply chain collaboration.

### **2.3. Information Sharing**

Collaboration is extremely important for company competitiveness and, according to Zha & Ding (2005), information sharing is a key step in the collaboration process. To Simatupang & Sridharan (2004), information sharing is the starting point to collaborate in the supply chain. Even though exists a vast literature, there is a lack of a clear definition and it is suggested that it happens because the concept is viewed as unproblematic and in no need of definition (Beynon-Davies & Wang, 2019).



Information sharing has been also referred to as “information integration” and “knowledge sharing” in the literature (Lotfi *et al.*, 2013).

### **Types of information sharing**

As exposed in the previous chapter, sharing information about plans, ideas and procedures is of extreme importance and there are diverse categories of information that can be shared in a supply chain. Those are inventory level, sales data, sales forecast order information, product ability information and exploitation information of new products.

Inventory level information, besides allowing a reduction of stock level, avoids safe stock duplication and going out of stock.

Sales data sharing can help differentiate real demand from “phantom” demands, eliminate order blow-up and decrease loss by excess or shortage of products.

Sales forecast information allows the supply chain to have better predictions and its members to gain competitive advantage.

Order information, whether by calling the partner or visiting its website, allows the enhancement of the quality of customer services, reduction in payment cycle and economization in the labour cost of manual operations.

Product ability information, that can be the flowing process of the product or from the products themselves, can help decelerate the possible shortage gaming behaviour and avoid the latent cause of bullwhip effect.

Information about the exploitation of new products can be shared by manufactures to obtain real demands from retailers and, by consequence, receive timely supply of goods from its suppliers (Lee & Wang, 2000; Zha & Ding, 2005; Lotfi *et al.*, 2013).

### **Quality of shared information**

To ensure information quality and measure its contribution in the supply chain, characteristics as accuracy; availability; timeliness; internal connectivity; external connectivity; completeness; relevance; reliability; accessibility and frequently updated information can be considered (Simatupang & Sridharan, 2005; Zhou & Benton Jr., 2007). More recently, Somapa, Cools & Dullaert (2018) emphasizes that the quality level of the exchanged information among upstream and downstream members of a supply chain is of extreme importance and identifies as main informational characteristics timeliness, accuracy and completeness.

Information timeliness refers to the “*frequency of information shared*” (Balasubramanian *et al.*, 2002, as cited in Somapa, Cools & Dullaert, 2018, p.322) and real-time sharing is viewed as the highest quality of timeliness (Somapa, Cools & Dullaert, 2018).

Information accuracy consists of the “*degree of conformity of the shared information with its actual value*” (Caridi *et al.*, 2010, p. 601). As it is a subjective notion, its evaluation is usually based on individual judgment, therefore it is proposed that an evaluation should be done by comparing the conformity of information to the actual values or by a performance-based criteria (Somapa, Cools & Dullaert, 2018).

Information completeness is “*the amount and type of information that corresponds to the needs of the users or the pertinence of the information*” (Francis, 2008, p.182). This information can derive from suppliers, in the form of production and completion of an order, and buyers such as level of demand and downstream inventory (Somapa, Cools & Dullaert, 2018).

### **Methods to improve information sharing within supply chains**

The advance of information technology is responsible for information sharing becoming the main feature of supply chain collaboration (Tsung, 2000; Simatupang & Sridharan, 2005).

Considering the advances in technology, Lee & Wang (2000) identified three models (or mode) in which supply chain members share information. Those models are the information transfer model, third party model and information hub model.

In the information transfer model, a supply chain partner receives information from other enterprises and stores it in its database to use it in its decision-making process. This model is an extension from EDI (electronic data interchange) in a way that supply chain partners agree to a standard and use it for information sharing purposes like sales information or inventory information (Lee & Wang, 2000; Zha & Ding, 2005).

The third-party model involves an enterprise outside the supply chain that collects, processes and provides information from/for the supply chain members. It provides information according to the particular necessity of each user (Lee & Wang, 2000; Zha & Ding, 2005).

Information hub model is similar to the third-party model; however, the third party is replaced by a third-party information system, which means that information is shared through a centralized information system (Lee & Wang, 2000; Zha & Ding, 2005).

Besides mentioning the three previous models, Zha & Ding (2005) added another mode of information sharing system: Web service mode. In this mode, each company has its information system and only provides to partners with some functions as Web Services. This way, the company can share specific data with each partner without the obligation of its systems being

connected. According to O'Brien & Marakas (2011), EDI is being slowly replaced by Web services.

Integration of intelligent systems, combined with management capabilities, is key for a supply chain adaptable and agile (Barton & Thomas, 2009) and information sharing with supply chain partners is included in that systems integration (Farajpour *et al.*, 2018). Therefore, and adding to the models above that are information systems that allow information integration in the supply chain, the impact of information systems in supply chain collaboration are presented below.

#### **2.4. Information Systems as a tool for supply chain collaboration**

Information systems are connected to the advances of information technology in the supply chain and information sharing. As Wang *et al.* (2010) show in their study with the use of radio frequency identification (RFID), information technology (IT) allows real-time information sharing among supply chain members.

Popular techniques of a supply chain integrated by an information system include VMI, ECR and CPFR (Nimmy, Chilkapure & Pillai, 2019; Barratt & Oliveira, 2001). Another system is EDI as it has allowed companies to exchange information more frequently (Christiaanse, 2005). Omar *et al.*'s (2010) study analysed the usage of IT tools in information exchange. It was identified nine IT tools, being the Internet, VMI and EDI the three highest ranked in the study questionnaire. Therefore, in this study, those will be aborded.

Internet technology allows companies to deliver information to a supply chain partner with ease and at a low-cost whether by e-mail, instant messaging or through the World Wide Web. It can also provide platforms where the information is presented to a defined group of users that can access via username and password (O'Brien & Marakas, 2006)

VMI happens when a supplier monitors and decides the level of stock of its client. The vendor is given real-time access to the customer inventory and sales which enables the decisions about the frequency and quantity of orders to maintain the stock level acceptable (Sari, 2008).

EDI is a technology that allows information sharing across organizations. It permits data exchange in an agreed/standard format such as orders, bills and invoices and is viewed as important to support business strategy decisions and, in consequence, achieve its goals (Yunitarini *et al.*, 2018).

Several studies have identified the implementation of information systems as collaborative platforms in several sectors. In supply chain, Tian-Min (2009) constructed an E-business platform to integrate information from suppliers, customers and other partners to manage

supply chain. Xiu and Zheng (2010) propose an integrated platform for fourth-party logistics (4PL) to share information and react quickly to customers' demands.

In other sectors, Li *et al.* (2012) constructed an electronic commerce platform to track agricultural products using Web 3.0 technology, while Alencar, McGarry and Palmer (2014) developed a collaborative cloud-based platform that allows data sharing, integration and processing requirements for watershed management.

### **Evaluation of information systems**

Organizations need to assess if their investment in information systems are successful and if it has met the organization's goals (DeLone & McLean, 2016).

A model to measure the performance of information systems was firstly developed by Davis (1986). Technology Acceptance Model (TAM) helped to understand the user acceptance of information systems and was one of the most cited models with this purpose (Wang & Liu, 2005).

However, according to Wang & Liu (2005), the DeLone & McLean (D&M) IS (information systems) Success Model become the standard in research to analyse the information system success.

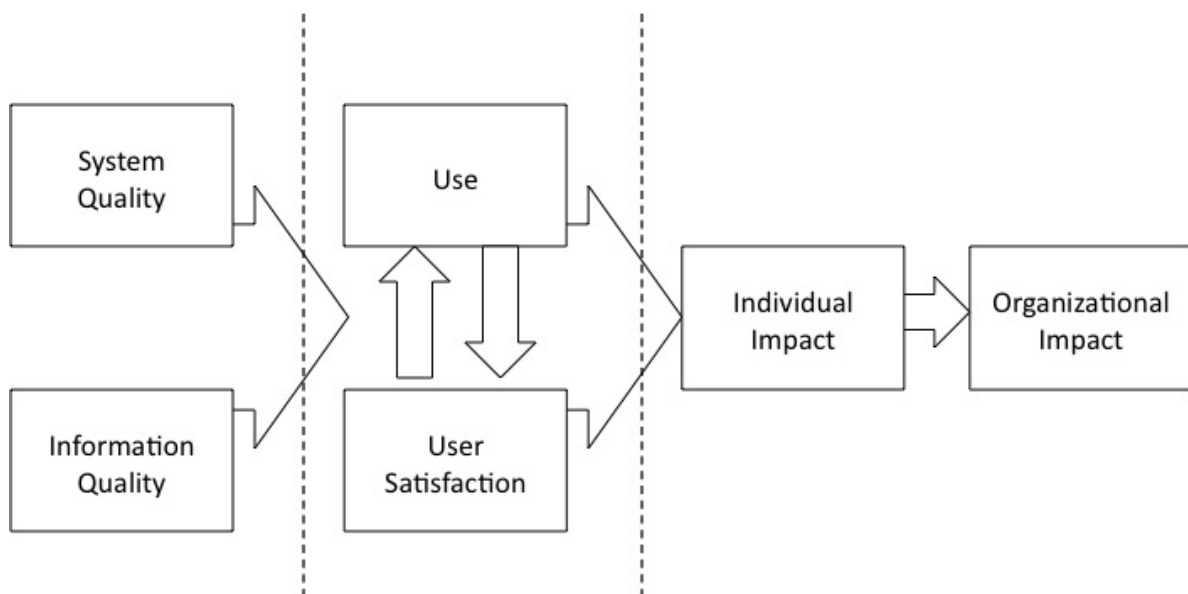


Figure 2.2 – I/S Success Model (Source: DeLone & McLean, 1992)

The D&M IS Success Model was firstly proposed in 1992 by DeLone & McLean (1992) to organize diverse research about the factors that impact information systems success. They identified six main categories to assess IS success, which are system quality, information quality, use, user satisfaction, individual impact and organizational impact. As Figure 2.2

presents, Information quality and System quality influence Use and User Satisfaction. Use and User Satisfaction influence Individual Impact. Finally, Individual impact affects Organization impact. “System quality” studies the performance of the system itself, while “Information Quality” refers to the output of the information system. “Use” measures the utilization of information system output, like reports. “User satisfaction” is the opinion of users about the information system. “Individual impact” refers to the impact that the information system has on the user’s behaviour, while “Organizational impact” addresses the influence that the usage of the information system has on the organization.

Ten years later, DeLone & McLean (2003) updated their original IS Success model (see Figure 2.3), by analysing what other researchers have found about their initial study. The three main changes were the inclusion of “intention to use” adding to “use”, because, in particular contexts, the use of the information system is not required; the inclusion of “service quality”, along with “information quality” and “system quality”, that will impact “intention to use” and “user satisfaction”; and the junction of “individual impact” and “organization impact” in “net benefits” to simplify the model.

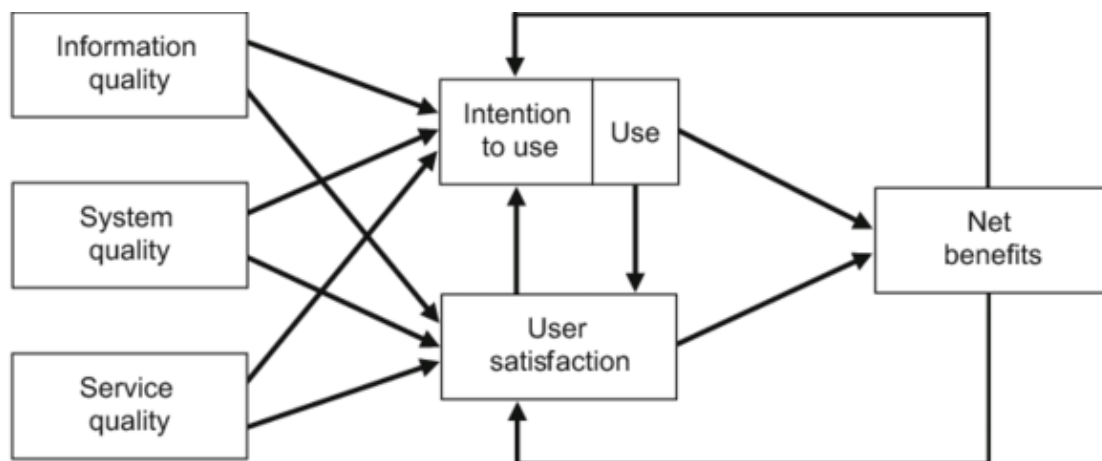


Figure 2.3 – IS Success Model updated (Source: DeLone & McLean, 2003)

DeLone & McLean (2016) did another study in which the recent trends of each category and a suggestion for respective measures was made. It was further added a recommendation of certain survey items to evaluate information systems that were previously tested and validated by Sedera, Eden & McLean (2013).

