An Exploratory Research of Information Technology features and Business Practices as enablers for the Supply Chain Management

Research dissertation presented in partial fulfillment of the requirements
for the degree of

Master of Science in Procurement and Supply Chain Management

Griffith College Dublin

Dissertation Supervisor: Dhafer Alahmari

By

Laura Oliveira

21st May 2020

Candidate Declaration

Candidate Name: Laura Raquel Ferraz de Oliveira

I certify that the dissertation entitled: An Exploratory Research of Information Technology features and Business Practices as enablers for the Supply Chain Management, submitted for the degree of: **Master of Science in Procurement and Supply Chain Management** is the result of the my own work and that where reference is made to the work of others, due acknowledgment is given.

Candidate signature: 

Date: 21/05/2020

Supervisor Name: Dhafer Alahmari

Supervisor signature: *Dhafer Alahmari*

Date: 21/05/2020

Dedication

To my mum, dad, and my brother. This achievement became reality because you are there for me, always. I do love you!

Acknowledgement

Thanks to God, who inspires and guides me.

Also, I would like to sincerely acknowledge to all interviewees, my supervisor Dhafer Alahmari, my faculty guide Mary Whitney, members of the College library and my lectures. Each one of you made a huge difference to make this achievement possible.

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Thank you to all my family and friends from everywhere. Thank you to my flatmates – you are amazing!

I could not do it without you. Trust me!

Abstract

The challenge to understand the real demand, that comes from the market, and establish consistent process flow is changing the way business operates. New technologies, such as VMI (Vendor Managed Inventory), RFID (Radio Frequency Identification), POS (Point of Sales), Cloud Computing as well as different business practices like, CPFR (Collaborative Planning Forecasting Replenishment) are emerging as strategic manoeuvre to improve and create a more robust Supply Chain and ultimately increase competitiveness.

This research was conducted based on a Qualitative, Exploratory, and Inductive approach. All data originated by, either through the semi-structured interviews for the primary data collection, or through an evaluation of the literature for the secondary data collection, were analysed, by the application of the Grounded Theory, and used to allow an expansion of the knowledge that already exist.

The main findings of this study showed strong evidence that technologies and collaborative practices are being adopting by organization, which are also, using different ways to overcome the lack of similarity of systems within the chain. Additionally, Supply Chain specialists, participants of this research, have described the relevance of all these IT features and initiatives for their routine.

This study provides valuable and the most up to date information, that can be used as a "temperature check", about what is happening in the global market for the Supply Chain Management process in different industry sectors.

Key words: Business Strategy, Supply Chain, IT features, VMI, RFID, POS, Cloud Computing, CPFR.

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1 Introduction

1.1 Overview

Demand uncertainty and disruptive events, such as trade war, nature disasters, decreased resources and suppliers' bankruptcy, are some of the examples that are continuously challenging organizations' capability as well as ability to produce, distribute its products and ultimately leverage its revenue growth (Chambers et al., 2006; Hopkinson et al., 2018) (Tukamuhabwa et al., 2015). In this scenario, increase the final price (selling price), which has a direct impact for consumers, is the last option (Burnt and Boyett Jr., 1979).

The race to overcome competitors, through identification of opportunities, which allows the development of unique differentiators and create its competitive advantage, requires from a company, for instance, investments on cost reduction projects, innovation as well as streamline process (Wang, 2014; Anwar, 2018; Ismail et al., 2018). Thus, reduction of operation' variable costs aiming to optimize profitability (Chambers et al., 2006).

Besides that, organizations are giving more attention towards customers behaviour and realizing that their continuous increasing in demand could be a key factor to drive business strategy. Back in 1993, Hines pointed out that Porter's Value Chain Model was focus on profit driven rather than customer satisfaction - when it should be the top priority. Hines' Value Chain Model presents customers acting as a main driver of business strategy, which is on the opposite direction designed by Porter (Hines, 1993; Lysons and Farrington, 2016).

To cope with this increasing demand, organizations needs to develop greater strategy to delivery products and services that will meet customers expectation and add value (Porter and Magretta, 2014).

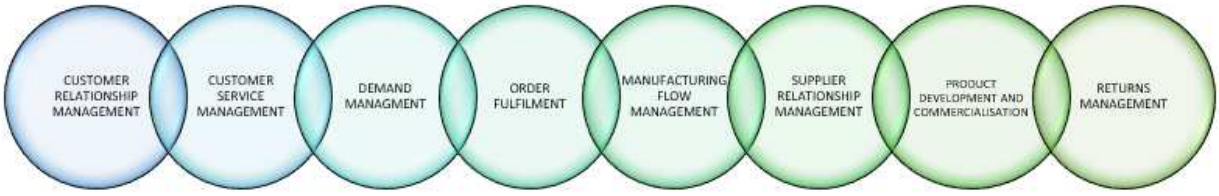
Striving for competitive advantage, boost of the potential for growth within the market as well as achieve customers satisfaction, it is vital to any organization ensure the right product in the right place, at the right price, at the right time - which means, assure product availability (Kurata, 2014; Um et al., 2018). Hence, a robust and advanced Supply Chain must exist, supported by a consistent foundation (Bendoly et al., 2018). For instance, searching for alternatives, companies are increasingly seeing the Procurement Department from a different perspective. Through providing more strategic information,

rather than only increasing the saving in a purchase process – which still relevant though, Procurement is playing a relevant role within the chain (He et al., 2016). Therefore, to utilize a full all the Supply Chain's capacity it is crucial to investment on new technologies and keep updated with innovation (Bowonder et al., 2010).

A stronger Supply Chain, based on a collaborative approach, allows better negotiation between trading partners, which can enhance companies' bottom line (Holmes et al., 2019). In this context, a supportive relationship with the supplier increase trust, potentialize a reliable chain and lastly improve forecasting accuracy (Fliedner, 2003). KPI (Key Performance Indicators) management is an alternative feature to facilitate this communication mean (Zimmer et al., 2016). Based on continuous follow up of the performance, organizations can provide feedback to their suppliers, to ensure contractual compliance.

Based on the fact that suppliers and customers are becoming valuable partners (Fredendall and Hill, 2016), Supply Chain Management emerge as a strategic feature to enable companies to achieve their goals through a holistic and innovative approach. A Supply Chain Management structure integrates the followings process (exhibit 1): Customer Relationship Management, Customer Service Management, Demand Management, Order Fulfilment, Manufacturing Flow Management, supplier Relationship Management, Product Development and Commercialization and Returns Management (Lysons and Farrington, 2016).

Exhibit 1 – Supply Chain Management Processes



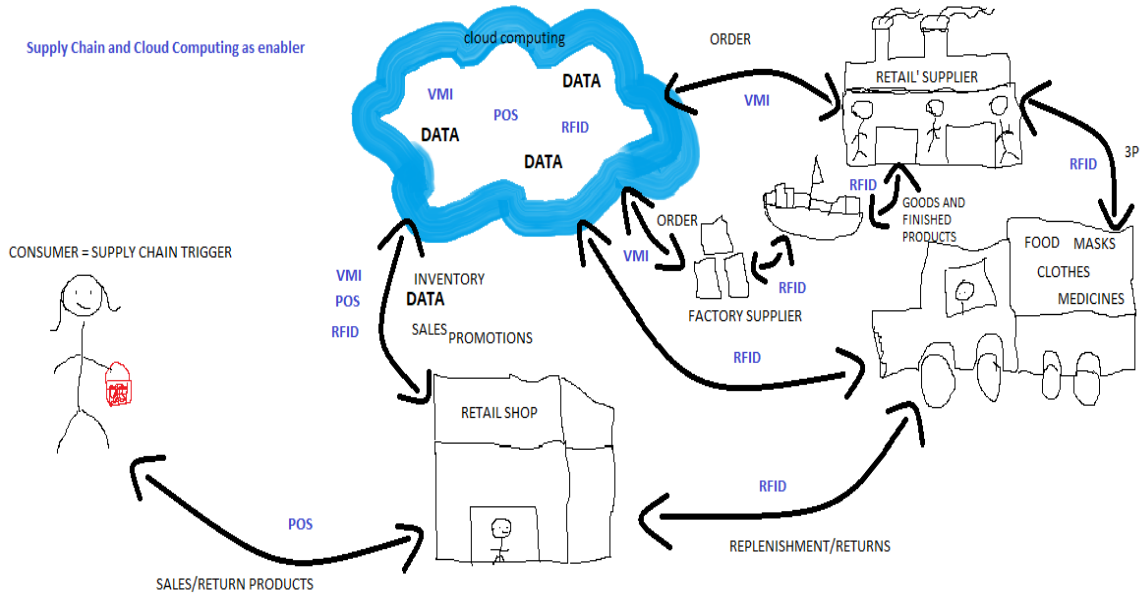
Source: Adapted (Lysons and Farrington, 2016)

However, the evolution and empower that Supply Chain have gotten through years is fully supported by development of the Information Technology (IT) – which has been making a huge difference between competitors. Investments on disruptive technologies can highlight the organizations that are willing to breakthrough (Marinagi et al., 2014).

More recently, by taking advantage of the Industry 4.0 revolution era (Philbeck and Davis, 2019), in which data analytics has become a strategic "weapon", companies are developing more capability to benefit from exchanging information with their suppliers through integrated systems (Harsono et al 2013; Hazen et al., 2016). In this context, for example, a company can creates a very privileged environment to set new standards and lift up the competition's level, based on the implementation of technologies such as (VMI) Vendor-Managed Inventory, (RFID) Radio Frequency Identification, (POS) Point of Sales and Cloud Computing as well as business practices like (CPFR) Collaborative Planning Forecasting Replenishment (Disney and Towill, 2003; Sari, 2007; Choi, 2011; Kurata, 2014; Panahifar et al., 2015).

Cloud Computing appears to breakthrough barriers and enable maximization of resources and the development of strategic competitive advantage (exhibit 2) (Truong, 2014). Cloud Supply Chain has becoming more common; however, the optimum usage of this feature varies from each company. Even though cyber security still one of the most critical factors to interfere in the adherence of Cloud systems, different benefits are already known, such as cost efficiency, integration and speed (Truong, 2014).

Exhibit 2 - Cloud computing enabling Supply Chain Management



Source: adapted (Truong, 2014)

Implementation of disruptive technologies can support a considerable step ahead for organizations in a competitive environment. The research topic gives emphasis to explore

the overall adoption of disruptive technologies and business practices for Supply Chain Management, by organizations of different sectors.

1.2 Research Purpose

The aim of this qualitative research is to identify how engaged the companies are, regarding the implementation of technologies and business practices within the Supply Chain Management process, to boost business performance and create a more robust strategy. The Supply Chain Management process can benefit from a variety of systems and different technologies and business approach that are available in the market. However, this research will focus on to explore the level of implementation of (VMI) Vendor-Managed Inventory, (RFID) Radio Frequency Identification, (POS) Point-of-Sales, Cloud Computing and (CPFR) Collaborative Planning Forecasting Replenishment, due to the strong connection linked to each other and assess how integrated they have been placed. As a result of this research, it is expected to gather information that mirror whether companies are implementing the IT features and business initiatives, listed above, to increase competitiveness.

1.3 Significance of the Study

A quick response to real time changes, it is also one of the main goals for a Supply Chain Management team. A highly integrated, connected Supply Chain allows for instance, a Supply Planner identify a potential impact on the production forecasting, due to customers behaviour, and activate adjustments according to the new demand. This ability to prompt response to an event can avoid the Bullwhip effect, which is characterized by poor inventory management an customer' dissatisfaction (Metters, 1997; Sagbansua, 2010).

The foundation for this systems' integration is to allow the movement of data within the chain on real time bases. Cloud Computing Technology speed up this data exchange, expand the volume of processed information and storage through lower investment cost compared to local infrastructure as well as it enables visibility within the chain (Wu et al., 2010; Joe-Wong and Sen, 2018). Visibility as well as communication are fundamental

elements to create trust between parties. Shortcoming of trust builds barriers for integration and as a result a collaborative chain can fall (Panahifar et al., 2015).

Alignment is also another relevant aspect to be considered regarding information sharing. The process of supplier selection must consider to what extent future partners are willing to invest on technologies (a certain level of similarity must exist), adapt their processes and systems to mitigate risk of cybersecurity issues and so allow a successful collaborative chain (Attaran and Attaran, 2007). In some cases, the cost of investment would reduce or eliminate trading partners (Sherman, 1998).

Vendor-Managed Inventory (VMI) and Collaborative Planning Forecasting Replenishment (CPFR) are tools, business practices, that are available to support Supply Chain Management strategy (Sherman, 1998; Disney and Towill, 2003). In both cases, performance can be impacted by a variety of aspects, including whether the organization has the ability to provide timely and correct information (Huoy et al., 2018). CPFR implementation has been encourage by publication of standards (Sheffi, 2002). Considering the demand for completeness and real time information within the Supply Chain, IT companies are continuously launching technologies to enable an effortless data collection. Software such as Point of Sales (POS), which are installed on the checkout points in store, are able to read bar codes and, in some case (RFID) Radio-Frequency Identification (RFID) tags, and immediately generate statistics that can contribute to Inventory Management process, for instance. The benefit from systems' integration is significant and can be seeing through all Supply Chain (Steckel et al., 2004; Zhao and Simchi-Levi, 2002; Sari, 2010; Williams et al., 2014). The implementation of an integrate Supply Chain is supported by institutions, such as VICS (Voluntary Interindustry Commerce Standards) which are setting global standards to do so.

This research can be source of information for professionals involved with Supply Chain Management, Information Technology Management, Software Developers, Entrepreneurs, students from different areas of knowledge. This study will focus on gather information regarding the adherence and implementation of technologies aiming to improve Business Plan, generate profitability and ultimately increase competitiveness.

1.4 Research Objective

This research aims to identify the following objectives:

- To identify till what extent are companies implementing IT features designed for Supply Chain Management to leverage its competitiveness.
- To what extent are these technologies/systems integrated to enable a collaborative approach within the chain.

Previously mentioned, this exploratory research main objective is to find out whether companies are implementing disruptive technologies as well as business practices to improve its Supply Chain Management. Therefore, the study will be designed to clarify the following questions:

Research Question 1 (RQ1): To what extent are organizations considering the IT features, designed for Supply Chain process, relevant for the business strategy?