## 2.5. Conclusions

This theoretical research evidences the connection between the concepts presented.

Nowadays, supply chain collaboration is seen as crucial to a company due to the increasing challenges in the market, as allows its members to have a competitive advantage than if they were to act isolated and managers must study ways to implement it to obtain the benefits that result from it. Even though some possibilities exist, information sharing is viewed as the focal point and has been increasing in terms of importance because of the major developments done in the information technology area.

However, various variables must be considered and achieved like which type of information is necessary and how should it be shared to present (and receive) the best information possible. Upon deciding the need to improve supply chain performance, it must be integrated within supply chain partners so all can beneficiate from it. Due to advances in technology, implementation of an information system is recommended by literature. After the implementation of an information system, it's important to measure its performance and impact, not only on the users but on the company as a whole.

### **3. Methodology**

This chapter aims to present the project's methodology. Firstly, which research method was selected and the justification and, afterwards, which sources of information and the tools used in each research step.

This project is divided into four steps, as shown in Figure 3.1.

#### **3.1. Case study**

Yin (2018) refers that to understand which method to use in research, three conditions must be answered. Those three conditions consist of:

1. Form of the research question;
2. Control over behavioural events;
3. Focus on contemporary events.

A case study's methodology is used when the answers to the questions above are the following:

1. "How" or "Why" question;
2. No control over behavioural events;
3. Focuses on contemporary events.

As this research comply with these answers, it will be used a case study's methodology.

According to Yin (2018), case studies can be defined as exploratory, descriptive and/or explanatory and can be designed as a single-case study or a multiple-case study.

In this investigation, it will be applied a descriptive strategy, because the relationship between Transbase and its suppliers, as well as its processes, will be described. It will also be used an exploratory strategy since this project explores a research question and identifies improvements, and consequently an evaluation, that can be used in similar case studies.

It is a single-case study because it only focuses on the processes of one company, Transbase.

#### **3.2. Research Steps**

Yin (2018) states six sources of evidence commonly found in a case study research: documentation, archival records, interviews, direct observation, participant observation and physical artefacts. This will be the basis of this study in terms of evidence collection

This chapter will present the following research steps (see Figure 3.1).

It will also be presented on how data collection will be executed and the tools used in each research step.

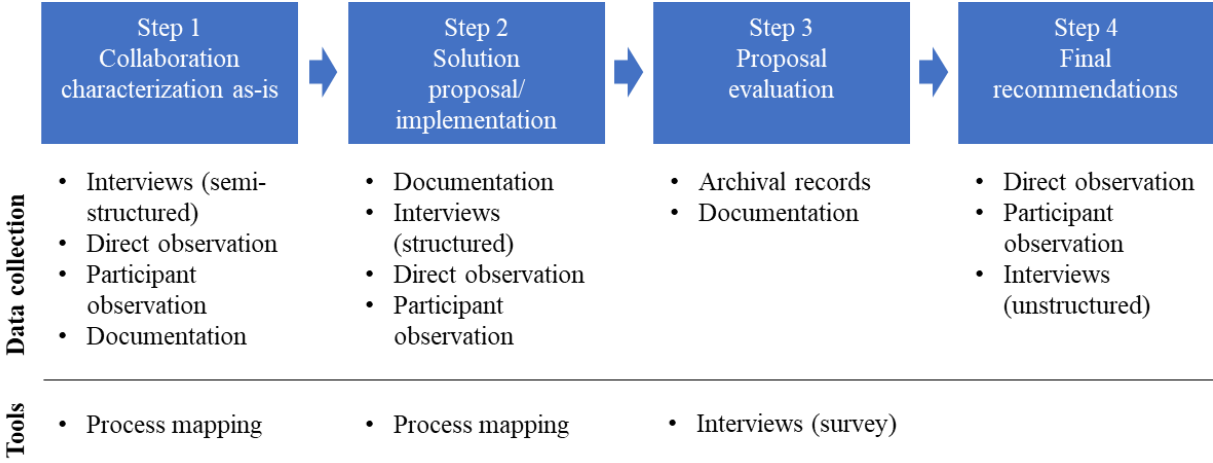


Figure 3.1 – Research steps (data collection and tools)

**3.2.1. Step 1 - Collaboration Characterization**

In this step, the collaboration between Transbase and its supplier is characterized, where it will be identified in which state the collaboration between Transbase and suppliers is nowadays, and which problems arise from the lack of information sharing.

The evidence will be collected by a series of semi-structured interviews (Annex A) with supply chain managers, inventory managers and workers to understand the type of contact that exists with suppliers.

Direct and participant observation of the processes in the warehouse and purchasing department will be another source in qualitative data collection.

Company’s documentation will be also used to help characterise the existing collaboration. As a result, the processes as-is will be mapped using the software Bizagi Modeler.

**3.2.2. Step 2 – Solution proposal/implementation**

After characterizing the existing collaboration and completing the unstructured interviews with supply chain managers, inventory managers and workers, it is proposed a solution to improve Transbase collaboration with its suppliers.

In this step, documentation (namely literature review) will play a major role in the solution proposal – the implementation of an information system. Meetings with supply chain managers and supply chain technology company will help define the goals and functioning of the solution.



Additionally, to implement the solution, there will be meetings (structured interview – see chapter 4.2.2) with suppliers to present the solution, where evidence will be gathered by direct and participant observation.

The processes to-be are also mapped to analyse the outcome of the solution on an operational level and will be validated in a focus group with supply chain managers. The process mapping will be executed using the software Bizagi Modeler.

### **3.2.3. Step 3 – Proposal evaluation**

Having the proposals being made and the process mapping to-be analysed, the next step is to measure the impact of the solution through the analysis of selected indicators and by a questionnaire presented on the literature intended for inventory managers, analysts, supply chain managers and suppliers.

To collect the necessary data, two types of source of evidence will be used:

- Transbase database – archival records – to measure the KPIs before and after the solution implementation;
- Questionnaire – survey interview (Annex B) – to help understand the impact of the solution.

Documentation (literature) by DeLone & Mclean (2016) and Sedera, Eden & McLean (2013) will be used to realise the questionnaire, however the survey items will be adopted to Transbase's reality (Annex B).

### **3.2.4. Step 4 - Final recommendations**

Lastly, recommendations are presented on how to improve the operational performance of Transbase, by proposing improvements for the solution. These recommendations are based on the conclusions of the previous steps.



## **4. Case study**

In this chapter, Transbase, as well as the Group where it is inserted, will be presented and the research steps will be executed.

### **4.1. Groupement Les Mousquetaires**

“Groupement Les Mousquetaires” (“Grupo Os Mosqueteiros”, in Portuguese) is a large retail group created by Jean-Pierre Le Roch that founded in 1969 a commercial French supermarket under the name “Ex-Offices de distribution”. In 1973, it was renamed to Intermarché (the first brand of the group) and, nowadays, its stores are present in four countries (France, Portugal, Belgium and Poland).

The Group operates in a very particular way, unique even in such a modern and creative sector of activity since its global management is shared by the group of owners of each store in each country.

The Group aggregates a group of independent entrepreneurs, called adherents, who are owners and fully responsible for the management of each point of sale. The several adherents benefit from a set of common structures for purchasing, logistics, development, quality, communication, among others, and are also co-managers of this structure upstream of their point of sale, dedicating a third of their time to its management.

This peculiar organizational structure determines that the Group assumes as a fundamental characteristic of its mission the maximum proximity to the communities where it is located, due to the direct involvement of its management with the reality of the respective stores.

That is why the Group, has adopted the mission of “Improving the quality of daily life by fighting everything expensive”, that is concretized in practice through an aggressive pricing policy, a strong commitment to the variety of products with its brands produced in more than 62 plants in operation in France and distributed by a fleet of 23 vessels.

Besides Intermarché, the Group has 8 other insignias (Netto, Bricomarché, Brico Cash, Bricorama, Rody, American Car Wash, Rapid Pare-Brise and Poivre Rouge) divided into four areas of activity: food, DIY, automotive and catering. In 2019, the 9 insignias totalled 3.961 points of sale in the four countries in which the Group is present.

#### **4.1.1. Portugal**

This study is focused in Portugal and, more specifically, the logistics department (Transbase), that, as Figure 4.1 presents, is a part of the Group in Portugal. Therefore, contacts with other

departments, namely negotiations with the commercial department (in Figure 4.1 identified as “ITMP Alimentar”, “CASA Por” and “ITM Automóvel” for Intermarché, Bricomarché and Roady insignias, respectively) and invoices with the financial department (in Figure 4.1 “Direção Financeira” in “ITMP Portugal”) are not considered in this study.

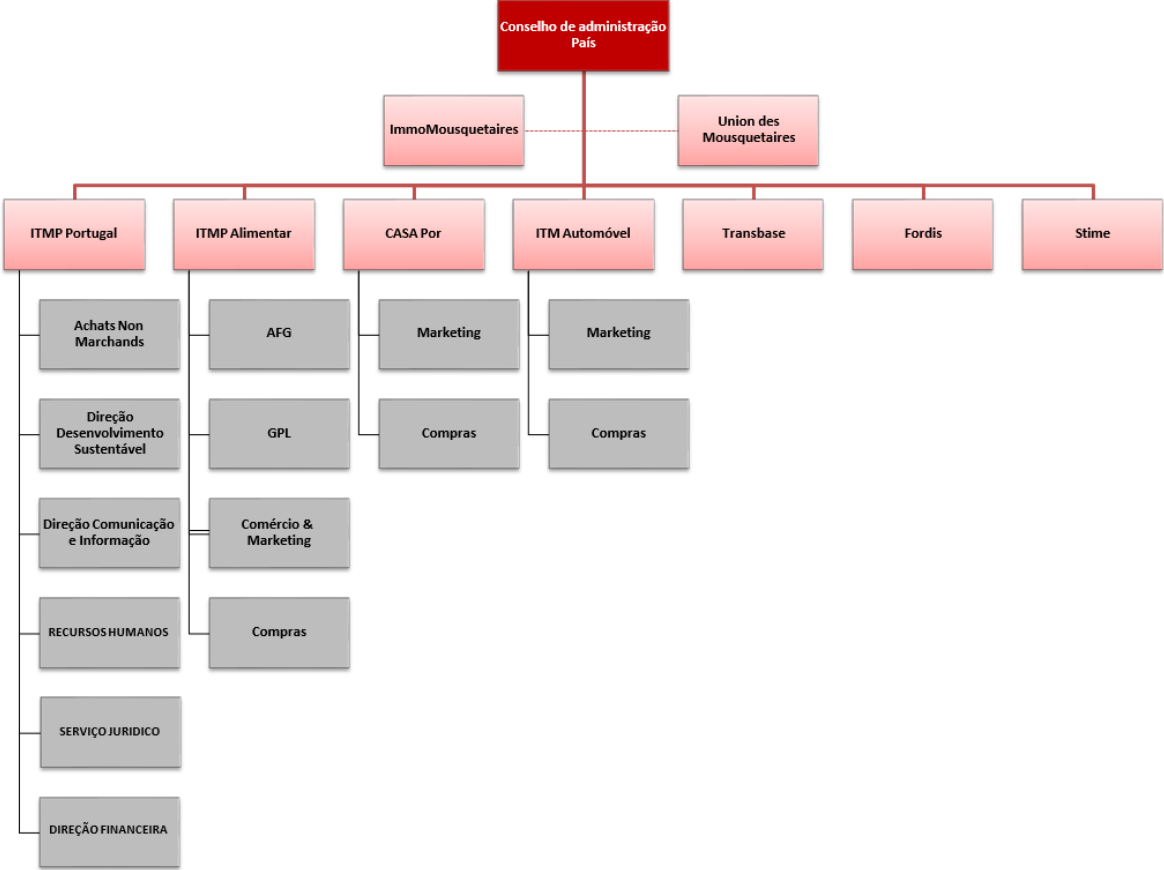


Figure 4.1 – “Groupement Les Mousquetaires” organizational chart Portugal (Source: company documentation)

**Insignias**

The Group established in Portugal in 1991 with the creation of the first Intermarché point of sale and has been able to consolidate their experience in the retail market, occupying the 3<sup>rd</sup> place in the Food Retail sector in Portugal.