Research Question 2 (RQ2): What are the technologies most adopted to support the SCM process in the organization? Are they integrated within the chain?

Research Question 3 (RQ3): To what extent are companies applying Collaborative Planning Forecasting Replenishment (CPFR) initiative?

Research Question 4 (RQ4): How much are companies considering supplier systems similarity as a prerequisite to establish partnership?

1.5 Structure of this Study

This research will be structured according to what is described below:

Chapter 1 – Overall introduction of the topic, exploring the demand and pressure for change to adapt and strive business to achieve raise bottom line. It also brings, the concept of Supply Chain Management (SCM) as well as authors who created models to illustrate SCM models. In additional, this chapter highlight the importance of Information Technology (IT) as one of the main enablers of the SCM evolution. Finally, present the objectives of research about the level of adherence regarding the implementation of tools,

business practices to leverage competitiveness and ultimately describe the questions which this study is aiming to fulfil.

Chapter 2 – A deep literature review around Supply Chain Management, IT features and business practices, which are available to strength SCM foundation, processes. This chapter will provide an experience to navigate through concepts and application of Vendor-Managed Inventory (VMI), Radio Frequency Identification (RFID), Point of Sales (POS), Cloud Computing and Collaborative Planning Forecasting Replenishment (CPFR), so-called disruptive. This chapter will be conclude presenting the Conceptual Framework for this research.

Chapter 3 – In this chapter, it will be presented all aspects related to the Methodology and Methods, such as Research Design Research Strategy, including Data Collection Methods and Source of Data, Nature of Data, Access and Research Ethics Issue and Approach to Data Analysis and Interpretation.

Chapter 4 – This chapter presents details regarding all information gathered for the research as well as discussions.

Chapter 5 – The fifth chapter, is designated to register Conclusion, including Implications of Findings for the Research Questions, Contribution and Limitations of Research, Recommendations for Practice, Recommendations for Future Research and ultimately the Final Conclusions and Learnings.

2 Literature Review

2.1 Overview

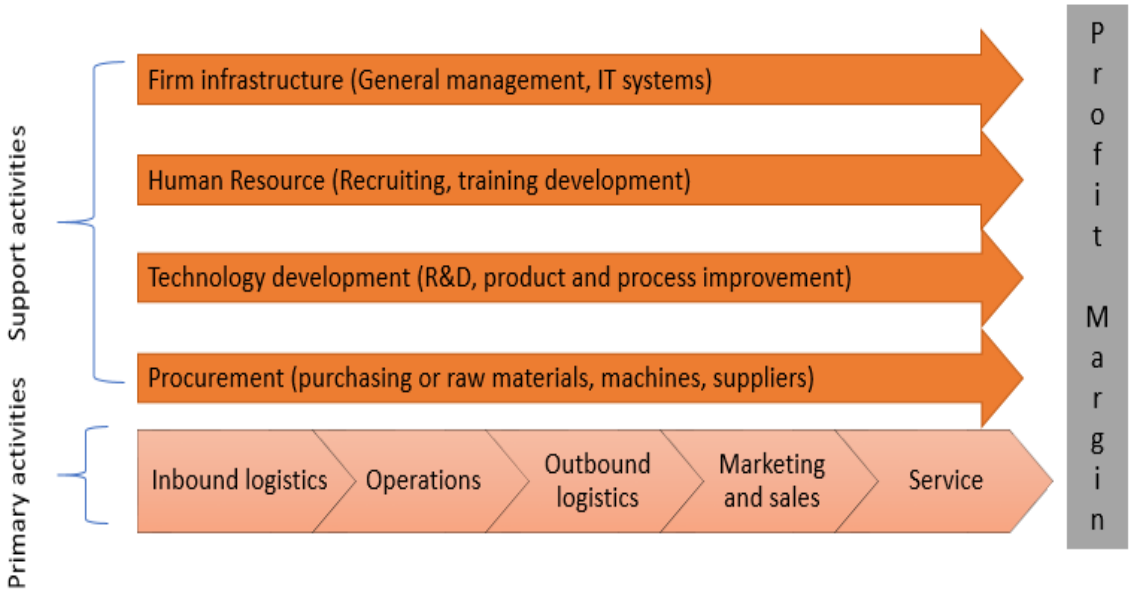
Organizations' pursuit for superior performance and competitive advantage is undoubtedly one of the hottest topics regarding strategic management. A dynamic global market environment creates a challenging scenario for any business. Considering that, it is relevant for organizations to focus on the adoption of new features to enable a consistent growth (Richardson, 2006). Timely identification of opportunities to invest and develop differentiators can be critical for a company's business plan success. (He et al., 2016) highlight that the identification of wise alternatives to overcome disruptive situation can lead to a competitive advantage. (Glauner, 2016) underline Porters' concept that competitive advantage is key element of outstanding performances. For instance, supply disruptions, like the COVID-19 pandemic, can happen unexpectedly, in some cases, it can result in bankrupt. On the other hand, it can be a good opportunity for those organizations that are attentive to the market' demand and opportunities, own a desired product or service and have a health cash flow (Tsai, 2016).

Throughout its journey to achieve competitive advantage, organizations also develop its strategy based on risk assessment of the market. Porters' Five Forces Model is largely used to support the analysis. The model consider the following aspects and which will vary according to each market that a company source or operates: bargaining power of suppliers, bargaining power of buyers, threat of substitutes, barriers to entry, and rivalry among competitors (Grundy, 2006)

Investments on innovation has been seeing as a silver bullet in many successful business cases. To call a few, Apple with its revolutionary mobile phone technology, a remarkable milestone for the entire world. Even though a leader within the tabaco industry, Philip Morris International is shaking the market and breaking through by generating more than 3.400 smoke-free patents (Koh and Geller, 2018). Amazon.com redesigning and creating a disruptive environment with its global Supply Chain (Bowonder et al., 2010; Abdelkafi and Pero, 2018).

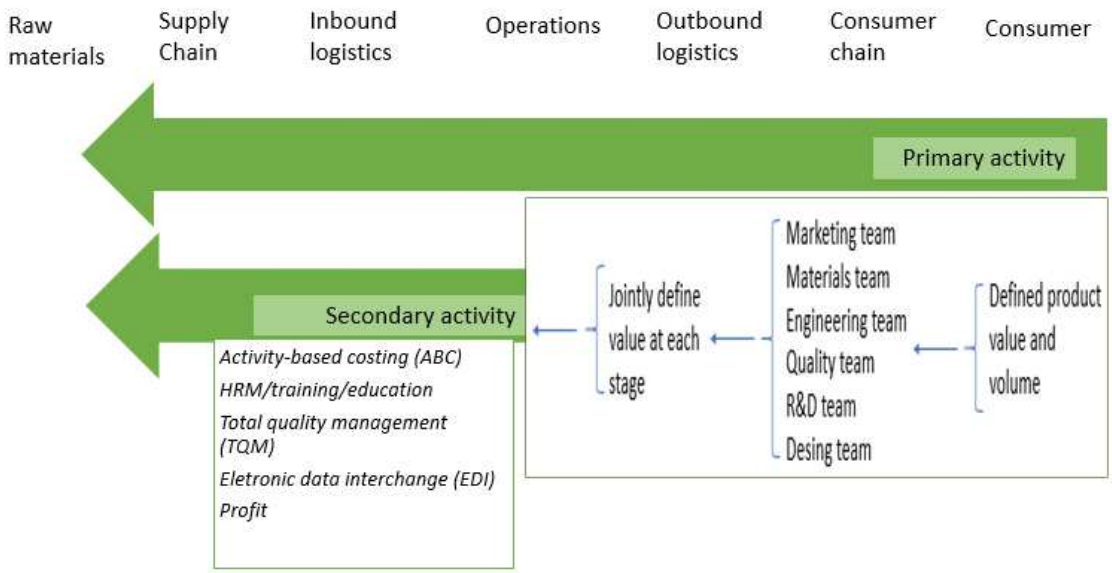
(Hines, 1993) Value Chain Model structure (exhibit 3) contrast that, organization's business plan should be driven by customer instead of profits. It is an opposite view from what Michael Porter has previously stated on his Value Chain Model (exhibit 4). An idea that was established during an era of considerable competition growth (late 1970s – 1999). Chasing alternatives to adapt its strategy, increase bottom line and get the benefits from customers' loyalty, organizations began to identify huge potential of the Supply Chain Management. Through this process it would be possible to manage flow of goods, services and information (Lysons and Farrington, 2016).

Exhibit 3 – Porters' Value Chain



Source: adapted (Lysons and Farrington, 2016)

Exhibit 4 - Hines' Value Chain Model



Source: adapted (Lysons and Farrington, 2016)

Thus, organizations emphasis on improvement of Supply Chain Management strategies, represents changing on its approach by encouraging not only internal and external process collaboration and integration, but also with its third parties and customers.

2.2 Supply Chain Management (SCM) and Information Technology (IT)

Supply Chain Management encompass the structured and coordinated flow of activities to ensure that production meets demand, which means customers satisfaction (Soundararajan et al., 2019). This process is not new. During the First War, it is already possible to identify acquisition and distribution of materials, to support the countries strategies to overcome enemies. However over the years, Supply Chain' focus has been changing and the initial idea of simply costly department is gradually shifting to a more strategic driven business activity (Lysons and Farrington, 2016).

By nature, Supply Chain Management is a highly cross-functional process, which rise the challenge to create a harmonic flow, but also to keep alignment with the company' business strategy, which is continuously reviewed to adapt to allow competitiveness (Clifford Defee and Stank, 2005; Delgado and Castelo, 2013). Its complexity requires a closer monitor and quick decisions to avoid or mitigate potential disruptions. Empowered by greater data bases, managers are improving strategy through a more effectively analyse of the information gather along the chain (Kim et al., 2006). Because of it, data analysis has become one of the main key players (Sanders and Premus, 2002; Chen et al., 2015; Hazen et al., 2016). Predictions are the foundation which drives a Supply Chain Management process. Thus, the more quality of data is available for analysis and the faster it is generated the better (Marinagi et al., 2014).

Motivated by the need of streamline its Supply Chain Management strategies and ultimately add value for the business, organizations are stimulating investments in innovation. As a result, new technologies have been created and implemented. Studies are showing that compatibility of systems between parties, that allow integration, can have a massive contribution for a successful Supply Chain Management. Therefore, it has become a key criterion for supplier selection (Ireland et al., 2002).

The implementation of new technologies allows companies to boost its market performance (Schneiderman, 2010). It accelerates decision making process, timely response, mobility – information is available worldwide, and also cost reduction due to improvement of the process as a whole (Bhardwaj et al., 2010).

Walmart and P&G are well known because of its giant logistical operations. This companies are examples of implementation of disruptive technologies in their process and gain competitive advantage (Southall et al., 2010; Biedron, 2018).

Real-time access to information allows companies optimize its supply process. Embracing the challenge to develop and implement differentiators, Maersk (Danish global shipment leader company) and IBM are engaged in a partnership to improve Supply Chain management process for the shipment sector. The system (TradeLens), based on blockchain (disruptive technology), aims to facilitate global trade (Sornn-Friese, 2019).

Effectiveness and efficiency are the two main goals that Supply Chain (SC) operations seeks for. And Information Technology come along to provide sophisticate features to enable this achievement (exhibit 5) (Neubert et al., 2018).

Exhibit 5 – IT features for Supply Chain Management

Source: adapted getapp.com, (2020).

The Information Technology (IT) evolution is printed through the chain and positives results are already reported (Singh, 2003; Hazen et al., 2016). A collective effort to

improve process are shared between IT and SC professionals, which spark the market for new technologies. Such IT features promotes flexibility as well as allows sharing of responsibilities with parties along the chain. Increase in responsiveness has a positive impact on business (Wang et al., 2006).

2.3 Collaborative Planning Forecasting Replenishment (CPFR)

A collaborative approach has promoted significant increase on Supply Chain Management performance (Som et al., 2019). This integration within the chain is known as CPFR, which stands for Collaborative Planning Forecasting Replenishment. (Lummus and Vokurka, 1999) referred to CPFR as a relevant feature. CPFR is a business model largely adopted (Fliedner, 2003).

Collaboration in a SCM means synchronism of data shared within the chain. All parties must have access to timely and completeness data. It requires a high level of engagement and commitment to share information. It requires trust between the parties, which is built based on good communication (Attaran and Attaran, 2007). (Fliedner, 2003, p19) highlight the extremely relevance of internal collaboration to provide accurate forecast:

> "Collaboration ensures all Supply Chain planners are using the same internally and externally consistent forecast."

It is important for a company, for the continuity of the business, to ensure that throughout the chain, everybody will be driven by the same information, which means alignment of strategy and expectation.

Implementation of new technologies as well as CPFR business model, makes the Supply Chain process more flexible and creates an attractive environment to invest due to visible return on investment. So then, is likely to rise the number of supply trading partners. The more competitive is the market, the greater is the chance to find more qualified suppliers. However, it can also be seen as a barrier and result in limiting the number of suppliers willing to invest (Sherman, 1998). Poor supplier performance can make considerable damage within the chain and impact on cost (Ireland et al., 2002).

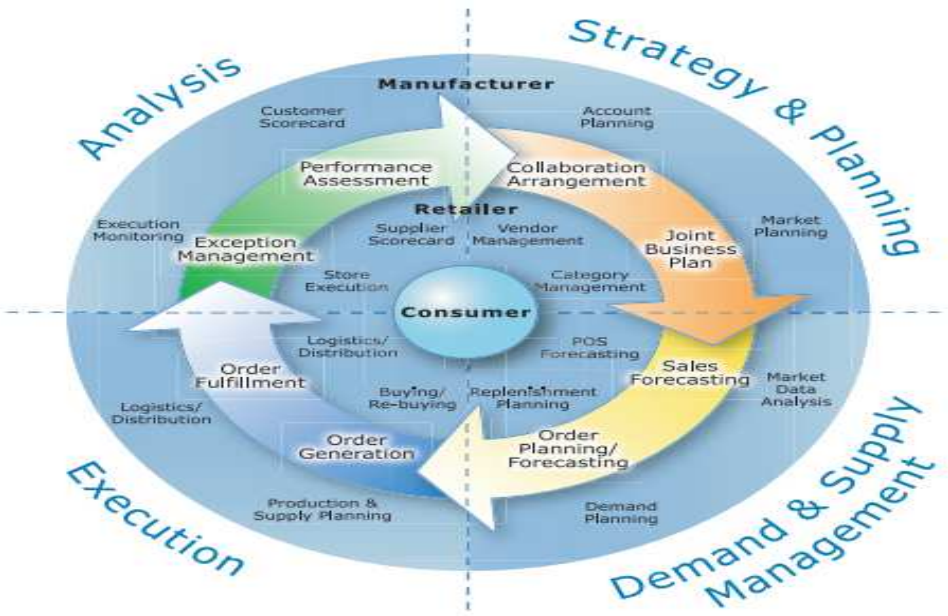
A variety of authors points out different benefits of CPFR' implementation. (Panahifar et al., 2015) listed: increase responsiveness, increase stakeholder's wealth, improve economic value added and enhance the level of customer service. An organization can benefit of a jointly forecast, especially when facing disruptions. It enables faster decision-making and it also can reduce the losses.

By recognizing the great results from the implementation of CPFR, standards to support and guide implementation Collaborative Planning Forecasting Replenishment was issue

in 1998 by a committee called Voluntary Interindustry Commerce Standards (VICS). It has been largely utilized (Sheffi, 2002).

The integration and tasks that is expected in a CPFR environment is presented below (exhibit 6). It is aligned with Hines has previously stated that, customers must be the top priority for a business plan (Hines, 1993).

Exhibit 6 – CPFR model



Source: gs1us.org, (2020).

CPFR implementation also contribute to improve visibility, not only between partners along the chain, but also for customer. So then they can make better buyer decisions and ultimately creates demands (Fliedner, 2003).

(Sari, 2008) research shows that CPFR improves Supply Chain performance especially during uncertainty. Another advantage of CPFR implementation is that, it also contributes to a dramatic reduction of the Bullwhip effect – one of the most unwanted situations for a supply chain team, which can result in major impact on demand forecast and the challenge to meet customers' needs (Boute et al., 2008). CFPR business model brings also benefits to organizations that operates with traditional Supply Chain (exhibit 7). However, it shows an significantly increase on performance when combined with technology (Kamalapur et al., 2013).

Exhibit 7 – Traditional Supply Chain structure

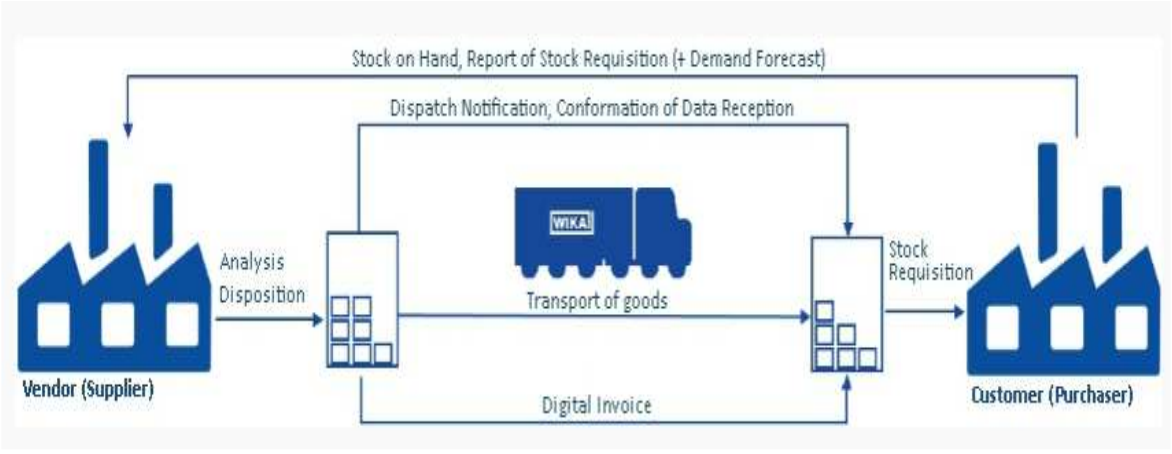
Source: (Disney and Towill, 2003)

2.4 Vendor-Managed Inventory (VMI) - a bridge

Organizations are increasing seeing positive returns on investments from the implementation of new technologies to escalate Supply Chain Management performance (Shi and Yu, 2013).

In contrast with traditional Supply Chain, where distributor is in charge of all control of inventory management and manufacturer responsible for production, VMI (Vendor-Managed Inventory) operates with the manufacturer (supplier) in charge of production and inventory, based on agreements (exhibit 8) (Disney and Towill, 2003). It is a collaborative process. Thus, VMI is used to drives replenishment policies, which is directly connected with customer satisfaction. Poor inventory management has a negative impact on profitability, for instance due to shift of brand, if the product is not available on the shelf, which means sales not going through (Srinivasan et al., 2011).

Exhibit 8 – VMI flow



Source: wika.com, 2020.

VMI implementation can leverage visibility, streamline process, and reduces cost. It can also improve partnership as a great level of trust is required to sign contracts. VMI implementation improves workflow because it releases customer from the demanding task of control inventory levels (Huoy et al., 2018). It is beneficial for the organization once the resources can focus on other activities that can add more value for the business.

A relevant aspect that has direct impact on VMI performance is that, the quality of information and automated systems, both plays an important role in this context as well as good communication between parties (Zachariassen et al., 2014). As integration of systems is one of the key element for efficiency and effectiveness, consistent data, forecast must be timely provided to allow an effective supply in demand (Huoy et al., 2018). Consideration that, the level of similarity systems for the supplier selection is also relevant for VMI outperform. Studies have shown that in some occasions, contracts could no longer exist due to low performance from the supplier side (Ireland et al., 2002).

Walmart and P&G, back in the 1980s, were the first companies to exploit VMI. It was remarkable milestone, especially because of the competitive advantage that was gained by this organizations. On the agreement, Walmart gave authority to P&G to ensure replenishment according to the information provided on a regular bases, regarding sales figures and inventory levels (Kamalapur et al., 2013). Later, this technology was also implemented by different organizations, such as Johnson & Johnson, Boeing and Alcoa, Electrolux Italia, Nestle and Tesco, and Dell (Sari, 2010; Huoy et al., 2018).

2.5 Point of Sales (POS) as enabler

Implementation of technologies may have a positive impact on long-term companies' strategy (Neubert et al., 2018). Considering customers as a driver, the adoption of features to capture and translate its behaviour and needs can lead Supply Chain processes to outperform.

Point of Sales (POS) is one of the technologies that has been adopted by companies willing to create a more robust and up to date forecast. It has been a while that the till is no longer only a checkout point. Its evolution is now called POS (exhibit 9). POS systems are designed to collect real-time data, such as, sales figures and stock keeping units (SKU), from the checkout points transfer to manufactures and distributors (Williams et al., 2014). Data gathered, can be source for data analytics, and ultimately steer organizations' decision-making.

Exhibit 9 – The Old Till vs POS

Source: bccourier.com, 2020; shutterstock.com, 2020.

Business Intelligence is on spotlight as an enabler in this process. Through increasing data analytics capability, BI software can quickly, prepare, consolidate, analyse all data collected on POS and provide predictive scenarios. It allows more flexibility along the Supply Chain, leveraging capability and responsiveness, thus, maximizing the likelihood of meeting customers' satisfaction. In a highly changing environment, is vital for an organization to adapt its strategy considering all the inputs, information issued by the market (Hazen et al., 2016; Moniruzzaman et al., 2016).

POS has been seeing as a crucial hub, that connects and sync customers' expectation and operation. It empowers business capability and gives support to delivery within an even smaller timeframe (Croson and Donohue, 2003). POS systems are a useful feature to elevate customization based on client' history – consumers are constantly seeking for personalized experience, so then, it can help to inspire customers' return (Frow and Payne, 2007; Boujena et al., 2009).

The level of detail of each information, for instance which products, what channel the sales occurred and location, can impact on the forecast. (Bursa, 2008) highlight POS as an enabler to achieve accuracy when forecasting, which depends on correct data inputs – quality of data. POS implementation is also related to trim costs (improvement of bottom line), for example due to increase on product availability on the shelve – action strongly linked to lead time optimization, as well as leverage of visibility between trading parties. Despite all its benefits, POS data protection demands attention. It is a valuable source of customers' data, including credit card transactions, for that reason cyberattacks can be deployed (Yang et al., 2007).

(Lee et al., 1997) stated that uses the high-end member of the supply chain, i.e., a retail, as a source of data can be beneficial for the process. POS is an IT feature, that can provide statistics data, which allows companies to drive replenishment, based on a latest information from the market (exhibit 10) and as a result reduce the bullwhip effect:

Exhibit 10 – POS as a source for forecast

Table 1 A Framework for Supply Chain Coordination Initiatives

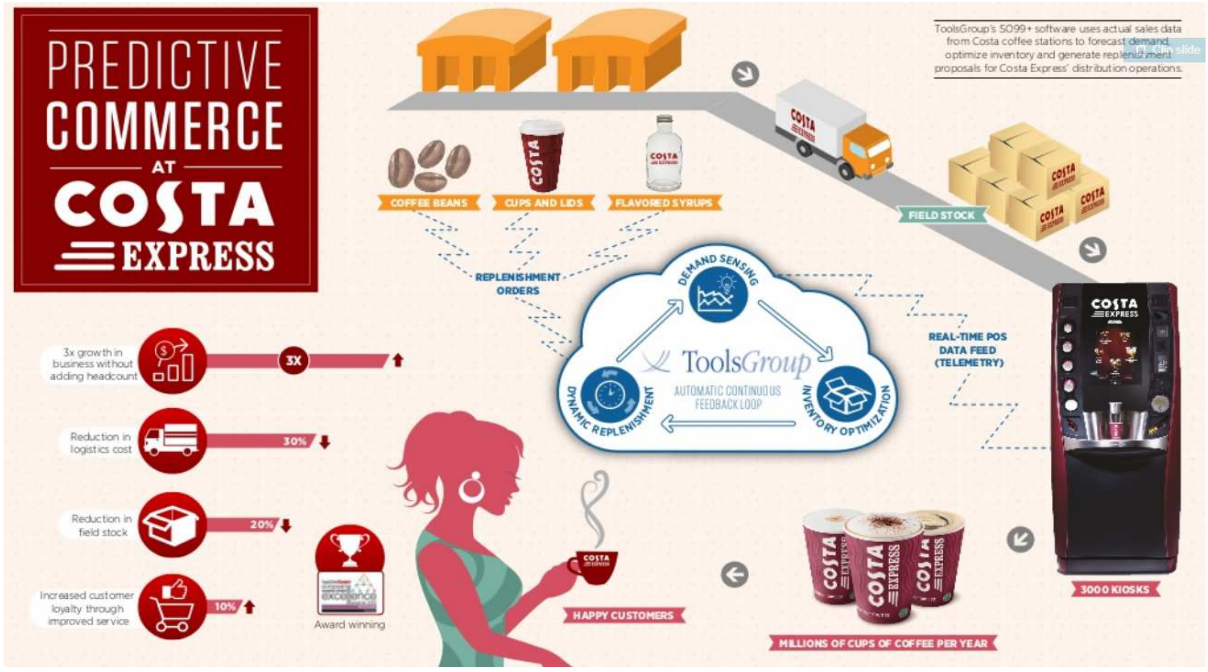
Causes of Bullwhip	Information Sharing	Channel Alignment	Operational Efficiency
Demand Forecast Update	• Understanding system dynamics • Use point-of-sale (POS) data • Electronic data interchange (EDI) • Internet • Computer-assisted ordering (CAO)	• Vendor-managed inventory (VMI) • Discount for information sharing • Consumer direct	• Lead-time reduction • Echelon-based inventory control
Order Batching	• EDI • Internet ordering	• Discount for truckload assortment • Delivery appointments • Consolidation • Logistics outsourcing	• Reduction in fixed cost of ordering by EDI or electronic commerce • CAO
Price Fluctuations		• Continuous replenishment program (CRP) • Everyday low cost (EDLC)	• Everyday low price (EDLP) • Activity-based costing (ABC)
Shortage Gaming	• Sharing sales, capacity, and inventory data	• Allocation based on past sales	

Source: adapted (Lee et al., 1997)

More recently, aiming to overcome siloed forecast, Demand Sensing (DS) model has been increasingly used. It incorporates data from all echelon along the chain, and then, through BI, companies can adapt forecast to a real or near-real time frame. DS allows organizations to improve its ability to highly match fluctuation customers' preferences. Demand Sensing is an area of predictive analytics which is focus on customers' demand which can benefit from completeness data gathered on POS (Lee et al., 1997; Folinas and Rabi, 2012; Humphrey and Laino, 2018). Thus, to consider customer the center of a Supply Chain (customer-driven), investments on technology it is a prerequisite.

Customers' demand changes over time and a well-tailored SC can help to meet their expectations. Costa, the UK coffee shop, is an example of successful POS implementation (exhibit 11). The point-of-sales data is collected every 15min to track demand and enables replenishment. Costa reports improvements on operational costs, resource optimization and more accurately response (Clowes, 2014; Bodenstab, 2015).

Exhibit 11 – Costa and POS system adoption



Source: toolsgorup.com, 2020.

2.6 Radio Frequency Identification (RFID) – a highly customized source to speed up process

Pressures to leverage competitiveness are continuous to soar. However, it is unlikely that an organization itself will manage to meet customers' demand. Companies are called to rise its network to improve its Supply Chain Management process, so then, increase revenue growth through customers' satisfaction (Johnson, 2003; Lal et al., 2018). A collaborative approach shows a positive impact for the coordination between trading partners within a chain (Fliedner, 2003).

As previous discussion, sharing information is beneficial for Supply Chain Management (Attaran, 2012). It can reduces the Bullwhip effect and improve forecast (Lee et al., 1997). Following an increase on demand for data to support predictive scenarios, improve inventory management, replenishment as well as leverage customized services, technologies such as Radio Frequency Identification (RFID) have been placed across the Supply Chain (exhibit 12) (Ilie-Zudor et al., 2006; Sari, 2010; Choi, 2011; Zhu et al., 2012; Harsono, 2013).

Exhibit 12 – RFDI and its vast application

Source: elainnovation.com, shutterstock.com, (2020).