Intermarché’s mission is to improve the daily quality of life of the Client through proximity and a permanent fight against what is expensive.

In can thus be said that Intermarché is positioned as an insignia very close to its customers and whose daily struggle is to bring these customers the best product at the best price as well as the best fresh products, product range and promotions; all this within the best store environment, with the best service and always at the best price. Furthermore, Intermarché’s value proposition is further enriched by a wide range of own brands and, nowadays, sells more

than 3.850 references of its own-brand products. Besides using its plants in France, Intermarché also works with national producers who develop some of its own-brand products, a factor that further attests to the concern to promote national production.

Intermarché currently has 252 stores in Portugal, spread across 187 towns from North to South of the country which gives Intermarché almost two million visitors per week in all stores. Among the multiple services provided to the Customer at the Intermarché stores, the 188 fuelling stations available throughout the national territory must be highlighted - a pioneering service launched by the Group that is directly related to its vocation to offer its customers the lowest prices low in each region, combining them with a good quality of product and service.

Besides Intermarché, “Grupo Os Mosqueteiros” also has two other insignias in Portugal: Bricomarché and Roady.

Bricomarché is the first insignia of non-food distribution created, in 1979, by “Les Mousquetaires” and opened in Portugal in 1998. Organized in five main sectors (Decoration, DIY, Construction, Garden and Pet-Shop), it offers thousands of different goods, from the more basics to the more advanced and its stores can have sales areas from 1.300 to 3.348 m<sup>2</sup>.

Bricomarché’s positioning is based on three fundamental axes: range variety with the best offer; the clear separation between useful buying and pleasure buying; and adoption of a new store concept that illustrates the growth dynamics of the insignia.

Bricomarché’s notoriety is also reflected in the professionalism and personalization of the sale, that is, technical assistance, cutting to measure, customer support, free quotes, woodcutting, financing solutions, home delivery, after-sales service, assembly and installation, paint refinement and gift voucher.

Roady (formerly Stationmarché) is a repair and maintenance workshop as well as an automotive store that includes parts, equipment and products. In Portugal since 1998, Roady has 33 stores in the country.

Roady centres are based on four fundamental axes: national guarantee on all work performed; availability of all parts within 24 hours (according to available stock); throughout the year, all major brands are available at the best prices; and commitment to be able to equip all vehicles, even the most recent ones.

As well as in the other insignias, Roady also pays great attention to the services provided to its customers and the prices practised.

## Transbase – Transporte e Logística, S.A.

Besides the importance of the insignias, the Group considers logistics as the cornerstone of its operation. Therefore, the Group created their own logistics (Transbase) that provides its services to Intermarché, Bricomarché and Roady stores and is organized around distribution centres, where almost all goods sold at points of sale are centralized.

The management of this system is based on a highly sophisticated computer network, which controls goods from ordering to sale, and on a network of warehouses. This structure allows guaranteeing deliveries up to 24 hours after ordering, regardless of the size or geographic location of the point of sale.

### Distribution centres

Initially equipped only with a small distribution centre in Cantanhede, the Group needed to create new structures, as a result of the rapid development achieved. Thus, in 1994, the Alcanena logistical structure was created, which currently represents 48.000 m<sup>2</sup> of warehouse and 3.500 m<sup>2</sup> of offices, totalling 752 jobs.

Paços de Ferreira followed in 2000 with 32,300 m<sup>2</sup>, creating more than 250 jobs. Finally, at the end of 2002, a new distribution centre in Cantanhede started to operate, intended for non-food products, with 27,500 m<sup>2</sup>, and employing about a hundred people.

In 2009, the Group's new platform was inaugurated in Paços de Ferreira, which expanded this distribution centre, allowing the creation of 100 new jobs. This new platform of fresh products includes two distinct areas (one of meat with 800 m<sup>2</sup> and one of fish with 1.500 m<sup>2</sup>) making the distribution centre with 34.600 m<sup>2</sup> in total.

### Organizational chart

Figure 4.2 presents the organizational chart of Transbase.

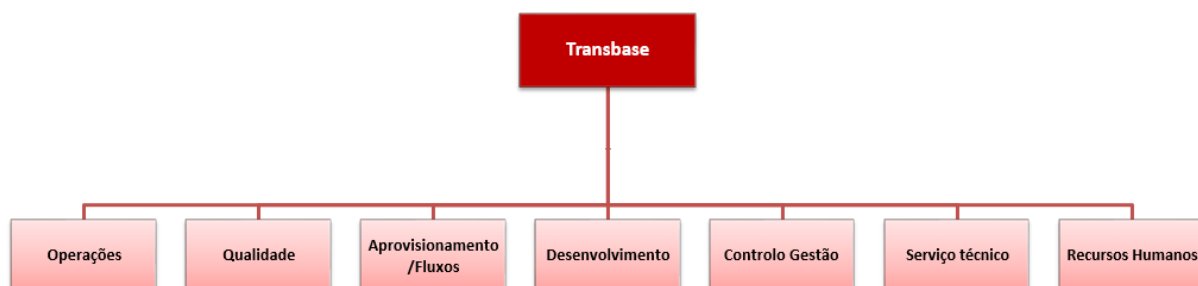


Figure 4.2 – Transbase organizational chart (Source: company documentation)

The departments inserted in this research are the ones who have the most contact, namely Operations, Purchasing and Logistical Flows departments.

Operations handle all operations in the warehouse from the reception of products to picking and transportation. This study will focus on the reception process, that is where the Operations department has contact with the supplier.

Purchasing department makes all orders to the supplier and manages the inventory level. This department doesn't negotiate pricing, that is the responsibility of the commercial area, as exposed before in this chapter.

Logistical Flows works as the bridge between Transbase and the suppliers since it is the main contact for suppliers when it comes to logistics problems. It handles the monthly reports, performance meetings with suppliers and has an analytical function that provides internal reports about the logistical flows of Transbase.

**4.2. Methodology application**

In this subchapter, the research steps will be applied: collaboration characterization (4.2.1); Solution proposal/implementation (4.2.2); Proposal evaluation (4.2.3) and Final recommendations (4.2.4).

**4.2.1. Step 1 - Collaboration Characterization**

As mentioned before, negotiations with the commercial department (since pricing to the actualization of the logistic data of the product) and invoice with the financial department are not considered in this study. The relationship with suppliers considered in this study is the one with Transbase.

Thus, Transbase’s main contacts with suppliers occur in two stages: order and reception. Additionally, monthly reports with information about these two processes will also be described in this step.

**4.2.1.1. Order and reception stages (as-is)**

**Order**

Figure 4.3 shows the order process as-is.

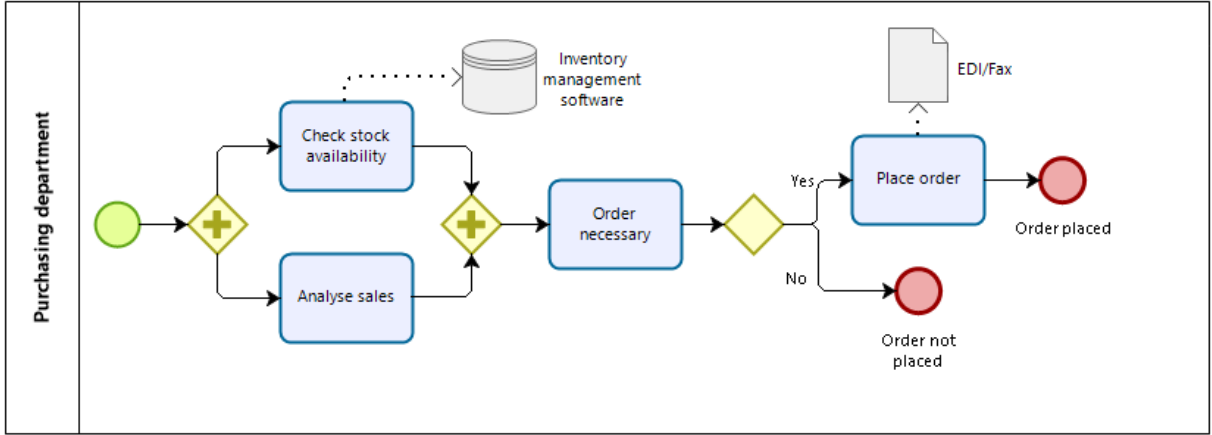


Figure 4.3 – Order process mapping as-is

Firstly, the inventory manager analyses previous sales and stock availability with inventory management software. After the analysis and if necessary, the inventory manager sends a purchasing order to the supplier through fax and/or EDI (example in figure 4.4).



```

+-----+-----+-----+
| ITMP ALIMENTAR, S.A.          |          |          |
| LUGAR DO MARRUJO - BUGALHOS  |          |          |
| 2384-004 ALCANENA Portugal    |          |          |
| Cont.:                        |          |          |
+-----+-----+-----+

```

\*\*\* ENCOMENDA NORMAL \*\*\*

```

No Encom. | 1207172.0 |
+-----+-----+
Data de enc. init : 25/05/2020

```

```

Supplier information      No Contrib. :      Supplier
                          Telefone.....:      information
                          Fax.....:
                          Contacto.....:

```

```

+-----+-----+-----+
|                               |          |          |
| Port : Paye par fournisseur  |          |          |
|                               |          |          |
| Encomenda entregue por si no dia |          |          |
|                               |          |          |
| Observaões.... :            |          |          |
+-----+-----+-----+

```

Cod.	Descrip+ao	Marca	Div	Qtd Fac	Qtd Gratuita	UC/Caixa	Qtd Ent (UC)	San
		PAN			Observaões.....:			Ref. Forne
		Brand	Price per unit	Quantity (boxes)		Units/box	Total quantity	Article code
00223005	0.25L							
01717364	ACAI EDITION 0.25L							
01811726	MACA E KIWI EDITO.25L							

```

+==== Morada de entrega +-----+
+                               *
+                               *
+ BASE DE ALCANENA           *      Numero caixas facturadas :
+ LUGAR DO MARRUJO BUGALHOS *      Numero caixas gratuitas :
+ 2384-004                   *      Total :
+ ALCANENA                   *
+                               *
+                               *      Total de Paletes encomendadas :
+-----+

```

>>> ENCOMENDA COM AVISO DE RECEPCAO <<<

Figure 4.4 – Example of order (Source: company documentation)

## Reception

Figure 4.5 details the reception process as-is in Transbase.

The driver, after arriving, will register in the entrance gate talking to the security. Afterwards, the security accepts the registration and hands over an entrance document (with arrival time) to the driver, who will have to wait for the receptionist to call to park the truck in a platform. After parking the truck, the driver delivers the papers (entrance paper and invoice) to the receptionist. Then, the receptionist will check the products in the truck (one by one) and unload the product (and verify if it is in accordance with the invoice and reception rules) or send the product back. Besides that, the receptionist must register all these events in the system.