RFID is a technology that allows real time products' traceability throughout the entire chain (Schneiderman, 2010; Zhu et al., 2012). This technology involves the use of radio frequency - low frequency (LF), high frequency (HF) and ultra-high frequency (UHF) -

to identify and track items which has a tag on (electronic chip). Each tag can be read by certain distance – Active tag has is more effective for long distance compared to Passive tag (exhibit 13). Thus, its application will vary business to business (Sari, 2010). A relevant aspect that impact RFID adoption is regulation. Governments are in charge to legislation regarding frequency spectrum, which means that the functionality of this technology could vary swing worldwide (Attaran, 2012).

Exhibit 13 – RFID Active and Passive Tags

Source: atlasrfidstore.com, (2020).

(Sabbaghi and Vaidyanathan, 2008) discuss the Supply Chain process, Demand Management, Order Fulfilment, Manufacturing Flow, Reverse Logistics and Supplier Relationship Management, in which RFDI has been implemented and benefits. For instance, RFID can facilitate return, recall of products as well as anti-counterfeiting - applicable for the pharma and food industries (Devadas et al., 2008).

The benefits linked to this feature is largely well known. Walmart in partnership with P&G has coined RFID implementation (Harsono, 2014). Positive results are also reported by companies such as Amazon.com and UPS (Chiles and Dau, 2005; Subramanian and Iyigungor, 2006). It represents another force that drives RFID implementation – mandate form powerhouses (Attaran, 2012). Moreover, international standards, like ISO, and national health legislations set to different industries, also stimulate companies to adopt such technology. For example, the temperature control required for the pharmaceutical companies – cold chain. The impact of a temperature variation out of the range can be highly costly if considered the waste that is can generate. Tons of drugs (medicine) can be disposable due to non-conformities resulting in a huge negative impact on profitability (Balachandar and Chinnaiyan, 2020). In this case, return on investment (ROI) can be seen, which can justify RFID implementation throughout the chain (Bertoni et al., 2007).

Consider to be a superior technology, compared to bar coding, RFID implementation can be costly. However, it can create a competitive advantage for the business strategy and boost profitability (Attaran, 2012). (Choi, 2011) analysis of RFID implementation cost in a two-echelon scenario, shows that, if shared, between manufacture and retailers, it can improve coordination within the chain as well as increase the adoption probability.

Inventory management can be outperform by accurate information provide by RFID (Williams et al., 2014). This technology reports transactions in real time frame. It improves responsiveness and efficiency by leveraging visibility, reducing shortage and loss, avoiding out-of-stock events, minimizing variations for the forecast also improve preparedness for replenishment (Sabbaghi and Vaidyanathan, 2008; Choi, 2011; Masum and Bhuiyan, 2013).

RFID tags can be read automatically and simultaneously, detected without human interference, which means that resource can be optimized and time lag in inventory shrink (Ilie-Zudor et al., 2006). Thus, RFID can be consider a line boosting, through contactless payments for instance, which maximize customer service and lastly contribute to encourage customers return (Jaska et al., 2010; Lacmanović et al., 2010; Masum and Bhuiyan, 2013). (Attaran, 2012, p159) stated:

> "Tags could be placed on supermarket products (…) everything in the shopping cart, except produce, could be read at once."

Few years later, it is a reality. RFID is the technology behind Amazon Go, which is a just walk out grocery store shop (Stern, 2020). This concept is changing the way people shop, challenging competitors and increasing Amazon.com competitive advantage.

Despite present many consistent positive results, when it comes to RFID implementation, data protection remain a threat and is considered to be an high priority issue to be address (Talidou, 2006; Attaran, 2012).

2.7 Cloud Computing

Supply Chain Management is an extremely dynamic process. Agility and flexibility can define organization responsiveness' level and ultimately highlight the market big players. In this context, Information Technology features can boost business strategy (Marinagi et al., 2014). Cloud Computing emerges to speed up data exchange, increase the volume of data being processed on real time, which has a positive impact on productivity, as well as amplify data storage. Advantages which are very convenient for the integrate format that SCM requires. Moreover, Cloud Computing improve accessibility and mobility through user-location independency (Tabrizi et al., 2017). It is possible to navigate from almost everywhere in the Earth. Another relevant aspect that makes Cloud Computing a bit more compelling is cost cut. Capital Expenditure (CAPEX), Operating Expenditure (OPEX), can decrease dramatically due to considerable reduction on infrastructure investments. (Molnár et al., 2013). The literature shows that, optimization of investments and collaborative approach within the Supply Chain can leverage competitive advantage, and ultimately result on major differentiator (Fliedner, 2003). Therefore, adoption of technologies such as Cloud Computing, based on correct assessment, can certainly enhance business strategy (Aviles et al., 2012).

The concept of Cloud Computing has been described by different authors, but is commonplace that, throughout its services, resources and applications, using the internet as an enabler, Cloud Computing is a virtual tool, can easily provide accessibility anytime, mostly anywhere to different type of users (Durowoju et al., 2011). In summary, Cloud Computing is basically the delivery of computing services over the internet "the cloud".

Currently, cloud Computing is available in three different types: public, private and hybrid (Durowoju et al., 2011):

Public clouds: Owned and operated by cloud service providers, such as Amazon.com, Microsoft and Google. In this case, software, hardware and supporting infrastructure are owned and managed by the providers and users can have access to their account through web browser. For instance, Google and Microsoft.

Private clouds: Exclusivity of access owned by the customer (organization). Some companies pay providers to host their private cloud instead of keeping it on-site. Services and infrastructure are maintained on a private network.

Hybrid clouds: A mix of public and private clouds, connected by technology which enables mutual access to shared data and applications. It promotes flexibility and facilitate integration. For instance, Facebook and Amazon Web Service (AWS).

Under the Cloud Computing's "umbrella" different types of services are available (exhibit 14) (Truong, 2009):

Software as a Service (SaaS): Software applications are delivered, on demand, through internet. Cloud providers oversee host and all management and maintenance of software and infrastructure. MS Office 365, Gmail, Salesforce, and ERP systems are example of SaaS.

Platform as a Service (PaaS): Computer services, designed to facilitate the development of software applications, including testing, delivering and management. Java, Windows Azure, Google App Engine and AWS Elastic are examples of PaaS.

Infrastructure as a Service (IaaS): Rental service of serves and virtual machines, storage, networks, and operating systems. This type of service has a pay-as-you-go format.

Exhibit 14 – Cloud Computing's "umbrella"

Source: adapted (Bhardwaj et al., 2010)

Cloud Computing environment may not be as flexible as a business needs in some cases, and it can compromise customization, for example of Enterprise Resource Planning (ERP) systems, considered a gear to enable integration within Supply Chain Management. Thus, is crucial to assess business information systems when establishing trading partnership. Lack of similarity can be limit number of supplier available and it can be a barrier for Cloud based systems' adoption within the chain (Sherman, 1998). However, despite the fact that this technology improves reliability, because of the back-up service, a critical evaluation of the Cloud Computing partner company regarding its security procedures (data protection) and certification (e.g. ISO 27001) as well as disaster recovery plan, should be consider and continuously reviewed. Data protection, data location are hot topics considering Cloud Computing adoption (Bochon et al., 2015; Kaye and Korbeck Jr., 2016)

Despite a large range of benefits, the decision whether adopt Cloud Computing as a business strategy can also be affected by issues regarding for instance, availability of internet elsewhere, dependency on release of new version and/or updates by providers. Cloud Computing systems are highly dependent on internet availability and speed. Lack of it or huge variation on the service provided can make a negative impact for organizations performance, results (Durowoju et al., 2011; Wu et al., 2013).

2.8 Conceptual Framework

Conceptual Framework is a "snapshot" of how a researcher sees the problem to be explored. It is a graphic approach to represent the researcher's hypotheses, ideas. Conceptual Framework has its foundation based on the Literature Review and Research Questions, which will give inputs, insights throughout the data analysis. (Imenda, 2014) describes what a framework would represents for in a research environment. (Liehr and Smith, 1999) states that it drives a researcher on the study of the questions, methods, and analysis. The findings would be based to assess whether the framework is consistent (Imenda, 2014).

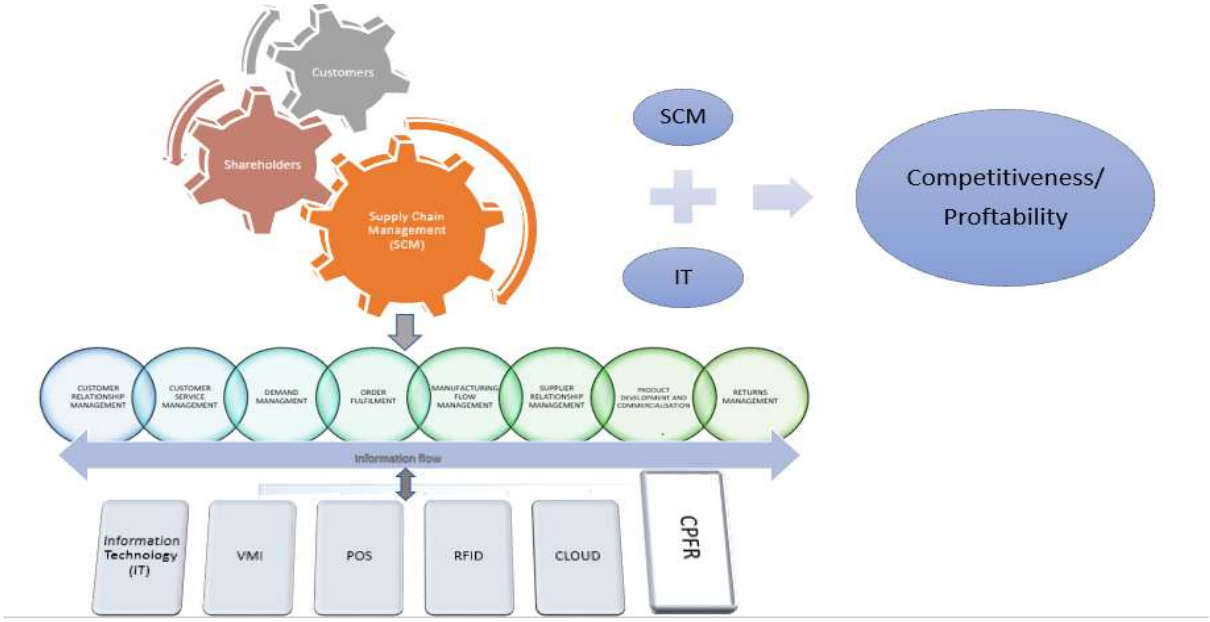
The presented Conceptual Framework is built on the believe that a combination of Information Technology and Supply Chain Management, supported by business practices (CPFR), can create a favourable business results for an organization, which means Competitiveness (exhibit 15). This research is designed to find out to what extent companies are seeing and investing on the implementation of technology as well as business practices, as enablers, to develop competitive advantage. The research questions were created to verify how Information Technology is facilitating the Supply Chain Management process. In addition, taking into consideration that, collaborative approach improves SCM, it will be also researched the level of systems integration within the chain, between trading partners.

Business opportunities are continuously rising on the market. The demand to resources that leverage business power has being detected by IT companies. Companies like SAP, Oracle, Amazon.com are some examples of giants on this market. Such companies are taking advantage launching products, which in general, requires complementary accessories, specialized support, and licences. Innovation is also driving the changes on Information Technology sector, it is enabling a consistent growth on products' portfolio at the same time compelling new customers, users.

Highly motivated to mitigate supply fluctuations, organizations came together to empower business strategy, gain customers' trust, increase its profitability. Decision on what investments a company should do are always surrounded by uncertainty. In this scenario, Information Technology plays an important role. For example, through data analysis, which requires timely and reliable data, alternatives have been identified to meet

customers' demand and lastly improve revenue. Integration and collaboration between trading partners can leverage organizations competitive performance as well as stimulate innovation.

Exhibit 15 – Conceptual Framework



Source: self-modified

Considering the importance of IT and business practices for SCM, the research objective is to explore to what extent its adoption is happening and if so, is systems integration also taking place. The validation of this Conceptual Framework will be assessed based on Literature Review, Data Analysis and Findings of this research.

2.9 Conclusion

Throughout a critical review of the literature, shown above, it was possible to identify a variety of references stating the benefits of IT features designed for Supply Chain Management process, as well as business practices to improve Supply Chain responsiveness and leverage companies' competitiveness. This research has been structured to amplify the knowledge around this topic, focusing on the adoption of (VMI) Vendor Managed Inventory, (RFID) Radio Frequency Identification, (POS) Point of Sales, Cloud Computing and (CPFR) Collaborative Planning Forecasting Replenishment. Next, the reasoning and results are presented

3 Research Methodology and Methods

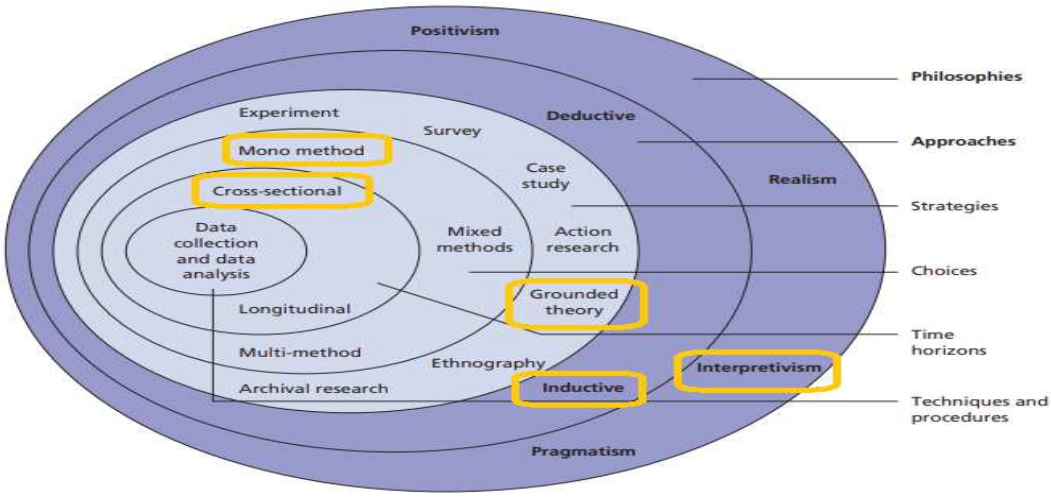
3.1 Overview

The Research Methodology and Methods will be presented in this section. It is a combination of the Research Philosophy and Approach, Research Strategy, Research Design, describing the methods chosen for Collection of Primary Data, Source of Data and Nature of Data. Access and Research Ethics Issue will be also summarized here and lastly, the Approach for Data Analysis and Interpretation.