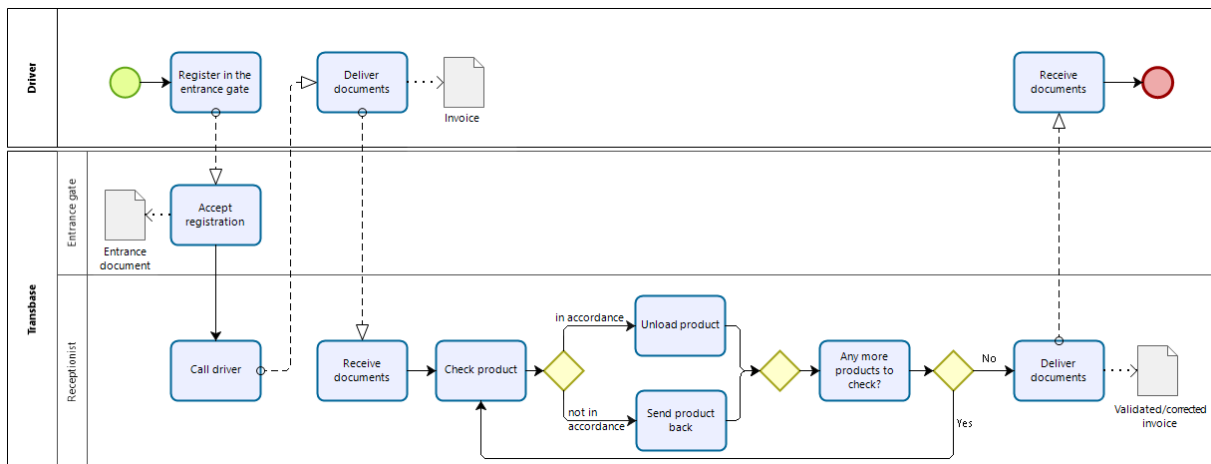


Figure 4.5 – Reception process mapping as-is

Table 4.1 summarizes the top 10 reasons why a product may not be considered in accordance when products are being checked. These reasons were extracted using information related to refusals corresponding to around 90% of all errors at the reception since the beginning of 2020.

Table 4.1 – Errors at reception (Source: company documentation)

Errors at reception	% packages/total
Damaged product/package	17,22%
Incorrect expiry date	14,53%
Billed but not delivered	12,20%
Pallets w/o unloading conditions	11,91%
EAN doesn't match	11,84%
Incorrect designation	4,82%
Incorrect packaging	4,81%
Unstable palletization	4,50%
Non-homogeneous pallet	3,93%
Non-conforming quality	3,79%
	89,55%

Once all the products are checked, the receptionist will fill and deliver the papers – validated/corrected invoice, reception report delivered by the reception system (where is visible all products received and/or refused and the reasons for refusal, example figure 4.6) and, if needed, a refusal receipt – to the driver who will leave the premises.



#### **4.2.1.2. Monthly reports**

Transbase (represented by Logistical Flows department) automatically generates a PDF document and sends it by e-mail at the beginning of every month a report with all orders from the previous month. Those reports contain information related to the service level (received products/ordered products), refusal reason (filled out in the system by the receptionist at the time of order verification) and value of logistical penalties (whether by delay, by stockout/non-delivery or failure to comply with previously agreed unloading conditions).

Figure 4.7 presents an example of a monthly report sent by Transbase.

This procedure allows Transbase and its suppliers to control their contractual obligations and review their performance every month. Besides this, suppliers can contest any penalty they consider undue. For such, they must respond to the email that contains the report with the reasons for contesting. Afterwards, an analyst of Logistical Flows department will analyse the case and decides whether to remove the penalty or forward the situation to the commercial area.


#### **4.2.1.3. Overview of difficulties due to lack of collaboration**

The analysis of the processes mapped allow to identify some difficulties that can be improved.

Firstly, the reception process is slow as the receptionist has to check all the information about the product and input it in the reception system before unloading it. This takes, on average, approximately 2 hours per truck.

Secondly, the lack of knowledge if an order is being delivered or not (the suppliers that inform about a non-delivery are very rare) causes many troubles to Transbase. On this note, according to company files, nearly 5% of orders weren't delivered and 7,36% weren't delivered on the day accorded. This, besides jeopardizing Transbase reception plan, may cause stockouts.

Concerning the monthly reports, and although allowing the performance measurement of suppliers, being a monthly report can make Transbase/suppliers late in solving problems.

	<b>NÍVEL DE SERVIÇO FORNECEDOR</b> Detalhe das encomenda apuradas de 01/05/2020 até 31/05/2020	Página 1 de 15
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**Fornecedor**

Encomendas	Linhas / Encom.	Atraso Médio	Linhas	Quantidade	Valorização
48	10,6	0,00	508	25.165 Cx	388.154,29 €

**Resumo por estado de entrega**

Estado	Linhas	Quantidade	Valorização
NÃO ENTREGUE TOTALMENTE	52	2.094 Cx	34.126,37 €
NÃO ENTREGUE PARCIALMENTE	2	28 Cx	530,44 €
ENTREGUE	454	22.811 Cx	348.672,92 €

**Resumo por motivo de devolução de mercadoria**

Motivo de Devolução	Linhas	Quantidade	Valorização
EAN13 NÃO CORRESPONDE	4	290 Cx	9.144,72 €
DLV NAO RESPEITA DIAS MINIMOS	8	456 Cx	5.408,93 €
FATURADO NAO ENTREGUE	2	28 Cx	530,44 €
DLV NAO HOMOGENEA NA PALETE	1	24 Cx	257,57 €
ROTULAGEM ILEGIVEL	1	24 Cx	257,57 €

**Nível de Serviço Mensal**

Base	JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	Total
ALCANENA	95,99%	98,06%	98,34%	98,09%	91,39%								96,41%
PACOS	97,03%	98,74%	96,49%	91,41%	91,81%								95,06%

**Penalidades Apuradas**

JAN	FEV	MAR	ABR	MAI	JUN	JUL	AGO	SET	OUT	NOV	DEZ	Total
1.872 €	390 €	3.685 €	361 €	1.733 €								8.040 €

**Detalhe por Encomenda**

Encomenda	Criação	Previsto	Receção	Supressão	Apuramento	Atraso	Nível Serviço	Penalidade
1201804.0	28/04/20	04/05/20	04/05/20		04/05/20	0	88,76%	76,23 €
<b>Grp.</b>	<b>Código</b>	<b>Descrição</b>	<b>Marca</b>	<b>Cx Enc.</b>	<b>Cx Rac.</b>	<b>Não Rac.</b>	<b>Tx Pen.</b>	<b>Penalidade</b>
46	00359512			20	20	0		
46	00360184			22	0	22	4.00% (E)	10,54 €
46	01231946			33	33	0		
46	01258566			20	20	0		
46	01258570			20	20	0		
46	01304940			20	20	0		
46	01415856			36	36	0		
46	01596732			42	0	42	4.00% (E)	21,79 €
46	01612905			24	24	0		
46	01752872			42	42	0		
46	01773785			24	24	0		
46	01797130			24	24	0		
46	01797182			24	0	24	4.00% (E)	20,07 €
								24dx DLV NAO RESPEITA DIAS MINIMOS
46	01797174			48	0	48	4.00% (E)	23,84 €
								48dx DLV NAO RESPEITA DIAS MINIMOS

(\*) Leadtime Não Respeitado

(A) Apuramento Anual

(B) Apuramento Mensal

(C) Apuramento por Encomenda

Figure 4.7 – Monthly report (Source: company documentation)

#### **4.2.2. Step 2 – Solution proposal/implementation**

The solution to improve the way information is shared between Transbase and its suppliers, both proposed by Transbase and validated by literature review, is an information system implemented in conjunction with a supply chain technology company.

This solution is a Web service mode (mentioned by Zha & Ding (2005) as a mode of information sharing system), where information is shared through Web services that, as O'Brien & Marakas (2011) referred, is slowly replacing EDI. As O'Brien & Marakas (2006) proposed its possibility by using the Internet, this solution is a platform accessible through a username and password.

Therefore, Transbase is a pioneer in the use of this type of technology in Portugal and has chosen a partner with experience in implementing these types of projects (namely with a British retail company).

##### **4.2.2.1.Objectives of the platform**

This platform will focus on providing information about the fulfilment of the order and its objectives will be based on four main points:

###### **➤ Real-time information**

With this solution, Transbase and its suppliers will have information in real-time based on the events that will happen since the creation of the purchase orders until the delivery of the goods in Transbase distribution centres. The access to this information will allow Transbase and suppliers to explore the data and gain better visibility about their processes.

###### **➤ Easy and Proactive Access**

The platform is hosted in the Cloud, as such is accessible through a normal Web Browser without the need to install any component. This model allows easy access (through username and password) and proactive use with permanent access to updated information on order processing between Intermarché and its business partners.

###### **➤ KPI based analysis**

The platform contains reports to explore the data in more detail and dashboard. Within the dashboard, Transbase and its suppliers will have access to KPIs that display consolidated information, where it's possible to explore the data that origins the KPI. This way, all users can understand which data was used and gain better insight.

The KPIs defined by Transbase to be presented in the dashboard and to serve as performance indicators are:

- Service level – calculated from the ratio between products successfully received and products ordered;
- Delay – Average days of delay by suppliers;
- Waiting time – Average waiting time for unloading a car after check-in;
- Errors at the reception – Reasons for problems with products in the reception stage.

➤ **Follow-up from the supplier to Transbase**

The platform provides information on the order status throughout the supply chain, from the Supplier to Transbase. All stages of an order along the supply chain are recorded and visible in the platform, thus allowing a fine analysis and full understanding of the route, timings and, therefore, results associated with order processing.

**4.2.2.2. Platform functioning**

To make the platform operational, Transbase and suppliers need to share messages that will “feed” the information system. Figure 4.8 shows those steps:

1. Purchasing order (PO) is issued in the platform, in parallel with purchase order issue through EDI and/or Fax, where suppliers can access to information such as articles, quantities and delivery date (example in figure 4.4);
2. The supplier ships the order and sends an Advance Shipping Note (ASN) into the platform that will match with the respective PO. By sending the ASN, a series of information about the truckload are communicated as serial shipping container code (SSCC), goods, quantities, lots and expiration date;



Figure 4.8 – Messages in the platform

3. The arrival of a truck at Transbase’s distribution centre (DC) is registered through a check-in process and the record of arrival time is visible in the information system;
4. Transbase receives the goods and sends a goods receipt (GR) to the platform which will allow seeing information like refused goods and reason for refusal, reception waiting time and check-out time.

#### 4.2.2.3. Order and reception stages (to-be)

Due to the platform, the processes with the suppliers will have changes.

### Order

Figure 4.9 illustrates the order process to-be.

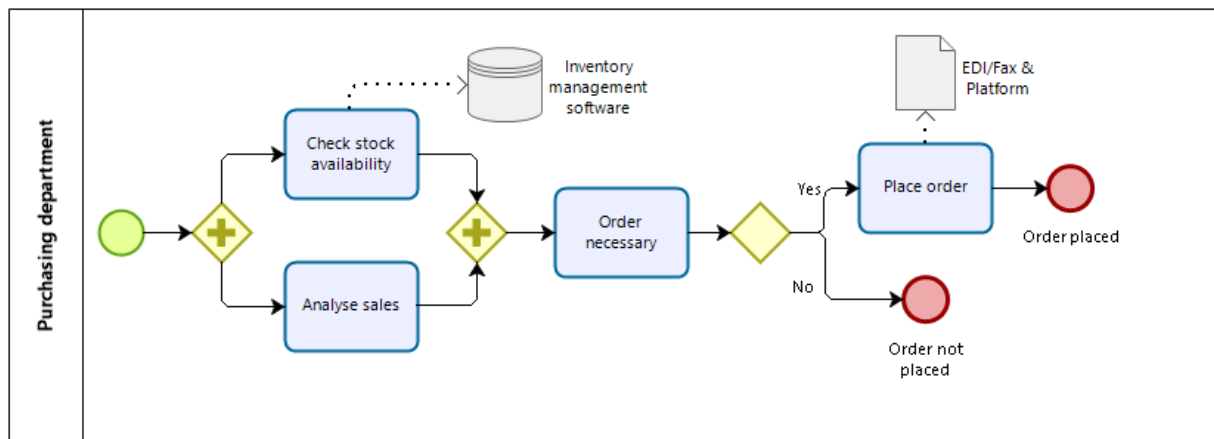


Figure 4.9 – Order process mapping to-be

The ordering process remains basically the same. The only difference is the order being sent to the platform, besides EDI or fax.

Upon shipping order, the supplier will send an ASN to the platform (see figure 4.8).

### Reception

Figure 4.10 illustrates the reception process to-be in Transbase.