3.2 Research Philosophy and Approach

The Research Onion Framework, a guideline provided by (Saunders et al., 2009), will support the decision-making process regarding the following aspects: Philosophy, whether Positivism, Realism, Interpretivism or Pragmatism; Approach, either Abductive, Deductive or Inductive (Awuzie and McDermott, 2017); Strategies, would be more convenient and assertive apply an Experiment, a Survey, analyse a Case Study or conduct an Action Research or utilize Grounded theory, or consider Ethnography or Archival Research; Methods to perform the study, a Mono method, a Mixed Method or a Multi-Method; Time Horizons, decide between Longitudinal or Cross-sectional; and finally, Techniques and Procedures, comprised of Data Collection and Data Analysis. The outcomes of this assessment, that will drive this research, is identified in the figure below (exhibit 16).

Exhibit 16 – Research Philosophy and approach of this study



Source: adapted (Saunders et al., 2009)

Organizations' ability to rapidly adapt and improve its process, to give a quick response to market's change, have been showing a dramatic increase for the past years. World widely, the Supply Chain Management teams has been called to improve its responsiveness, through more efficient and effective operations. Pressures to identify the best and appropriate approach and overcome competitors push business' leaders to use bigger lenses to catch, in advanced, the best practices and ultimately improve their strategies. However, rather than compete, companies have been challenged to work with each other and build stronger partnership to facilitate meet customers' needs (Glauner, 2016; Tsai, 2016; Neubert et al., 2018). Information Technology has been always in companies' radar as an alternative tactic to invest focusing on deliver more robust results (Subramanian and Iyigungor, 2006). The Information Technology sector seems to be very attentive to this continuous demand flow and has been continuously offering innovative features to help companies meet their goals (Kim et al., 2006). For this research, a Qualitative Approach was chosen, aiming to get a better understanding about this connection between business strategy and technology to improve companies' bottom line.

A qualitative approach, due to its broader nature, allows a deeper comprehension about a phenomenon as well as to assess the real scenario in which Supply Chain professionals are currently dealing with, and gain richer insights around this theme (Marshall, 1996; Choy, 2014; Herrero et al., 2020).

Aiming to clarify the knowledge that this qualitative research can generate and try to extract the most from the research participants, an Interpretivist Stance is applied as a research philosophy. It is an attempt to explore and at the same time to polishing the information gathered throughout the study (Saunders et al., 2009).

(Saunders et al., 2019, p130) describes research philosophy:

> "(…) a system of beliefs and assumptions about the development of knowledge."

In other words, the development of learning about something.

A considerable amount of information is available in the literature regarding the usage of various technology' features within the Supply Chain Management process. However, it is also possible to identify a lot of room for different research approach which can bring to light a variety of aspects and interactions linked to this two vast fields: Supply Chain and Information Technology, that, if combined, can rise competition and as a result improve customers' satisfaction.

Considering that, is not a goal of this qualitative research to provide conclusions from logical analysis of premises, which characterized a Deductive Approach. But, it is understood that an Inductive Approach is a more appropriate the methodology to be applied. It is a scope of this research, however, to validate the conceptual framework presented (exhibit 15) through an exploration of data collected and its analysis. Inductive approach, which consider suggestions originated from the data analysis, without excluding people from the context, to draw conclusions, was lifted by social scientist researchers through an inquiring look at the deductive approach which allows cause-effect to be assessed without consider the perspective of humans' social interaction when creating a rational (Saunders et al., 2009).

3.3 Research Strategy

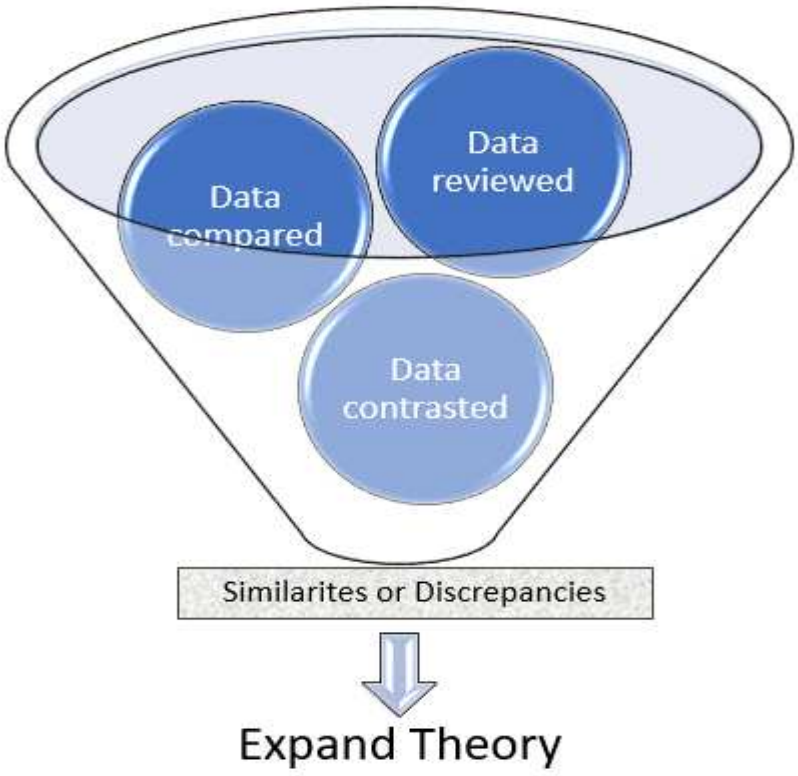
Like a project, a research also requires a plan. It is crucial for the success of the study to elaborate a reasoning proposal including for instance, research strategy, research choices and time horizon. These aspects, as well as its rational are following presented.

All interactions and results from the combination between Supply Chain Management and Information Technology can always vary and unexpectedly change the way business operates. It is mutable. For this reason, rather than try to create an accurate and static

picture of an event (Descriptive) or explain potential connections between different aspects (Explanatory), this research is characterized as an Exploratory – which has its focus narrowed down according to the research progress, which can be conducted using the literature as a source and, but not restrict to, interview with field' specialists. Due to its nature, an exploratory research is essentially adaptable to its findings. This flexibility is relevant to allow the researcher capture significant data that will be later analysed and may contribute to draw a conclusion (Saunders et al., 2009).

Aligned with the choice described above, it was possible to identify an interesting advantaged on using the Grounded Theory technique to assess and expand the knowledge raised about the research topic throughout this study. The application of the Grounded Theory becomes even more palpable, considering the fact that it allows gaining more clarity of the information gathered during the data collection, by deeply analysing and mapping similarities and discrepancies and hence, draw an inductive development towards an amplification of the theory (exhibit 17) (DePoy and Gitlin, 2015).

Exhibit 17 – Visual idea of the Grounded Theory



Source: adapted (DePoy and Gitlin, 2015)

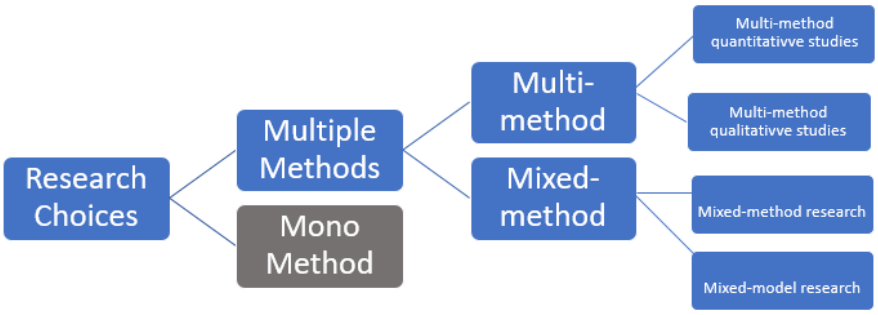
Therefore, the application of the Grounded Theory in this research aim to maximize the understanding about the connection between Supply Chain Management, Information Technology, and business practices to boost competitiveness.

3.4 Collection of Primary Data

3.4.1 Source

The qualitative Mono Method was identified as the most appropriate for this research, since a combination of both primary data and secondary data has been carried out (exhibit 18). Firstly, applying critical review of secondary data, gathered through a deep assessment of academic literature, such as academic journals, articles, books, e-books, and websites linked to the research topic. Secondly, collecting primary data through in-depth interview with professionals, from different industry sectors, strategically involved with Supply Chain Management.

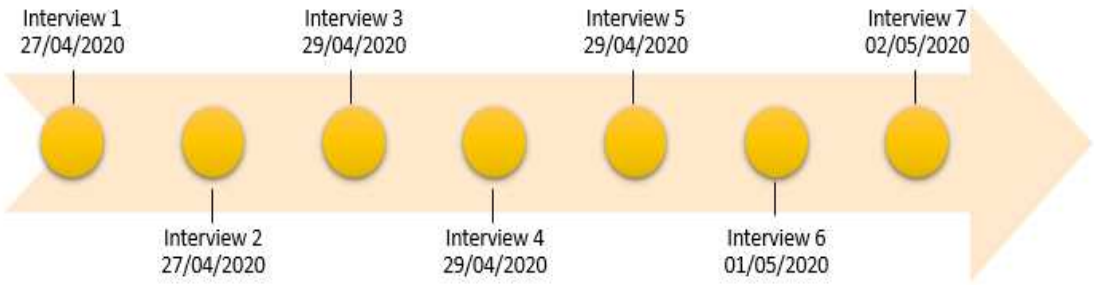
Exhibit 18 – Research Choice – Mono Method



Source: adapted (Saunders et al., 2009)

To contribute to this research, all participants agreed to do so, based on a consent letter (Appendix 1), which was handled in advanced to the interview take place. The interviews were conducted through the Zoom – an app specific for online meetings, according to each participant availability (exhibit 19). The Zoom features provides a recording function, which was important to enable to do the transcript of the conversations, and ultimately facilitated the data analysis process. To optimize resource, the transcript process was facilitated by using Otter.ai feature, which is available online.

Exhibit 19 – Interviews timeline



All interviews were conducted based on semi-structured set of opened questions (Appendix 2), focusing on gaining the most recent scenario of the implementation, adoption of enablers technologies (VMI, RFID, POS and Cloud) and business practices (CPFR), by the Supply Chain Management process, to leverage business' competitiveness.

Aiming to elevate the level of certainty for the correct identification of the most suitable sample to carried out this research, the Purposeful Sampling technique is applied. Due to the specific, strategic knowledge that is required regarding the topic, it is crucial to approach the correct professional to answer the questions (Benoot et al., 2016). The sample selected for this research, was designed to reach out highly qualified professionals from the Strategic and Tactical levels of an organizations (exhibit 20) as well as Consultants.

Exhibit 20 – Organizational pyramid

Source: adapted (Schmidt and Wilhelm, 2000)

In additional, a careful strategy was put in place to ensure that the interviewees were selected considering the different process of the Supply Chain (exhibit 21).

Exhibit 21 – Representation of the SC process of each interviewee

Retail

Face to face with customers, the Retail has one of the most strategic roles. Working as a "bridge" between customers and the supplier, the Retail captures not only demand on real time, but also insights, fresh perceptions about the market. The retail can help to adjust real demand. It is from the moment that sales happen, that the whole Supply Chain starts moving to meet the market's demand.

Industry

In charge of translate all data gathered from the market and transform sales in products, the Industry is key to keep synchronism within the chain. It is in the industry, that new products are created to attract customers' attention, desire for consuming, i.e.., in clothes industry, or formulation, recipes for a new medicine and beauty products.

Distribution/Transportation

The Distribution/Transportation process is crucial to ensure a timely response for the demand, responsiveness. Striving to meet customers' expectation and keep the business continuity, a variety of transports modal are utilized throughout a product' supply process. Improvement and innovation have been transforming the way of delivery.

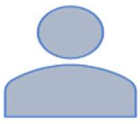
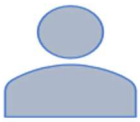
A mix of different industry sectors, i.e., Beauty, Food, Logistics, Pharmaceutical and Steel, was also another aspect considered during the identification of the selected sample for this study

To obtain a wider sense of the topic, the sample prepared for this research included professionals from organizations based on three different continents, spread worldwide, mostly from multinational companies (exhibit 22).

Exhibit 22 – Worldwide interviewees location

All participants of the research interview process, either are professionals directly involved or part of the decision-making process on whether implement technologies and business practices within its Supply Chain Process; or professionals who are both, dealing with and directly impacted by, these technologies and business practices on a daily basis (exhibit 23).

Exhibit 23 – Interviewee's profile

	Interviewee 1 Male More than 10 years of experience working on retail Multi-Site Manager
	Interviewee 2 Female More than 20 years of experience on Procurement CEO of Consultancy Company
	Interviewee 3 Male 11 years of experience working in the industry Supply Planner
	Interviewee 4 Female More than 20 years of experience working mainly within the industry CEO of Logistic Channel
	Interviewee 5 Male More than 20 years of working directly with complex distribution Supply Chain Executive Director
	Interviewee 6 Male More than 10 years of experience within maritime transportation industry Procurement Manager
	Interviewee 7 Male More than 30 years of experience working within the Supply Chain Supply Chain Consultant

This research has been deployed with the objective to meet the requests from a Masters' degree in Procurement and Supply Chain Management programme. It has a limited time frame already pre-established, so for this reason, a Cross-Sectional time horizon is considered for this study (Saunders et al., 2009).

3.4.2 Access and Research Ethics Issue

For the purpose of data protection, it is important that moral and ethical commitment must be assuring by the author (Saunders et al., 2009). For this study, the results, data, personal information, is treated as anonymous (non-disclosed). However, when it requested, it can be only shared with the dissertation supervisor to evaluate the authenticity of the data/information. A Consent Form, covering all information regarding the Ethics approach for the interview is sent in advanced, to obtain the interviewee permition to proceed with the data collection (Appendix 1).