With the ASN sent to the software, it functionates as a pre-register since Transbase knows the truck in transit, so it can also estimate an ETA (estimated time of arrival).

After arriving, the security acknowledges the arrival, records arrival time and accepts the entrance.

The receptionist then calls the driver to park the truck in a reception platform.

Afterwards, the receptionist (who has access to the ASN, therefore knows which products are in the truck and which are in accordance with the order) unloads all products, only checking



if the information in the label matches the product (if not, the product is refused). This allows a faster process as the receptionist doesn't need to check all aspects of the product, only if the label matches the information of the ASN.

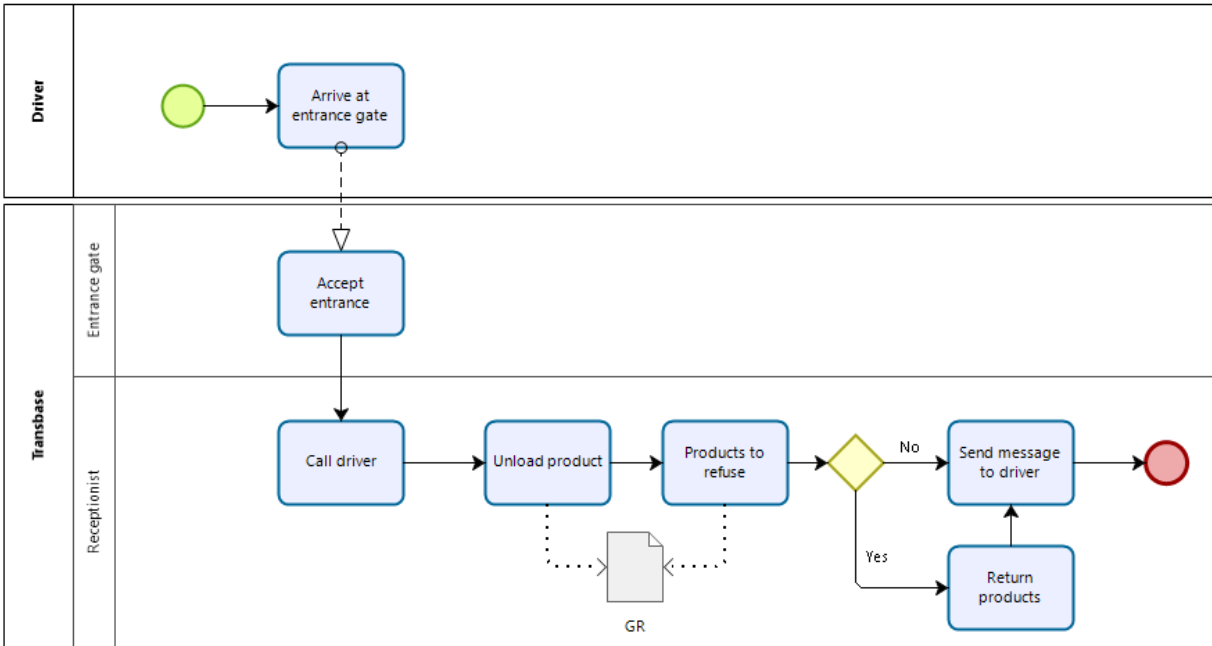


Figure 4.10 – Reception process mapping to-be

Having unloaded all products and register received products (and, if existent, errors), a goods receipt is sent to the system and the driver is informed that it is possible to leave the distribution centre.

**4.2.2.4.Implementation of platform**

After having the solution defined with the supply chain technology company, the steps needed to implement the platform are visible in Figure 4.11.



Figure 4.11 – Solution implementation

**Step 1 – Meeting with suppliers**

The goal is a generalized implementation of all suppliers, however in the first stage of meetings only the “big” suppliers (that perceptibly have more capability) were considered, selected when analyzing a benchmarking in which Transbase participates, in addition to the sales volume.

To summon these partners, an email was sent requesting a meeting to discuss a new project. Moreover, there was the need to plan the visits; execute the meetings and monitor the results and opportunities arising from it.

The purpose of these meetings was to present the project and understand the openness, time and resources - mainly technological – of the suppliers to start this project with Transbase.

The meetings had a duration of, approximately, 40 minutes and were guided by a PowerPoint document that contains all the information present above in chapters 4.2.2.1 and 4.2.2.2., as well as an example of the possible dashboard of the platform.

Until the need for obligatory confinement due to COVID-19 outbreak, a total of 16 meetings were executed. All suppliers except for one affirmed the capability to participate in this project.

However, this first meeting was only introductory and after the meeting was sent the specifications (PDF document) by email so the suppliers could ascertain with their IT department and the capability to send the necessary messages.

A total of 20 meetings were executed after the confinement, however this time, and due to actual restrictions, via video call guided with the same PowerPoint document.

### **Step 2 – Follow-up**

After the first meeting, there was a need to receive feedback from the suppliers. Since none had responded during the obligatory confinement, an email was sent to the initial 16 suppliers asking if there were any advances from their part that allowed them to move to the next stage.

Of those 16, only 8 responded and the answers were all negative, mostly due to COVID-19 outbreak and the impact it had on their company.

The other 20 suppliers had yet to provide feedback.

### **Step 3 – Testing with partner**

Since none of the suppliers had any positive advances with their IT department, this step was not realized.

After testing with Transbase's partner and being able to send the ASN, suppliers would have access to the platform.

### **4.2.3. Step 3 – Proposal evaluation**

This step should be ideally divided into two stages that are essential to measuring the impact of the new system in the collaboration between Transbase and its suppliers: first, several KPIs

should be measured before and after the implementation of the system; and a questionnaire should then be prepared and sent to Transbase collaborators working in the ordering and receiving processes. With this information it is possible to assess how efficient and effective is the implementation of the system in Transbase.

However, due to COVID-19, solution implementation has not been finalized. Thus, only expected improvements due to the process simplification (visible by comparing as-is mapping with to-be mapping) achieved as a result of the system implementation will be presented in the first stage.

Concerning the questionnaire, it was possible to be disseminated and analysed due to the development of an internal tool that already includes all the information that is supposed to be introduced in the new system by Transbase. Accordingly, Transbase' employees/managers can answer to the following categories of the questionnaire (Annex B): Information Quality; Use; and Individual Impact. The other categories (System Quality and Organization Impact) will be answered only by the managers and by the future perception of the information system. Due to the problems already mentioned, suppliers will not respond to the questionnaire, as planned.

#### **4.2.3.1.Stage 1: KPIs evaluation**

Analysing process mapping as-is and to-be after information system implementation allows to identify improvements in the collaboration between Transbase and its suppliers and in the operational performance. Those are related to the following 7 KPIs:

##### **➤ Flexibility in the reception process**

By receiving the ASN, Transbase already knows which products are arriving in each order. If the ASN isn't received, Transbase will have knowledge of the failure.

Therefore, the unloading plan will be improved and the resources allocation to this process will be managed in a better way.

##### **➤ Reduction of errors at reception**

Errors at reception (table 4.1), whose information is present in ASN, will be visible when matching with respective PO. So, taking into consideration the table 4.1, those errors are incorrect expiry date; billed but not delivered; EAN doesn't match; incorrect designation; and incorrect packaging. These errors represent, at least (as table 4.1 only represents the top 10), 48,2% of all of the 10 top errors at reception.

As this information is also available for the supplier in the information system, the shipment can be corrected and these errors avoided.

➤ **Reduction of driver's waiting time**

The increased insight and visibility to ETA, driver arrival and the increase of flexibility in the reception process will help to reduce the driver's waiting time. This also helps return capacity to the market.

➤ **Improved inventory management**

By knowing what will be received, inventory managers know beforehand the stock that will be available and manage orders and stockouts accordingly. This will also permit to reduce safety stock build-up.

➤ **Paper's dematerialization**

By providing ASN, Transbase won't need to receive the invoice from the driver, as nowadays, to compare the products billed and products received. Furthermore, the reception receipt will also be replaced by the GR sent to the information system.

Each month, on average, is printed 8.500 reception receipts (many with multiple pages). So, if 20.000 pages are printed at a cost of 0,02€/per page, there's a saving of 400€/monthly.

➤ **Access to the same data in real-time**

Problems with a product or order, that, with monthly reports, could take up to one month to solve, can be approached daily with the same information available for both Transbase and suppliers in real-time.

This will also allow for Transbase and its suppliers to have a common performance measurement of service level/penalties in real-time.

➤ **Control of carriers and third-party logistics (3PL) providers by suppliers**

Having access to check-in and check-out times provided in GR, suppliers can compare information received from its carriers or 3PLs with the information from the information system.

#### **4.2.3.2.Stage 2: Questionnaire**

The questionnaire is based on a questionnaire proposed by DeLone and McLean (2016) and Sedera, Eden & McLean (2013) on how to measure the success of an information system. Even though the model was updated with more indicators, as exposed in the literature review (see chapter 2.4), this questionnaire only focuses on 5 topics: Information Quality; Use; System Quality; Individual Impact; Organizational Impact.

As mentioned before, the questionnaire is intended to all users of the information system, that includes 24 inventory managers from purchasing department, 3 analysts from Logistical Flows department, 3 managers in charge of the information system implementation and all

suppliers' representatives. However, as the information system was not totally implemented, the questionnaire is answered by the ones who have access to the internal tool, which does not include suppliers.

Even though the questionnaire answers don't include the visibility about the information that suppliers will send (ASN) or even the answers of suppliers, the answers from purchasing and logistical flows departments about information available in PO and GR (visible in the internal tool developed) gives a starting point on how important this shared information to the relationship with the suppliers is and will be when the solution is fully implemented.

**Detailed analysis of the questionnaire's answers**

Description of the sample

To facilitate the interpretation of this questionnaire, a characterization of the respondents was made.

The total respondents (figure 4.12) were 27, where 22 are from purchasing department, 2 from Logistical Flows department and 3 managers (Logistics and Supply Director, Purchasing and Logistical Flows Coordinator and Logistics Development Coordinator).

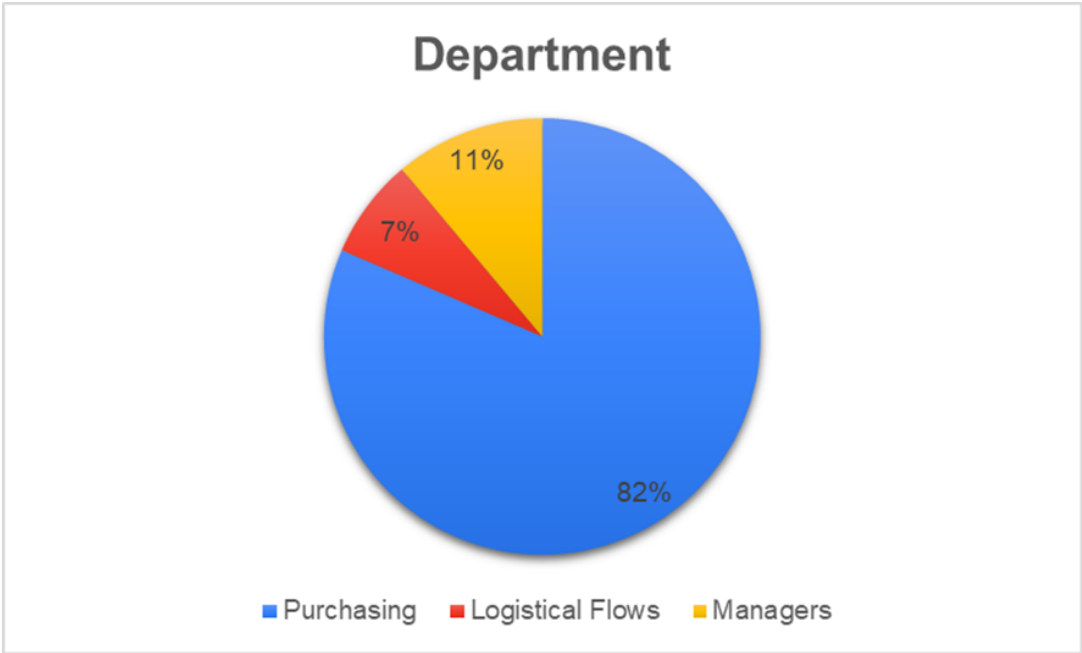


Figure 4.12 - Department

70% of the respondents have been working in the Group for 16 years or more and 55% have been in the actual job for 16 years or more (figures 4.13 and 4.14).