3.5 Approach to Data Analysis

It is relevant to produce a consistent result at end of this research. So then, through a careful assessment of all information obtained among the primary data collection was realized (Saunders et al., 2009). To facilitate this process, coding was the technique used as a guide for the data analysis required in this study. The Coding technique is a bridge between the primary data collected and the development of a potential theory or an expansion of knowledge. This technique, allows the researcher to mine the data to transform it on valuable information (Charmaz and Belgrave, 2015).

In other words, all the answers provided by the participants, were initially reviewed and the key words, fragments are highlighted and put aside for further focusing analysis, comparing and contrasting with others interviewees' opinions and then, make suggestions to a conclusion (DePoy and Gitlin, 2015; Charmaz and Belgrave, 2015). At this point, becomes even more clear the amplitude of resources that the Grounded Theory enables to access. Follow a more details of the data analysis process for this research:

The process of primary data collection was through virtual interviews held on Zoom. All interviews were recorded and, later a transcript was put in place to enable an amplification, a clarity of the information, that was kindly given by each interviewee. Aiming to optimize the transcript process, an online tool called Otter.ai was used. The result of each transcript was exported to an excel spreadsheet. All data, already placed on the excel spreadsheet, was meticulously assessed and analysed. Small adjusts were required to clarify the information, in some cases, Otter.ai did not recognized words or

created a wrong sentence because of the quality of the audio as well as the correct usage of the language. All interviews were conducted using English as the official language.

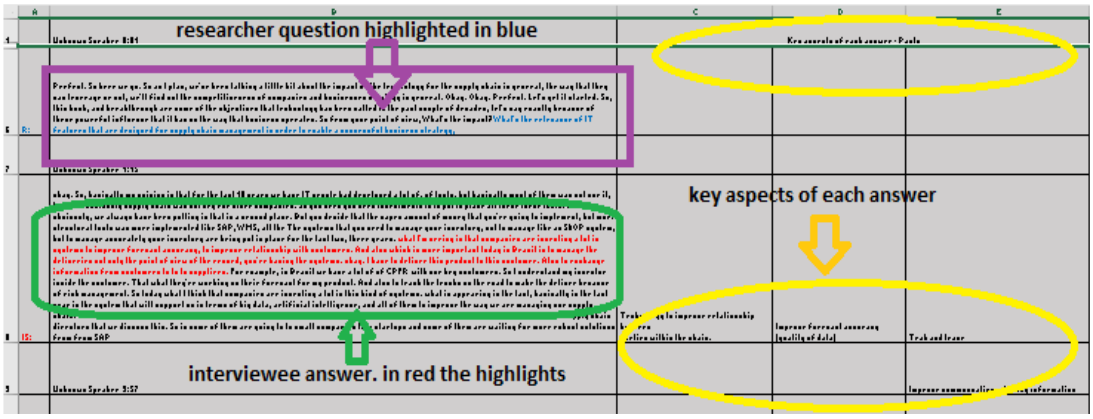
The data analysis was based on Coding technique, as it was previously explained in this study. Each code was created based on each group of the semi-structured opened questions, used to drive the conversation during the interviews (exhibit 24). These questions were designed to cover all aspects stated on the Research Questions.

Exhibit 24 – The Codes

Code	***Group of semi-structured opened questions***
ITI4BS	***Information Technology's Influence for Business Strategy***
An overall assessment on how important the IT features are designed to support SC process for the success of a Business Strategy. A check of the level of digitalization within the SC that each participant is part of.	
ITF4SC	***Information Technology Features for Supply Chain***
Identify whether VMI, POS, RFID and Cloud have been implemented across different SC as well as the level of integration when the implementation exist. What is the motivation for such implementation An assessment on the impact of these features for the SC performance.	
CPFRasE4SC	***Collaborative Planning Forecasting Replenishment as enabler for Supply Chain***
An assessment on the impact of the adoption of collaborative practices within the SC.	
SSasR4BP	***Similarity of systems as requirement for business partnership***
An assessment on to what extent the lack of similarity of systems would be consider a barrier to establish business partnership within the SC	

After a detailed transcript of each one of the seven interviews collected, supported by the Otter.ai tool, every topic discussed, every conversation were listened multiple time and analysed in-depth to extract and identify potential patterns that could contribute for the expansion of knowledge about the impact of the implementation of technologies (VMI, RFID, POS and Cloud) an collaborative practices to support business strategy and ultimately increase competitiveness. Already with all data well organised in an excel spreadsheet and according to each interviewee, by the application the coding process, the hottest topics of each conversation were highlighted in red, to segregate the main ideas from the overall answer. Following this step, a summary with the most important extract of each participant's answer was created aside, in another column created for this reason, to allow a better visual management of the data, understanding of the content as well as make it more straightforward. The potential patterns could be easily identified on the spreadsheet (exhibit 25).

Exhibit 25 – Snapshot of the excel spreadsheet showing the coding application



During the assessment of each answer, was possible to visualize indicators, traces that, by the inductive approach, would suggest that, the IT features (VMI, RFID, POS and Cloud) and collaborative practices, can improve companies' performance and rise competitiveness. For instance, by increasing responsiveness and sharing accurate and timely information with the parties. A more structured and detailed of the findings is presented as followed.

3.6 Conclusion

The above structure has been placed as a pillar, aiming to create a favourable and flexible scenario for the development of this qualitative and exploratory research. It is expected that this format allows a maximization of clarity whether the integration between Information Technology and Supply Chain Management as well as business practices increase organizations' competitiveness.

4 Presentation and Discussion of the Findings

4.1 Overview

The data analysis presented was based on the assessment of the answers gathered throughout the interviews with a sample of 7 professionals, working for organizations based on 3 distinct continents (American Continent, European Continent and Asia Continent), the majority has worldwide footprint. All professionals are directly involved with different process (Retail, Distribution, and Industry), and different markets within the Supply Chain. Each one of them was strategic reach out because of their consistent experience working with Supply Chain, all of them has background of at least 10 years within this field, which increase the value and credibility of all information collected. An X-ray with the complete profile of each one of the participants of this research is exposed above on exhibit 23. The Consent Form was signed by all interviewees and the researcher before the interview take place.

Based on the analysis of each group of questions, as it is described on the exhibit 24, all answers provided by each one of the interviewees was carefully listened and assessed. Similarities of point of views and examples of their experiences were identified, such as the relevance that the Supply Chain within the organization – it is increasing the recognition of this process as a significant player for the company' business strategy. Moreover, that integration must go beyond systems' integration – a close communication between the team involved in the process can optimize it and mitigate inefficiency. On the other hand, discrepancies were also stated, for example, similarity of systems as a barrier to set up a business partnership.

It is important to highlight that IT was recognized by all participants, from three different countries, in different moments of development, a one of the key pillars to support a successful Supply Chain strategy.

4.2 Findings

This chapter is dedicated to present all information that was processed during the primary data analysis, discuss its relationship with the topic of this study and ultimately draw, suggest a conclusion based on inductive approach, throughout an assessment of each interviewee answer as well as a comparation to what the previously literature review describes. The structure of the following analysis combines parts of the original participant' statement and the researcher considerations. The result is presented according to each group of the semi-structured opened questions, identified by its respective code.

4.2.1 - IT4BS – Information Technology for Business Strategy

Throughout the secondary data collection for this study, it possible to identify an abundant the number of authors pointing out that IT features can create a positive impact for an organization strategy. It can improve performance and process and ultimately increase competitiveness, which has a direct effect on profits.

Efficiency, effectiveness, share information in a timely manner, and accuracy are also aspects that were directly mentioned by most of the participants. These are some of the main characteristics of competitiveness for Supply Chain process.

Asked to assess the impact that Technology designed for Supply Chain may have for a Business Strategy, as well as the level of digitalization (out of 10, where 10 is the greatest level) within the process they are involved, the interviewees highlighted:

"…For me, the biggest thing we're probably all benefiting from the advances in technology is the efficiency of processes are being increased or speed up, or if anything, the technology behind that is making maybe processes that were taken a little bit longer, we're able to complete those at a much more efficient timeframe so that we can kind of focus on other areas of the business as well. It is just increasing the capacity for performance. And accuracy as well. Accuracy is something we speak about an awful lot. So, the accuracy is starting to improve because the human errors have been reduced with the technology…"

Regarding digitalization within the Supply Chain he states:

"It is getting better. We are trying these advances here, there, and everywhere, so everybody's learning. Still got a lot a lot of improvements that are needed. I would rate 7 out of 10.

Interviewee 1, Multi Site Manager

Interviewee 7' statement also goes direct to the point about the role of IT features for the Supply Chain and rate the digitalization within the SC:

"…It plays a very crucial role as far as the supply chain goes. In fact, IT and supply chain go hand in hand."

"…I would rate digitalization level at 8."

Interviewee 7, Supply Chain Consultant

Interviewee 4, CEO of a Logistic Channel, emphasizes the relevance of technology to allow companies to understand consumers' behaviour:

"…So, in order to, to reach out better the consumers, the industry and the logistic will need to use data and data comes through technology (…) through data and mining of these data, companies will be more effective on the reaching of consumers."

Interviewee 4 rated the Supply Chain that she is involved with 7 out of 10.

For *Interviewee 3, Supply Planner,* who rated one of the greatest levels of digitalization within the SC, one of the biggest achievements from the implementation of IT within the SC process is the possibility to work in a smarter way:

"…These IT tools are related to speed up lead time and bring information in an easier and smart way to make decisions. I would like to highlight as, as an analyst as a supervisor, dealing with managers, I cannot see another way to provide information without these tools (…) the technology need and will help the logistics to be more efficient on that…"

"…I would say nine or 9.5 for the level of digitalization within the process."

On his answer to these set of question, *Interviewee 5, Executive Director,* stated that the level of digitalization can improve as he sees some gaps within the process. He also detailed the importance of technology for the SC:

"…what I've seeing is that companies are investing a lot in systems to improve forecast accuracy, to improve relationship with customers. And which is more important today in Brazil, is to manage the deliveries (…). Also, to exchange information from customers to suppliers. (…) what is appearing in the last, basically in the last year, is the system that will support us in terms of big data, artificial intelligence, and all of them to improve the way we are managing our supply chain. (…) everybody is searching a lot for that. Everybody is looking a lot in this direction today to get systems that could improve our forecast accuracy, to understand how the market is going to change to support integration in between them."

"…For digitalization level, in mind today, I think my level is five.

I have X system, I have part of my production planning inside the Y tool, my forecast, my S&OP runs in an Excel spreadsheet (…) but I don't have a system that integrate them…"

Interviewee 6, Procurement Manager, describes the relevance of technology to coordinate a such complex operation across the globe:

"…We are in the end, facilitating the global trade and supporting the companies to bring the goods or the parts to assembly the products or even to deliver the final product to the customer(…) risk management is one of the goals (…) so, technology is used to monitor the fleet

of containers and eventually the fleet of the trucks, weather forecast for the next hours and days, so, if there is any issue, adjustment on the routes to be done, and for several reasons for safety for optimization, and also to avoid taking unnecessary risk (…). Suppliers send information to the system where you change the responsibilities in each of the parts of the supply chain…"

The digitalization level within this chain was described by Interviewee 6 as "fully digitalized".

From the consultancy perspective, *Interviewee 2, CEO of a Consultancy Company*, technology is a strategic tool that works as enabler within the SC. She expands the aspects of the business that can get benefits from the implementation of technologies:

"…So, technology is making us do things faster, better, smarter, cheaper, but we still have to have the knowledge of the people. So, we still have the right and best business practices. Technology, however, it can be a cost saving. Definitely. It will drive transparency. There's full traceability and transparency (…) to bring it all back down, we will always measure efficiency and effectiveness. The technology originally was all about making us a lot more efficient, doing the same with less resources, less resources was less people. It was also less equipment, less everything we're now I do believe that technology has allowed us to move into the effectiveness and improving effectiveness…"

Based on the assessment of these answers, it is highly suggested that organizations are investing on and are putting Information Technology in place throughout the Supply Chain process focusing on increase its competitiveness by using different and up to date IT tools to gather information from the market, consumer demand, that will be used to drive business strategy.

4.2.2 - ITF4SC - Information Technology Features for Supply Chain

For this set of semi-structured opened questions, the aiming was to identify the level of implementation and integration of VMI (Vendor Managed Inventory), RFID (Radio Frequency Identification), POS (Point of Sales), and Cloud within the Supply Chain process for the organizations represented by each one of the interviewees, as well as access the motivation for such implementation. Also collect some examples that shows the impact of this adoption for the business' performance.

Overall, VMI, RFID, POS and Cloud have been implemented by all organizations, except of course the Consultancy Company due to the nature of the business. Not all organizations have all above systems already implemented, it will vary from each company. The participants stated that, exist an integration of these systems, when implemented, but they also highlighted that still a lot of room for improvement in this aspect. Lack of flexibility of the already existed system and cost of acquisitions were

point out as barriers to establish the so-called integration. However, if the integration is not implemented, all interviewees declared the use and alternative systems, to enable data analysis and translate it to valuable information for the business. All interviewees provided real life examples, from their routine and experience, of the beneficial results from the implementation of these features on the Supply Chain that they currently represent. Each statement is following presented:

"All three of all three, I think the most recent one that we that we implemented was the RFID (…) the RFID has ensured that the accuracy is at 100% every single time (…) that's making it easy (…) it's making it so much better for us. We are quite a fast-paced business. So at least for the RFID is implementing a measure of controls that we do not need to worry too much about. So, we've got that control sets done."

Interviewee 1, Multi Site Manager

Interviewee 1 also correlate the motivation for the implementation of technology with competitive advantage:

""Definitely the motivation is efficiency and ease of service. And again, I think it is one of those parameters that we add on and we set to show a bit of advantage (…) we are ahead of the game and we are trying to do something a little bit different in retail…"

Interviewee 1, Multi Site Manager

For Interviewee 7, the implementation of these features is also related to cost optimization:

"I am basically concerned about reengineering and optimization, cost optimization. So, sometimes it is all three integrated, sometimes it is just one of them implemented. Sometimes it is two of them. So, it depends upon the project side project. It varies from project to project."