It's safe to say that most of the respondents are both experienced on the job, but also on the Group itself.

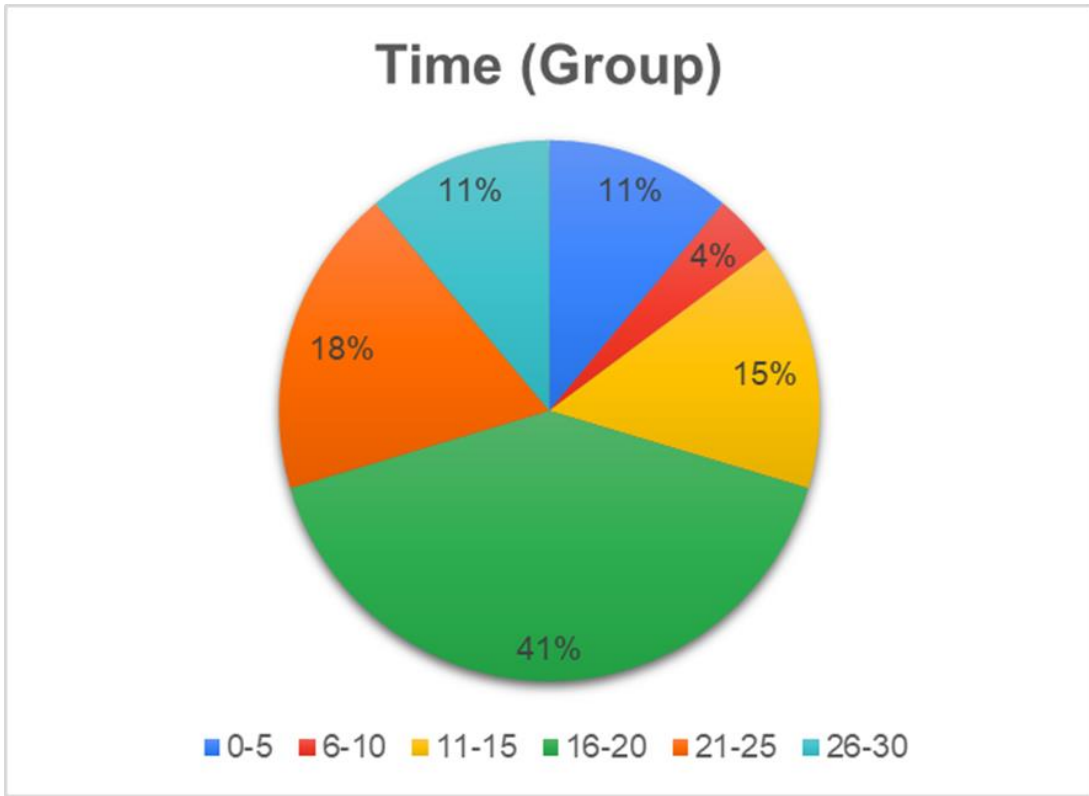


Figure 4.13 – Time at Group

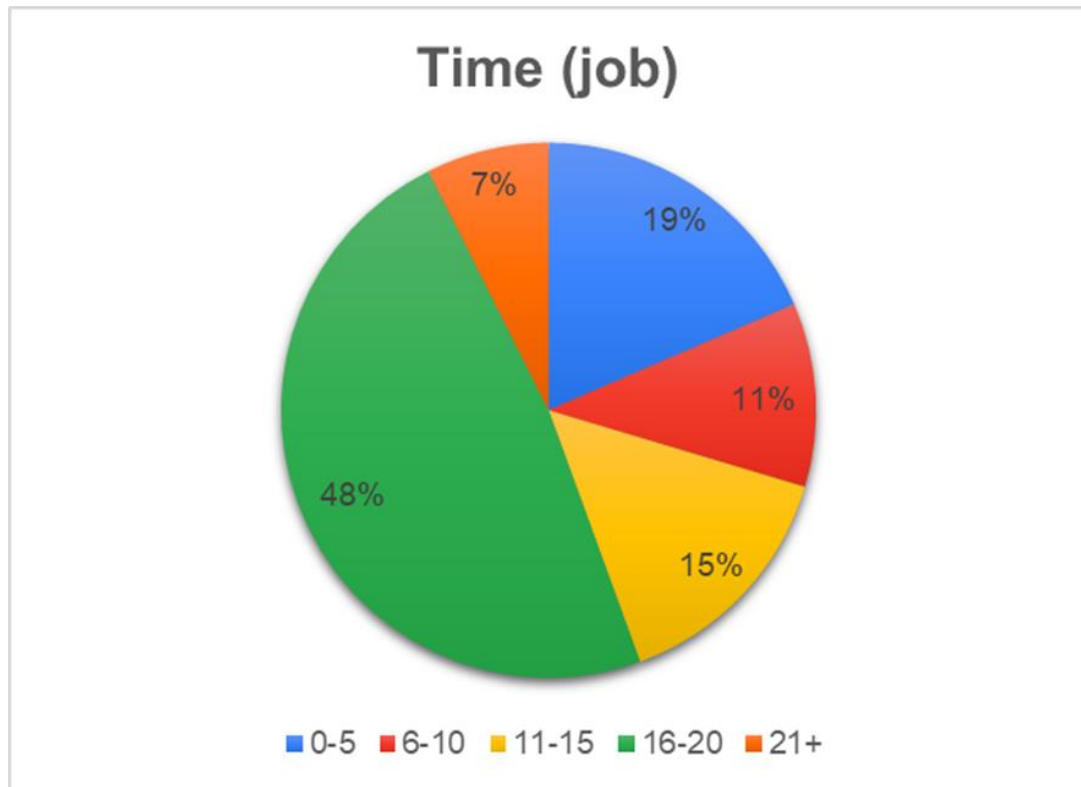


Figure 4.14 – Time at current job

### Information quality

Information quality is one of the most important questions in this questionnaire as the objectives of the research is to improve information sharing and collaboration between Transbase and its suppliers and this topic allows to measure the respondents' view on information timeliness, accuracy and completeness (figure 4.16).

Even though the actual order tracking (with information only of the GR) is based on the past, that is only after receiving the order, is visible the information of what happened, 93% of respondents, the information currently available is exactly what is needed for correct order tracking (figure 4.15). This is explained due to the paradigm installed in the collaboration of the non-existence of real-time information about what is arriving (present in ASN) and the fact that most of the problems are only discussed after they happen.

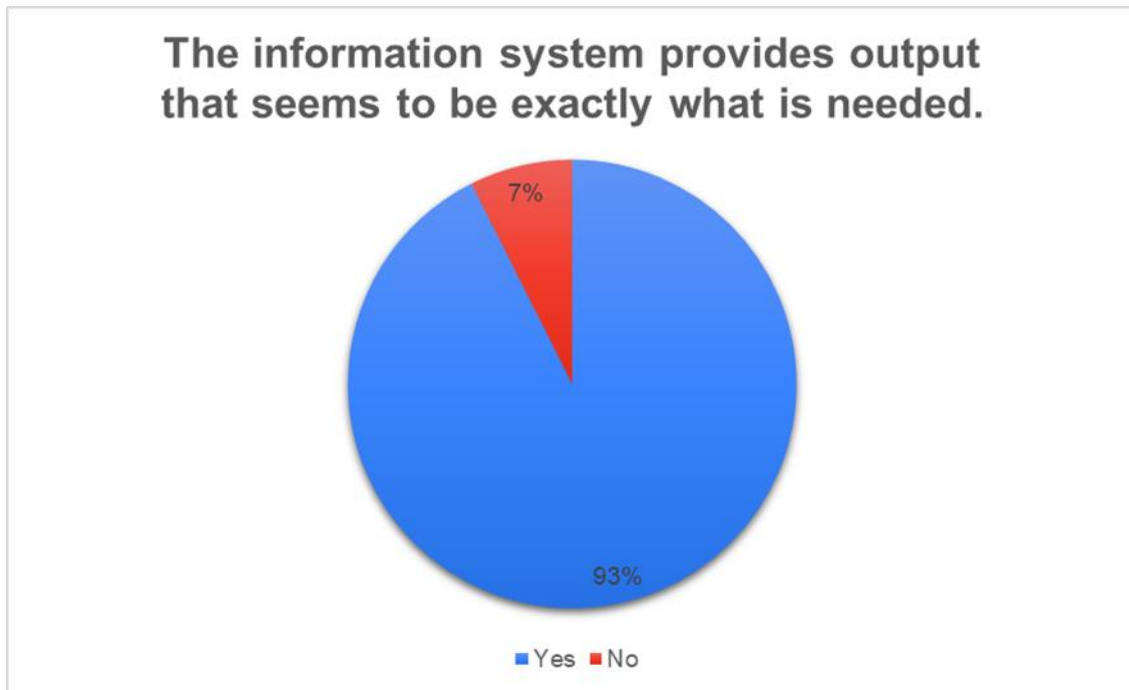


Figure 4.15 – Introductory Question Information Quality

Most respondents (96,3%) agree that information they need is always available and (92,6%) that is readily usable, which means that the frequency of information shared (timeliness) is real-time and corresponds to the needs of the users (completeness).

Moreover, the information shared is near its actual value (accuracy), since 88,8% of respondents agree that information is easy to understand and 96,3% agree that information appears readable, clear and well-formatted. Lastly, 92,6% agree that information is concise.

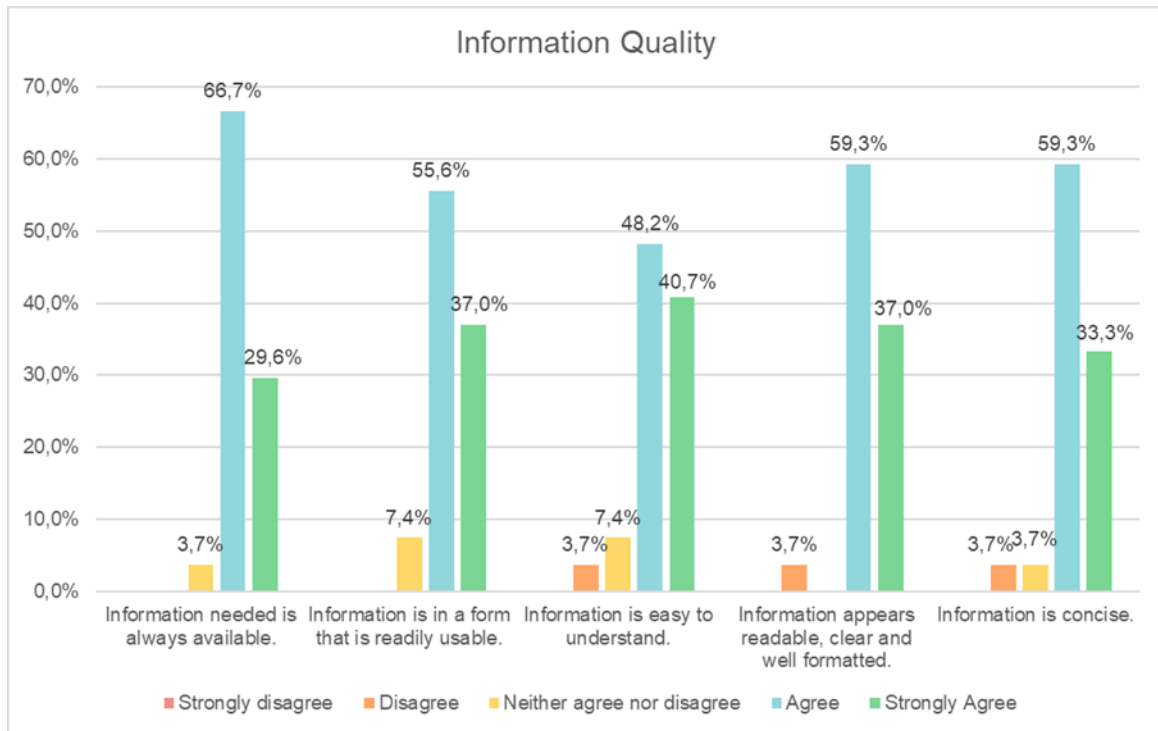


Figure 4.16 – Information Quality

Information quality will improve greatly user experience, as having better information, users will be more informed and more accurate when contacting with each other, which will ultimately improve collaboration between Transbase and its suppliers.