Interviewee 7, Supply Chain Consultant

Interviewee 4 states her broad overview and consider these features as an important piece, instruments to drive business strategy:

"…I see the cloud RFID and others technology as an element for the big scenario, which I see in the future that will be traceability (…) the only way to really capture all the data is through traceability. Then you can use RFID, you can use a lot of other software's and hardware that will collect this data and it will manage the data for you. But in the end, you need to have artificial intelligence and machine learning to collect all this data in order to give you really good business insight (…) So this, the supply chain, is a part of the chain between extraction of raw material and manufacturing. And then after was between manufacturing to distribute and then distributed to clients to the consumer. So, I see the supply chain playing a very big role in terms of adoption of technology, because is in the entire life of the product."

Interviewee 4, CEO of a Logistic Channel

Interviewee 3's statement gives precise example of the benefit of the implementation of these features for the accuracy for inventory management, and the barriers for integration between systems, but also describe the favourable flexibility that Cloud provide for the business:

"yes, RFID and cloud, they have been implemented. And RFID was implemented in our warehouse. And this is amazing because it reduces the inventory issues a lot and we reduce the human work a lot. And of course, the process become much more feasible and much more, I would say reliable on (…) I think there is a gap on integration. This is a point that in the future will be better. Because if you don't buy RFID from the solution provider, if you don't buy a system that is integrated to the main ERP we are operating, you have to build up an IT integration from the system you are implementing for that existed provider, to translate it. Then these of course costs money to the company cost time to integrate both tools (…) With Cloud we can have access to the data anywhere we are, we can have those data's backup, if something happen."

Interviewee 3, Supply Planner

Interviewee 5, who has one of the most top strategic position between all interviewees, declares the impact, the relevance of the adoption and the integration of these IT features associated with other tools for his daily basis analysis

"…more structural tools was more implemented like SAP, WMS, all these systems that you need to manage your inventory, not to manage like an S&OP system, but to manage accurately your inventory are being put in place for the last two, three years (…) I have a tool developed by my own team, is a BI tool that integrates information from one system, information from some satellite system, for example, that receive online information from the tools that I use to make picking, to measure productivity. So, I integrated everything in a BI tool. So, I can see in real time what is happening with my operation…"

Interviewee 5, Executive Director

Involved with one of the more complex Supply Chain operations, Interviewee 6 emphasizes his point of view about the relevance of these technologies for the process and give a consistent example on the application of RFID within the Cold Chain as well as the value that integration has in this scenario :

"I think these technologies are actually quite important to be determined and to be implemented across the supply chain. One interesting, very interesting device, that has been also implemented on the logistic segment that comes up of managing the assets is to manage the cargo and the supplies are capable to access the temperature inside the container in the transport of sensitive cargo. So, by that the system measure the temperature from time to time and I think that every 15 minutes or so, and then they send a message to the central system that can also share the information to customers. Or otherwise is only to monitor the temperature of the containers. And if there is any major variation, depending on the sensitiveness of cargo, then they need to go check and take the necessary actions to reduce the variation (…) when we talk about the technology, integration of information, and there is a huge value on that (…) So, for example, with the blockchain and having a simple platform where you can send your data but also have access

to data from other experts in the supply chain. So, basically it means that you can better focus to better plan your operations based on information of others.

Interviewee 6, Procurement Manager

Interviewee 2, directly assessed some of the motivations for the implementation of VMI, RFID for business performance:

I always liked VMI (…) I never had a problem paying extra money for the supplier who did it well, because that meant that I did not have the headache. I did not have to think about it. And it might be the small little things that you run out and it can bring a whole factory down. Definitely it streamlines your operation. And you have a shared responsibility with the supplier to make sure that you are collaborating, and you give them the right information (…) VMI is definitely making efficient and effective, that collaboration and that information share (…) RFID it's all about transparency, you know, and understand that it has to do as well with lean and that has to do with just in time. And they are all great tools. And they are used. RFID is more used in the logistics rather than in the inventory. So RFID is, if it's value is the value product, you want to make sure you track it, you want to make sure at all times that all the right information is associated with it that. You know exactly where your capital is, is sitting (…) Retail are implementing indeed. It has a lot has to do with retail, again, just in time (JIT) deliveries for clients, it is their fast-moving goods. You do not want to stock too much. You do not want to stock too little. And so, and it is the tracking and the logistics of it, understanding where at all times your stock is. It is very important and sharing that information with your customer…"

Interviewee 2, CEO of a Consultancy Company

4.2.3 CPFRasE4SC - Collaborative Planning Forecasting Replenishment as enabler for Supply Chain

Throughout the studies carried out for this research, is was possible to verify that the stand-alone approach seems to not be a smart strategy for organizations that are aiming to establish its business, especially from a global perspective. The literature says that companies that work in a collaborative approach with its partners are likely to get better results and stamp their brand by increasing customers loyalty, because they can trust that the company, the brand, the products will be there when they need. So, to make it happen, "dreams come through", all parties within the chain needs to get together and work as close as they can to ensure coordination, efficiency, responsiveness. The more engaged is the Supply Chain the better to make it sustainable and continuously.

The answers reported during the primary data collection phase of the research, amplifies, what is stated in the literature. The interviewees made loud and clear that Collaborative approach is has becoming must.

Interviewee 1 says that collaborative approach with suppliers has a "massive" importance:

"...We're in a business where we've got multiple different stakeholders, and some we chat to on a day to day basis and the stock on the supply chain would be a day to day stakeholder that we do touch base with quite often multiple times throughout the day if need be like yeah, definitely huge (...) Forecasting and Replenishment it is generally automated, based on sales. However, we still have autonomy, where if we do want to increase or we do want to change or add on to our, our portfolio, we can do that."

Interviewee 1, Multi Site Manager

Interviewee 7 declared that collaborative is part of the Company Philosophy and it applies to every partner. He also highlights that KPIs (Key Performance Indicators) and SLA (Service Level Agreement) are used to align expectation:

"It is part of the Group philosophy to work in partnership, be it vendors be suppliers, so it's always collaborative. These assignments will be held with vendors. So, it is everybody in fact, be the supplier, be vendor. Anybody, it is a collaborative approach only always (...) In one of the business they outsource this to a vendor who to whom the place belongs, say for example, if it is in Nepal, so, we have choose the local partner over there and integrate the software, his software with the Group software. So, that is how we keep on collaborating with various partners just relying on the partner. It is taken care of by the partner. KPIs SLA is everything is by fixed by the group. But they are followed by the partner."

Interviewee 7, Supply Chain Consultant

Interviewee 4 consider collaborative approach "mandatory" for the success of any business. But she also touches on one of the biggest concerns, barriers, also reviewed on the literature, for the adoption of a collaborative approach within the chain – lack of trust:

"It's mandatory. We need to have this horizontal exchanging. However, I see at least in Brazil and a little bit in Europe as well, I see resistance, due to the fear to exchange data, and the reactions from the supplier side, for example, increasing my price because he knows my demand. And I see people very concerned about the confidential information exchanged. However, what will dictate the extension of data exchange will be the market. So, how much efficient do you want to be? Do you want to play together to be efficient in double or do you want to be efficient a stand-alone and then lose market? So, I see, I think that in this way the market will tell a lot, how much collaborative between parties on the chain need to be and will be a change of habits I would say."

Interviewee 4, CEO of a Logistic Channel

It is understood that organizations that manage to overcome lack of trust and establish a good relationship with its business partners are likely to last longer and gain solid and positive results.

Interviewee 3's response to this question, highlight lack integration as a significant barrier for the adoption of a consistent collaborative approach, but he has a positive example of good result from one of the process which is collaborative approach based:

"…the theory, you can see a very beautiful (…) But in reality, what I can see is the company that purchased the system has this information integrated among the company. but if you go abroad, if you look to the suppliers or customers, we are still receiving a lot of spreadsheets from each side and have to integrate those spreadsheets in our system to process and to make it work to make it only one database."

"we receive input from, the demand, suppliers and then customers. So, this is a collaborative chain that goes automatically by those databases and then a BI tool process (…) comes out automatically and every part has collaborated among this. This is one part of the process that I can see this is working (…) with this IT tools everything become much more shared and aligned between the partners definitely."

Interviewee 3, Supply Planner

Interviewee 5 explored this topic from the perspective of the collaborative approach with its customers and its suppliers. On his statement it is possible to identify another element that contribute for a stronger and more robust Supply Chain process – communication between parties:

"…So first for me, is the customers, my customers. So, I am the supplier and I work with a very collaborative approach with them. What it is important, is the relationship. Basically, because today when I build my demand plan, obviously I take a look on brands and products, but also I take a very detailed look on channels and customers (…) so, it is really important to understand what they are doing, which promotion they are doing. What they want to do in terms of commercial actions, what they want to do for the exposition of our product. So, I need this information to supply them (…) Second, to the segments that are not perishable products, you have 30 45 60 days of inventory inside the customer. So, you must really analyse selling and sell out what is happening. So maybe you are selling products to these guys, and they are not selling to the customers in our inventory is increasing. So, it is our mission to understand these scenarios. What is happening today. We can help them in terms of, create a collaborative promotion to increase selling out, stop selling to avoid some sort of cash problems for these guys. And that is the same thing in terms of visibility, we provide to our suppliers (…) in some case, give a visibility of six or seven months of production so they can supply me."

Interviewee 5, Executive Director

On the shipment side, Interviewee 6 give his opinion about collaborative approach for the success of this type of operation. He also highlights two pillars related to this practice – data completeness and timely information:

"That's the most important and it can be on any side, with any kind of supply. If you share on a collaborative system (…) you share your forecast, your demand in advance to understand that there will be some decent volume. So, essentially lower volumes that the vendor can also prepare for it. (…) it is very important to review and ensure that the information and forecast is provided on a timely manner (…) In logistics time is essential. So, if the operation is planned well in advance with the reasonable resource for the expected demand and everything goes according to plan…"

Interviewee 6, Procurement Manager

From a consultancy point of view, Interviewee 2 states that still room for improvement regarding collaborative approach adoption:

"...Some companies are really doing it well already, where they share, they share all their information over the technology platforms (...) but that's not everybody's approach, because of the emotional element, it is our head will tell us, yes, we should do this. And then there are emotional elements, which is trust, which tell us I actually don't trust them to give them full visibility of my information, because they might actually use it, abuse it, sell it to my competitors (...) But trust is such an important ingredient for any relationship mapping like that..."

Interviewee 2, CEO of a Consultancy Company,

4.2.4 - SSasR - Similarity of systems as requirement for business partnership

Some authors described that similarity of systems as a critical aspect for the establishment of a business partnership because it could secure a more agile and robust the information flow. Thus, a requirement.

Throughout the interview process, though, the participants declared that it might be a requirement yes, but not a limitation factor. Lack of similarity of systems between parties in a Supply Chain could be solved by the implementation of different software, integrators that allows integration. Moreover, according to some interviewees, cost is a concern in this process. However, communication within the chain was described as one of the most relevant aspect rather than similarity of systems.

"Yeah, I think so or at least we try to make sure that the transition can be made as smooth as possible and that we have got access to whatever operating system or maybe not full access, but at least a little bit of visibility to the operating system and to see how that is going to improve things."

Interviewee 1, Multi Site Manager

"In case the similarity of the software is not there, then what we do is, we integrate our software that is X with the customers and that's how we uniform software that is used between all the partners."

Interviewee 7, Supply Chain Consultant

"I think for the short term will be a requirement. However, we have a lot of API's that enable communication between different suppliers' systems. In fact, supplier that want to win on this market needs to have a more flexible and more open API to connect with, even with competitors."

Interviewee 4, CEO of a Logistic Channel

"This is a requirement. Definitely. But this is not the most important one. Price is considered more significative."

Interviewee 3, Supply Planner

"No, no similarity of system? No. (…) What is important is the integration of information. No matter which system they are using. It is important for me to receive this information, translate this information and put it into my system. I believe that today we have a lot of tools that make this integration. (…) So, I think is more important to integrate the process than the system."

Interviewee 5, Executive Director

"I believe that depending on what you are buying from or procuring from, what kind of security. But for each kind of business, they will have the system and suitable to that kind of operation. And of course, if they have the best system or the most updated the most updated system maybe or most likely they will have a productive operation. (…) Of course, the system will be a very important tool to get the results, productivity, the performance that it requires, but then, between companies, it will be important to have the right API messages and communication placed."

Interviewee 6, Procurement Manager

"It's always a nice to have, but it's not a must have. (…) So, there is system integrators that will make one ERP system talk to the other (…) it should not be a barrier."

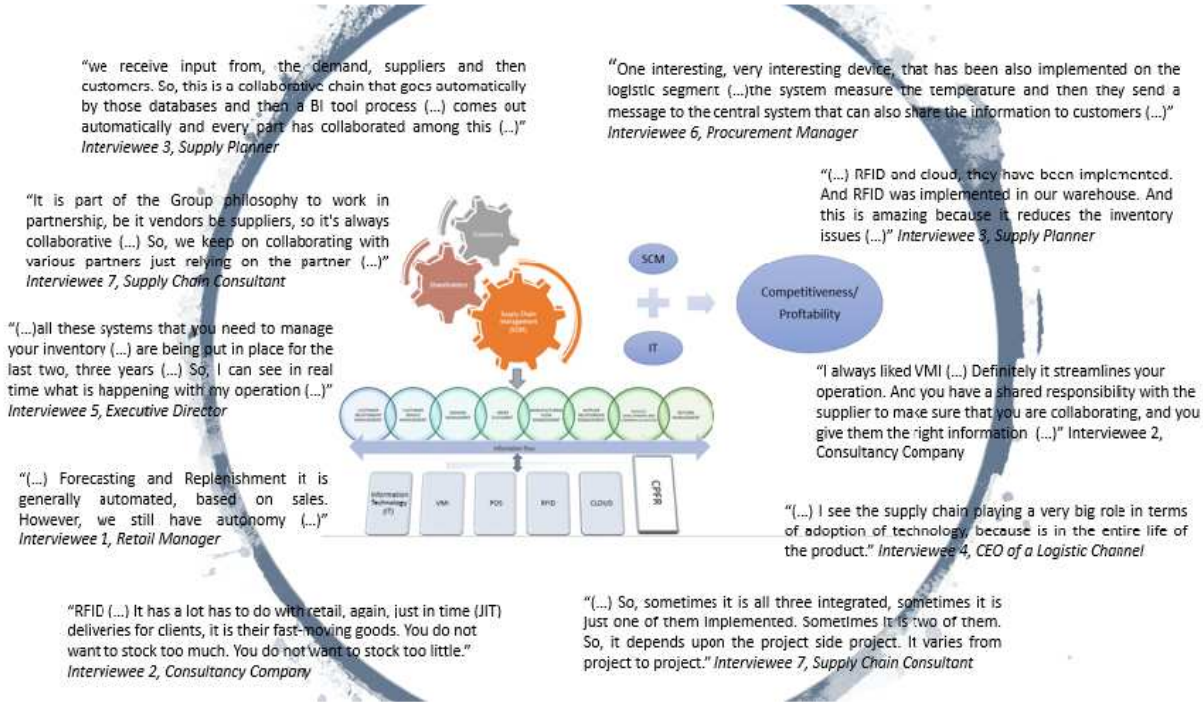
Interviewee 2, CEO of a Consultancy Company

4.3 Discussions

The following discussion address the final considerations based on this study.