### Use

This section allows measuring not only the utilization of the internal tool but also the exploratory use of it (figure 4.17).

Although less than half (48,1%) access the tool several times a day, more than half (63%) of the respondents use it daily or almost every day.

The exploratory use indicators are more positive as 66,7% uses the tool features in-depth and 63% explore new uses of the tool regularly.

With the reception of ASN and all planning (whether in reception or orders) improvements that it will make possible, it is believed that this topic would increase in terms of importance and the use of the information system would be higher than the internal tool.



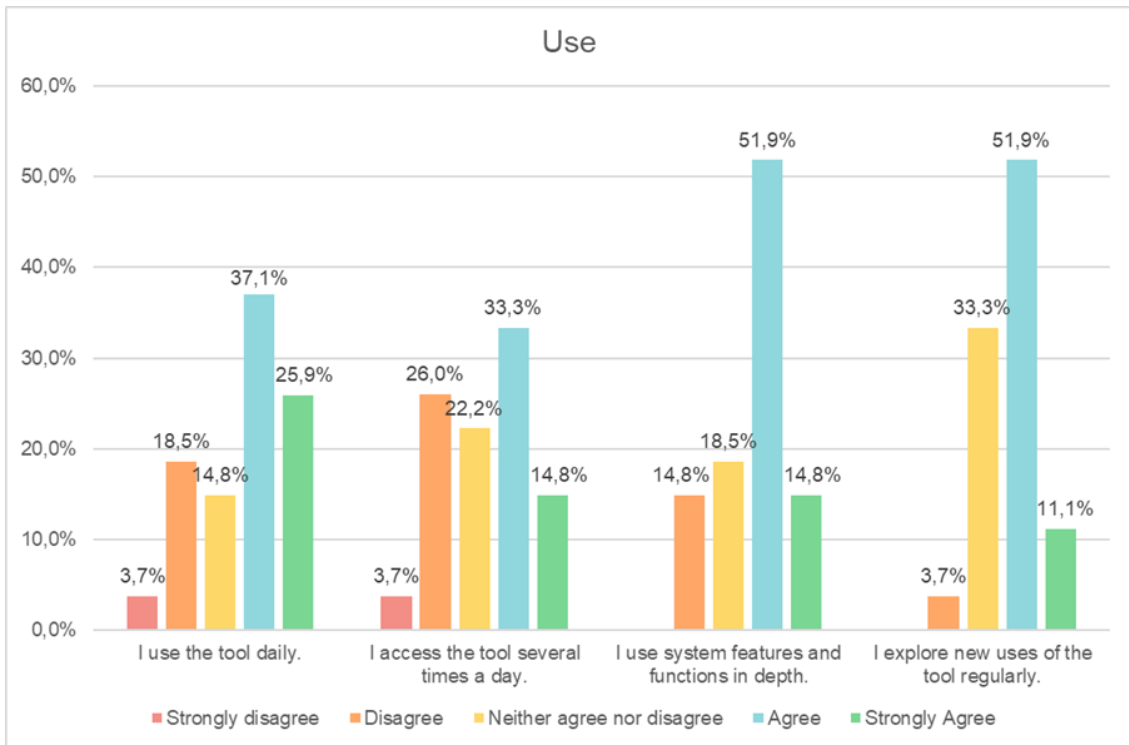


Figure 4.17 – Use

### System Quality

Another topic present in the questionnaire is system quality, however, to evaluate the performance of the system, the internal tool can't be used as it has no similarities in terms of technology. Therefore, it was asked to the managers, since they had a peek to the information system, their future perception of the solution in terms of performance (figure 4.18).

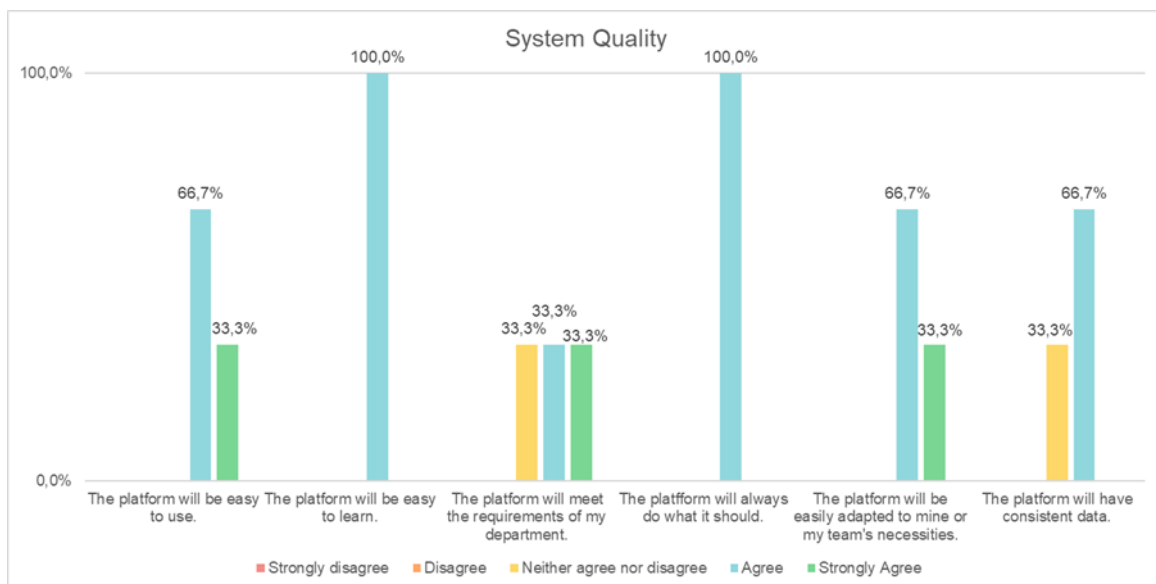


Figure 4.18 – System Quality

The expectations of the managers are encouraging, even though the highest accordance wasn't very visible in the answers, probably due to the uncertainty.

Managers mainly expect the information system to be easy to use, to learn, to be reliable and to be adaptable.

Both managers from the departments that have contact with suppliers (Logistics and Supply Director and Purchasing and Logistical Flows Coordinator) believe that the platform will meet the requirements of their department.

### Individual Impact

This topic measures the impact that the information system has on the user's behaviour, in this case the internal tool (figure 4.19).

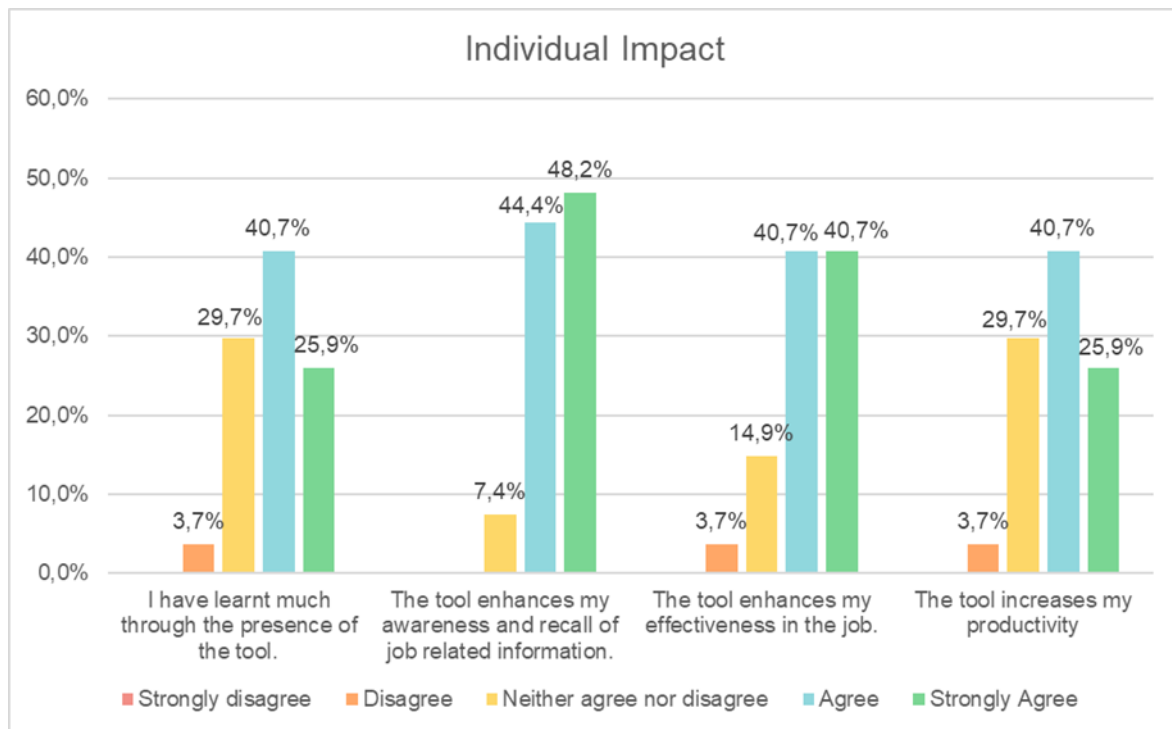


Figure 4.19 – Individual Impact

Two-thirds of the respondents agree that they have learned by using the tool and it has increased their productivity but where they notice more the impact of the tool is recalling information about the job (92,6%).

Another significant impact is the improvement of the quality of the job by using the tool (81,4%).

This is another topic, that with the use of ASN and the information system, will expectedly increase as the respondents will benefit from more tools to improve their effectiveness and productivity, as well as information when contacting/collaborating with suppliers.

## Organizational Impact

The last topic will also be only evaluated by the managers and with a future perception, since, without the solution implementation, there's no organizational impact yet (figure 4.20).

As in system quality, the expectations of the managers are encouraging (or even more). All managers agree that the platform is cost-effective and will result in cost reductions. Moreover, managers also agree that overall productivity will improve as well as the outcomes of the information system.

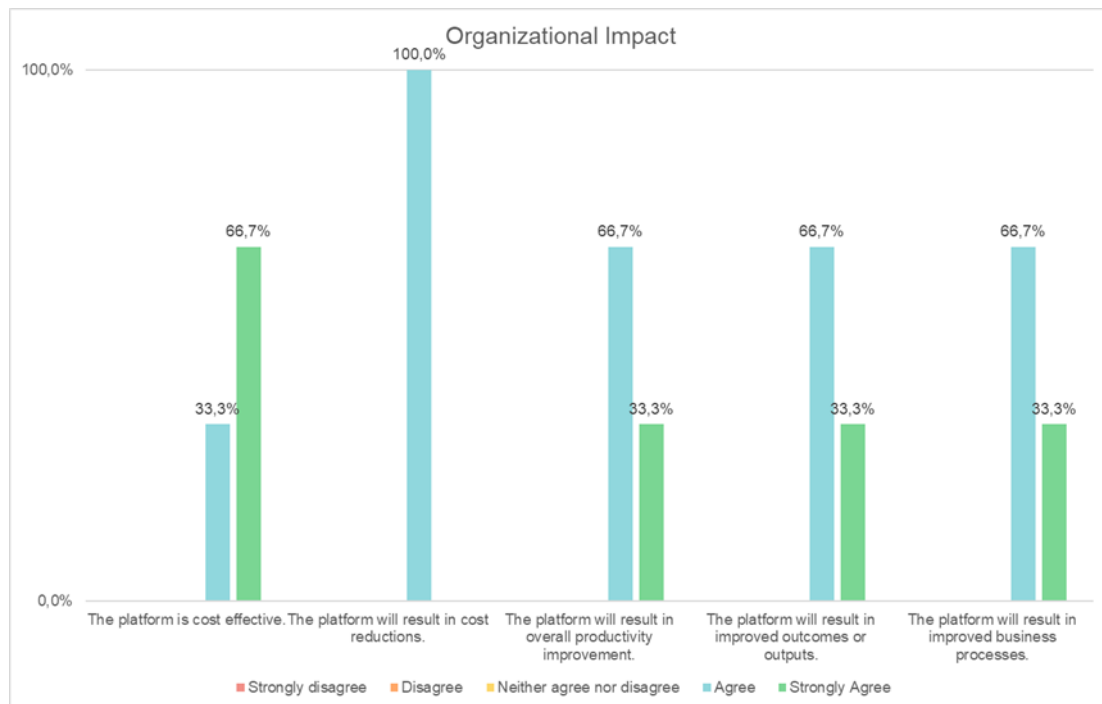


Figure 4.20 – Organization Impact

Lastly, managers are also expecting improved processes, some already described previously in this chapter.

## Overview of the results extracted from the questionnaire

In sum, with visible limitations, the questionnaire permitted to evaluate the information that will be visible in the solution, as well as the expected use. The internal tool allowed to understand how real-time information is important for Transbase (and, expectedly, for suppliers) and the level of utilization that could be given to the solution. The individual impact was another topic that the internal tool allowed to measure, even though the expected impact by the solution is higher.

However, two topics couldn't be measured, even with the use of the internal tool as an indicator. The solution found was a future perception of managers to try to understand the expectations about system quality and organizational impact.

The main conclusions from the questionnaire responses are the importance of the information system to a correct following of the order and a better performance of the inventory managers in their job, mainly by keeping them informed. The opinion from the managers about the information system is also very positive, which is a good indicator of its (future) importance for the organization.

#### **4.2.4. Step 4 - Final recommendations**

This chapter is the last of the case study and where will be presented recommendations to the company taking into consideration the last chapters.

Due to the delay in the project caused by COVID-19 outbreak, the implementation of the solution was not possible. Therefore, the first recommendation is to continue with the meetings with suppliers and finish the implementation of the information system.

After finishing the implementation, it's important to continue to improve collaboration with suppliers. For that, Transbase should use the metrics available in the solution to improve processes with the suppliers that have problems.

Furthermore, and also mentioned by suppliers in meetings, the information system could be improved by adding a forecasting section that would help both suppliers' production planning and Transbase's ordering process. This would, besides lowering stockouts, improve the relation, and, therefore, collaboration of Transbase and its suppliers.

These recommendations were validated in a meeting with Logistics and Supply Director and Purchasing and Logistical Flows Coordinator, even though the information system implementation wasn't finalized.

## 5. Conclusions

Transbase is the logistics company of “Groupement Les Mousquetaires” in Portugal, that supplies the majority of Group’s stores from north to south of the country. The research was executed in the distribution centre in Alcanena, mainly integrated into the Logistical Flows department. The main goal of the project was to improve collaboration between Transbase and its suppliers, in particular by improving information sharing. To achieve that goal, a characterization of actual collaboration was executed, followed by a solution proposal and consequent implementation and evaluation.

To answer the research “*How to make Transbase’s operational performance both more effective and more efficient through better collaboration with its suppliers?*” and comply with the proposed objectives, a series of actions were taken.

To characterise collaboration and identify failures, it was necessary to understand how reception and ordering process works and map all material and information flows. Then, a solution was chosen and specifications defined in conjunction with supply chain technology company. To start the implementation of the solution, a series of meetings with suppliers were executed to present the information system and evaluate their capacity. Although the solution implementation was not finished, a series of expected improvements were provided, as well as the analysis of responses to a questionnaire intended for Transbase employees who have contact with suppliers.

Even though the original plan was not possible to achieve, it is possible to consider, although not with 100% certainties, that the objectives were accomplished and that by improving collaboration with suppliers, operational performance will indeed be more effective and efficient.

Findings have limitations due to the non-implementation of the solution. Firstly, the improvements are expectations and not certainties since the measures of KPIs after the implementation could not be collected. Secondly, the questionnaire didn’t focus on the information system, but on the internal tool, even though the information sent by Transbase (PO and GR) are the same. Moreover, the information in the ASN is not considered by respondents in their questionnaire responses by respondents. Finally, suppliers' views on the information system and possible impacts on collaboration were not impossible to obtain.

Given that the implementation of the solution was not finished, the main suggestion for future work is to complete this research by implementing totally the solution and compare the KPIs after and before (the step that was not possible) and collect supplier responses to the

questionnaire. Other suggestions for future work are similar research by considering forecasting in the solution; research on process improvements with suppliers, individually; and implementation of other tools to improve supply chain collaboration.

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**Annexes**

**Annex A – Semi-structured interviews**

Throughout the process mapping, a series of semi-structured interviews were done. The goal was to understand the order and reception processes and how it affected Transbase and supplier’s relationship. Thus, the following figure presents the main questions asked that led the interviews.

<b>Department</b>	<b>Main questions</b>
Purchasing	<ul style="list-style-type: none"><li>• How/When do you order?</li><li>• Do you have a program that helps?</li><li>• How is the order sent?</li></ul>
Operations (namely reception)	<ul style="list-style-type: none"><li>• How is an order received?</li><li>• Do you deliver any documentation/information to supplier?</li><li>• What happens when a problem occurs?</li></ul>

Figure A.1 – Semi-structured interviews script

## **Annex B – Questionnaire**

The following figures (B.1 and B.2) present the survey items proposed by DeLone & McLean (2016).

### System Quality

- SQ1 The [IS] is easy to use.
- SQ2 The [IS] is easy to learn.
- SQ3 The [IS] meets [the Unit's] requirements.
- SQ4 The [IS] includes necessary features and functions.
- SQ5 The [IS] always does what it should.
- SQ6 The [IS] user interface can be easily adapted to one's personal approach.
- SQ7 The [IS] requires only the minimum number of fields and screens to achieve a task.
- SQ8 All data within the [IS] is fully integrated and consistent.
- SQ9 The [IS] can be easily modified, corrected, or improved.

### Information Quality

- IQ1 The [IS] provides output that seems to be exactly what is needed.
- IQ2 Information needed from the [IS] is always available.
- IQ3 Information from the [IS] is in a form that is readily usable.
- IQ4 Information from the [IS] is easy to understand.
- IQ5 Information from the [IS] appears readable, clear, and well formatted.
- IQ6 Information from the [IS] is concise.

### Extent of Use

- U1 I spend [X number of] days per week on the [IS] completing my [procurement] tasks.
- U2 On an average working day, I create [X number of] reports/transactions per day on [procurement] tasks.

### Exploratory ES-Use

- U3 I explore new system features and functions of [X] on the [IS] for [procurement] tasks regularly.
- U4 I explore how the [IS] can better support my tasks in [procurement] tasks regularly.
- U5 I explore new uses of the [IS] for [procurement] tasks regularly.
- U6 I try new features and functions of the [IS] for [procurement] tasks to make me more efficient than others.

Figure B.1 – Questionnaire Survey Items (source: DeLone & McLean,2016)

### Depth of ES-Use

- U7 When I [purchase goods], I use [X] on the [IS] for all necessary steps.
- U8 When I use the [IS], I use the [vendor evaluation feature] of the [IS] to determine the [best vendors].
- U9 When I use the [IS], I can [record goods movements of multiple and/or partial goods].
- U10 When I use the [IS], I can determine the [errors of an invoice through MRBR transaction].

### Individual Impact

- II1 I have learnt much through the presence of the [IS].
- II2 The [IS] enhances my awareness and recall of job related information.
- II3 The [IS] enhances my effectiveness in the job.
- II4 The [IS] increases my productivity.

### Organizational Impact

- OI1 The [IS] is cost effective.
- OI2 The [IS] has resulted in reduced staff costs.
- OI3 The [IS] has resulted in cost reductions (e.g., inventory holding costs, administration expenses).
- OI4 The [IS] has resulted in overall productivity improvement.
- OI5 The [IS] has resulted in improved outcomes or outputs.
- OI6 The [IS] has resulted in an increased capacity to manage a growing volume of activity (e.g., transactions, population growth, etc.).
- OI7 The [IS] has resulted in improved business processes.
- OI8 The [IS] has resulted in better positioning for e-Government/ Business.

Figure B.2 – Questionnaire Survey Items (source: DeLone & McLean,2016)

As mentioned before, the questionnaire used in this research was based on the survey items above. However, some questions and the topic “Depth of ES-Use” was not considered as it didn’t make sense in Transbase context and the status of the solution. The other change was the aggregation of two sections about “Use” (“Extent of Use”; ”Exploratory ES-Use”) in only one topic.

The figures B.3, B.4, B.5 and B.6 present the questions asked to inventory managers, analysts and supply chain managers, while the figures B.7, B.8 and B.9 were asked only to supply chain managers.

## LogiPDV - Nível Serviço FRS

O módulo "Nível Serviço FRS" no LogiPDV permite o seguimento das encomendas fornecidas ao Intermarché e engloba um vasto leque de informações acerca do relacionamento entre Intermarché e os seus fornecedores.

O presente questionário tem como objetivo avaliar a qualidade do módulo e da informação disponibilizada por este e como este impacta a performance do Intermarché para com os seus fornecedores.

Desta forma, são apresentadas algumas questões que deverão demorar menos de 5 minutos a responder.

Agradecemos a colaboração.

[Seguinte](#)



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Figure B.3 – Introduction Internal Tool

# LogiPDV - Nível Serviço FRS

\*Obrigatório

## Informações

Departamento \*

A sua resposta \_\_\_\_\_

Há quanto tempo trabalha no cargo atual? (anos) \*

- 0-5
- 6-10
- 11-15
- 16-20
- 21 ou mais

Há quanto tempo trabalha no Grupo? (anos) \*

- 0-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-30
- 31 ou mais

Figure B.4 – Introductory questions

## LogiPDV - Nível Serviço FRS

\*Obrigatório

### Nível Serviço FRS

A informação presente é exatamente o que é preciso para um correto acompanhamento da encomenda. \*

Sim  
 Não

Que informações acha necessário acrescentar?

A sua resposta

---

Avaliação da informação \*

	Discordo totalmente	Discordo	Não discordo, nem concordo.	Concordo	Concordo totalmente	Não sabe/Não responde
A informação está disponível atempadamente.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A informação está pronta a usar.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A informação é fácil de entender.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A informação é clara e bem apresentada.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A informação é concisa.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure B.5 – Information Quality



Uso do módulo \*

	Discordo totalmente	Discordo	Não discordo, nem concordo.	Concordo	Concordo totalmente	Não sabe/Não responde
Uso o módulo diariamente.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acedo ao módulo várias vezes por dia.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uso de forma aprofundada as suas utilidades.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exploro o módulo de forma a encontrar novas utilidades.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Impacto do sistema \*

	Discordo totalmente	Discordo	Não discordo, nem concordo.	Concordo	Concordo totalmente	Não sabe/Não responde
Tenho aprendido através do módulo.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O módulo permite manter-me informado.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O módulo melhora a qualidade do meu trabalho.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
O módulo aumenta a minha produtividade.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure B.6 – Use & Individual Impact

Nesta seção pretende-se uma percepção futura de quando a plataforma estiver em total funcionamento e o impacto que poderá ter no Intermarké.

A plataforma contém as funcionalidades necessárias. \*

Sim

Não

Figure B.7 – Introduction Information System

Avaliação do sistema \*

	Discordo totalmente	Discordo	Não discordo, nem concordo.	Concordo	Concordo totalmente	Não sabe/Não responde
A plataforma é fácil de usar.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma é de fácil apreensão.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma satisfaz as necessidades do meu departamento.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma faz o que é pedido.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma pode ser facilmente adaptado às minhas necessidades ou da minha empresa.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma tem os dados consistentes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure B.8 – System Quality

Impacto na organização \*

	Discordo totalmente	Discordo	Não discordo, nem concordo.	Concordo	Concordo totalmente	Não sabe/Não responde
A plataforma apresenta uma boa relação custo-benefício.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma permitirá redução de custos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma permitirá uma melhoria geral na produtividade.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma permitirá alcançar melhores resultados.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A plataforma permitirá uma melhoria nos processos de negócio.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure B.9 – Organizational Impact