Firstly, all information extracted from the primary data analysis was utilized to support the validation of the framework presented on this research. Which means that, based on all inputs, insights and direct affirmation declared from the interviewees, it is possible to understand that organizations are investing on the combination of Information Technology, business practices and Supply Chain to support its Business Strategy and ultimately its competitiveness (exhibit 26).

Exhibit 26 – Framework' validation



Source: self-modified

Secondly, it is a fact that the IT features VMI, RFID, POS and Cloud have been implemented to increase Supply Chain efficiency, effectiveness, responsiveness aiming to meet the market demand. Which means that the level of digitalization within the Supply Chain is growing and it is a continuous process. Different interviewees, who have solid experience in the field, working in different continents, the majority is involved with global Supply Chain, reports the witnesses of the digital transformation throughout the years.

In additionally, the Supply Chain, the Business Strategy as a whole, has been driven by customers' demand. A lot of effort has been put in place, especially the implementation of these IT features, to get the most precise, accurate information to drive all the entire chain, process.

All interviewees highlighted that the integration of systems is important within the Supply Chain and facilitates their routine. But, when the existing software does not have the flexibility required to do so, different alternatives, IT tools can be used to minimize or to solve de problem.

The experience of using VMI, RFID, POS, and Cloud, when implemented, was describe as positive by all participants of this study.

Collaborative approach is implemented and working well for some companies. All interviewees stated that, practices such as sharing information with parties, establishing communication, and creating trust are helping their activities and facilitating the Supply Chain process. Because of that, the information flow has improved as well as agility within the chain. It is a general perception identified from professionals of the Tactical and Strategic level of the organizations as well as Consultants. All these aspects contribute to a more effective and efficient chain. However, it was reported by some participants that, these collaborative practices do not always happen as it is described in the literature. And the lack of trust between parties was pointed out as the main issue, barrier to allow such approach. It can cause a significant impact on the coordination of the entire operation. For instance, if the numbers, the forecast is not timely and completeness the so-called Bullwhip effect can take place and it can result in loss, but mainly impact on the most crucial aspect: meet customers' demand. It also can create a negative impact for the brand reputation. And ultimately lose market and investors.

Although similarity of systems is described as essential to establish business partnership for the Supply Chain, most of the participants in the research declared that it can be a requirement, but not a barrier. The integration of process between partners that has distinct software is already reality. However, the cost of this operation was also considered a concern. Additional aspect that was also highlighted by the interviewees is that alignment and clear communication between parties within the Supply Chain can be more important than integrate systems.

4.4 Conclusion

In this section, the opinions, experiences, and insights of the seven interviewees, gained based on a conversation using the semi-structured set of opened questions, were assessed and their contributions were also provided above, allocated according to each code.

It was presented the validation of the framework proposed for this research (exhibit 26). By checking and comparing each one of the answers collected during the interview process, it was possible to find out strong evidences, that can be used as rational, to validate the initial idea that companies are being using IT features designed for Supply Chain and business practices to increase competitiveness.

5 Concluding Thoughts on the Contribution of this Research, its Limitations and Suggestions for Further Research

5.1 Implications of findings for the research questions

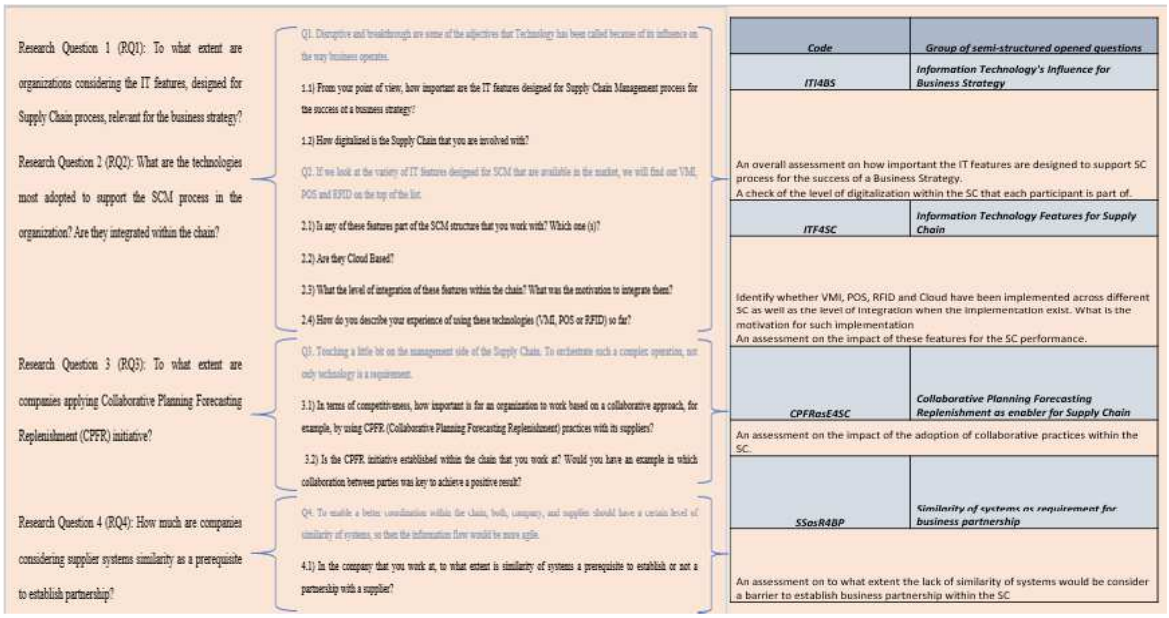
In this section, all implications of findings for the research will be presented.

By utilizing the qualitative and exploratory research approach, it was possible to gain a richer, a wider range of data to support the amplification of knowledge about the impact of the implementation of IT features designed to support the Supply Chain Management process and business practices to increase competitiveness. Firstly, by mining information already printed in the literature and secondly through the in-depth and appropriate approach used during the interviews for primary data collection.

The choices made to set up the Research Strategy were key to reach out the best sample of interviewees and extract the most up to date information about what is going on in the market. Which was and later compared to the literature to validate the initial idea illustrated on the framework, by showing that organizations are taking advantage from Information Technology and business practices focusing on Supply Chain to rise competitiveness.

Moreover, the findings previously presented, indeed communicate directly with the research questions, mainly due to the connection, link between the research questions, the semi-structured set of opened questions and the code (exhibit 27), and provide answers that allows an expansion of knowledge around the topic.

Exhibit 27 – Link between Research Questions, Semi-structured Opened Questions and the Code



Source: self-modified

Throughout a deep analysis of the primary data it was feasible to identify that companies, with different business core and complexity of operation as well as footprint, acknowledge technology as an important instrument to leverage its business strategy – which is the enquiry of the RQ1.

Moreover, connected to the RQ2 and RQ3, the primary data also provide information that organizations are implementing VMI, RFID, POS, Cloud, and collaborative practices throughout its Supply Chain Management process. The findings are also in favour to understand that companies are working based on CPFR practices, even though in some cases not through integrated IT systems. Aligned and timely communication was declared as a key aspect to overcome lack of technology.

In additional, by the assessment of the data collected related to the similarity of systems as a requirement to set up business partnership, topic of the RQ4, it is possible to verify that it can be a requirement indeed, in some case due to the specificity of the process, but the lack of it can be solved with the application of different technologies.

To sum up, the finding presented above in this chapter, allowed an amplification of knowledge, which can give precious insights to Supply Chain professionals, Procurement professionals, IT professionals as well as students of these filed. Professors, members of

the academy and professionals from different field that are willing to get an up to date overview about what is most recently happening for different organizations, part of different process of the Supply Chain, in the global market can also benefit from the information offered by this research. The primary data was collected from professionals highly qualified that are working in 3 different continents, who are currently involved with complex Supply Chain operations.

5.2 Contributions and limitations of the research

This section presents contributions and limitations of the research. As it was mentioned before, this study can bring the most up to date information about the current business practices related to the Supply Chain Management process focusing on meet customers' demand but also improve competitiveness.

This study was carried out during the COVID-19 scenario, under lockdown, which has a certain level of impact for the research process. However, the main barriers were overcome, such as:

- Access to secondary data: All member of staff from College, that were direct related to the research process, provided an outstanding support. More than ever, IT features were useful. Timely information, virtual workshops…the efforts went through the roof.

- Access to primary data: I have gotten a massive positive response from the professionals to whom I approached inviting to be part on my research interview. All interviews were realized by Zoom, which is available for online.

- IT and research methods knowledge were covered by the support provide by professionals, experts that became friends.

- Discipline and focus would also be a potential risk, but through the application of Lean practices, a consistent routine was established to facilitate the research process.

Perhaps, the limited time for the development of this study was the major challenge. The research topic of this study was established only 2 months before the final submission deadline, because of my interesting on learning more about it. So, it reduced my timeframe a little bit.

5.3 Recommendations for practice

This section is designed to present recommendations for practices. Based on the overall perception gain from the primary data analysis, the following recommendations are presented:

- The recognition of the Supply Chain as a strategic function has started. However, organizations should give more attention and invest more on the improvement of this process.

- It is also towards organizations the next recommendation. Enable an environment where trust exist depends on you, it depends on a positive change on mindset of the organization. But also, increase awareness that, stand-alone approach is in the past. It is up to the consumer to set demand. So, a more sustainable and collaborative Supply Chain, where all parties play in the same team is likely to be more assertive when it comes to meet customers' needs, and ultimately improve financial results.

- Also, as an outcome of this research, it is recommended that Governments do the same: invest on the improvement of its process to allow a better flow of the Supply Chain process.

5.4 Recommendations for future research

This section has recommendations for future research. Throughout this study a lot of different aspects that can limit the implementation of IT features designed to support Supply Chain process as well as business practices were identified, such as cost, lack of trust within the chain and Government bureaucratic practices and process. Understand the root cause of these issues, to enable effective problem solving, can open the doors for new investments that transform and optimize even more the Supply Chain process and ultimately leverage business profitability.

In additional, a further assessment of the current practices including more different industry sectors, more professionals from other different continents can also be used as a parameter to improve quality of primary data and draw new conclusions.

5.5 Conclusion and reflections

This section presented all aspects that were identified throughout this research journey, such as the Implications of findings for the research questions, Contributions and limitations of the research, Recommendations for practice and Recommendations for future research. Each content was created based on the evaluation of the current scenario, critical lenses and understanding of potential further studies to amplify the knowledge provide by this study, as well as opportunities for improvement along the Supply Chain process.

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Appendices

Appendix 1 - Ethics Form

Consent to take part in research

I……voluntarily agree to participate in this research study.

- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I understand that I can withdraw permission to use data from my interview within two weeks after the interview, in which case the material will be deleted.
- I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that participation involves answering questions related to an assessment of the impact of Information Technology combined with Supply Chain Management for business competitiveness.
- I understand that I will not benefit directly from participating in this research.
- I agree to my interview being audio-recorded.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.
- I understand that disguised extracts from my interview may be quoted in my dissertation and the final presentation of for the College Assessment Committee.
- I understand that if I inform the researcher that myself or someone else is at risk of harm they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.
- I understand that signed consent forms and original audio recordings will be safely retained, with limited access only by the researcher and supervisor, until the exam board confirms the results of their dissertation.
- I understand that a transcript of my interview in which all identifying information has been removed will be retained for two years from the date of the exam board.
- I understand that under freedom of information legalisation I am entitled to access the information I have provided at any time while it is in storage as specified above.
- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Researcher: Laura Oliveira Supervisor: Dhafer Alahmari

Research for the purpose to complete a Master in Science of Procurement and Supply Chain Management at Griffith College Dublin/Ireland

Participant printed name

_____

Current job position:

_____

Date:

I believe the participant is giving informed consent to participate in this study

Researcher printed name

Laura Oliveira

Date: *XX/XX/2020*

Appendix 2 – Semi-Structured Opened Questions

Q1. Disruptive and breakthrough are some of the adjectives that Technology has been called because of its influence on the way business operates.

1.1) From your point of view, how important are the IT features designed for Supply Chain Management process for the success of a business strategy?
1.2) How digitalized is the Supply Chain that you are involved with?

Q2. If we look at the variety of IT features designed for SCM that are available in the market, we will find out VMI, POS and RFID on the top of the list.

2.1) Is any of these features part of the SCM structure that you work with? Which one (s)?

2.2) Are they Cloud Based?

2.3) What the level of integration of these features within the chain? What was the motivation to integrate them?

2.4) How do you describe your experience of using these technologies (VMI, POS or RFID) so far?

Q3. Touching a little bit on the management side of the Supply Chain. To orchestrate such a complex operation, not only technology is a requirement.

3.1) In terms of competitiveness, how important is for an organization to work based on a collaborative approach, for example, by using CPFR (Collaborative Planning Forecasting Replenishment) practices with its suppliers?

3.2) Is the CPFR initiative established within the chain that you work at? Would you have an example in which collaboration between parties was key to achieve a positive result?

Q4. To enable a better coordination within the chain, both, company, and supplier should have a certain level of similarity of systems, so then the information flow would be more agile.

4.1) In the company that you work at, to what extent is similarity of systems a prerequisite to establish or not a partnership with a supplier?

We are coming to the end of this interview. Are there any other aspects of this interaction between IT and Supply Chain that you would like to highlight?

Thank you very much. I am stopping this record here.