COLLABORATIVE METHODS IN SUPPLY CHAIN: A CASE OF STUDY IN A GENERAL IRISH HOSPITAL

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I certify that the dissertation entitled: COLLABORATIVE METHODS IN SUPPLY CHAIN: A CASE OF STUDY IN A GENERAL IRISH HOSPITAL

Submitted for the degree of: **MSc in Finance and Accounting Management** is the result of my own work and that where reference is made to the work of others, due acknowledgment is given.

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Dedication

“This research work is entirely dedicated to my parents. The two biggest drivers of the achievements of my dreams. Thank you."

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To my mother, Sandra Malgor, and my father, Paulo Neves, who are responsible for all the love, encouragement, and support needed so that I could move toward my achievements.

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Abstract

Over the last decades' companies in various segments have begun to realize that having more efficient processes within their own organization was no longer enough to ensure a competitive advantage over their competitors, and it was necessary to develop a systemic view of the entire chain that is inserted including its supply chain. Faced with these movements, the health sector realized that to increase its competitiveness, it was necessary to pay attention to supply chain management.

Some studies indicate that efficient hospital supply chain management generates positive results such as cost reduction. For this reason, hospitals are increasingly adhering to supply chain management practices and methods.

Given the above, the objective of this research was to present the five main methods of collaboration in supply chain management. More specifically, the study sought to look at the supply chain management of a small Irish general hospital and the challenges for implementing collaborative supply chain management practices in this hospital.

The study results indicate that the hospital studied is not investing in supply chain collaborative methods and that many process improvement opportunities can be adopted, especially in its IT area that is paramount to the adoption of collaborative practices in the supply chain. The research also indicates that one of the key challenges for implementing collaborative supply chain management methods is a high investment.

Keywords: Supply Chain Management, Hospital Supply Chain, supply chain management practices, among others.

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1 Introduction

1.1 Overview

Given the high competitiveness that has established itself in the business world, organizations from various sectors have paid attention to this movement and started to look for new alternatives to become more competitive. For these efforts to produce results, it was observed that initiatives to increase competitiveness should be taken in general and not only in isolation, that is, together with inter-company arrangements.

From there, various concepts addressing this topic began to emerge, such as Filiére, Cluster and Supply chain among others. Thus, it is clear that competitiveness is increasingly sought among chains, and not between companies alone (Kliemann & Souza, 2004). Chan, Chong, and Zhou (2012) have shown that companies currently operate in a complex, unpredictable and competitive global marketplace, and organizations are responding to these challenges by implementing collaborative supply chain management for competitive advantage.

Therefore, as an alternative to increasing competitiveness, the need for companies to collaborate with each other became relevant, thus becoming able to meet the needs of their consumers efficiently and economically. From this scenario, supply chain concepts began to be explored, and studies with the characteristics of distinct methods emerged in the literature. Thus began the exploration of concepts about collaborative chain management methods.

As new entrants of competitiveness and complexity emerged, collaborative methods also contemplated these factors, and as a result, increased complexity in their implementations. This complexity results in difficulties in implementing collaborative methods and consequently in low adherence by companies.

Given the above, the first question of this research arose: What are the characteristics of the five main collaborative methods of the supply chain? The answer to this question was the first proposition of this study, which was through a literature review study based on previous articles and studies.

The second question object of this research was to understand how organizations are managing their supply chains and how collaborative supply chain management methods are being applied by organizations, more specifically in the health sector, as it is known that the hospital universe It is highly complex. Thus arose the second question of this research which is: How does one small Irish general hospital manage its supply chain? The answer to this question was through a case study applied in a small Irish hospital through qualitative research.

The third and final question of this study aimed to understand what were the difficulties encountered by organizations when implementing collaborative supply chain management methods. Thus the following question arose: What are the difficulties encountered in the implementation of collaborative supply chain methods in this hospital? The answer to this question was through a case study applied in a small Irish hospital, through qualitative research that allowed a comparison with the researched literature and subsequent conclusions.

The article is structured in two parts. The first contains a literature review of the main collaborative methods currently studied and applied. The second covers a case study on hospital supply chain management and the barriers to implementing collaborative supply chain methods.

In this chapter, were presented the research purpose, the significance of the study, the research objective and was also shown the structure of the study.

1.1 Research Purpose

As markets become more complex and competitive, the ability to think systemically becomes a competitive advantage for businesses. Organizations understand that they need collaborative actions by strategic decision seeking to generate competitiveness have doubts about what configuration and method to follow since there is not in the literature works focused on critical analysis of models of collaborative programs comparing them with each other.

Given this reality, the problem of this research focus will be on presenting the main collaborative methods of supply chain most widespread, showing their characteristics, advantages and disadvantages. And also investigate how an Irish general hospital performs its supply chain management and what the difficulties and challenges in the implementation of collaborative methods in this hospital.
The main issues that will guide this research are:

1. What are the characteristics of the five main collaborative methods of the supply chain?

2. How does one small Irish general hospital manage its supply chain?

3. What are the difficulties encountered in the implementation of collaborative supply chain methods in this hospital?

Based on these questions, the research was structured in order to approach the relevant topics in order to direct the answers relevant to this research.

The justification of the problem can be based on the "low existence" of research focused on the critical analysis of the collaborative methods of supply chain management. Barratt (2001) mentions in his work that there are many reports that show that the use of a collaborative chain management method has many benefits, but emphasizes the lack of studies that seek to characterize them in order to identify their advantages and disadvantages.

1.2 Significance of the Study

In recent decades, companies have begun to identify that being internally efficient alone was not enough to result in greater competitiveness, requiring a systemic look encompassing all links outside the organization. To this end, understanding a supply chain management has become a prerequisite for becoming competitive and increasing business profitability (LI et al, 2005). Faced with this movement, organizations from

diverse industries have made considerable improvements in supply chain management, but this trend has not yet successfully reached supply chains in the health sector (MCKONE-SWEET; HAMILTON; WILLIS, 2005).

One reason for this is that the healthcare industry has not made the same effort as other industries, such as manufacturing and retail, in supply chain management. Since the main objective is to provide quality services for patients to promote rapid recovery, investments are often made in areas that are directly associated with technical and scientific services (SMITH; NACHTMANN; POHL, 2011a).

Resource investment in improving supply chain management processes is not a focus of the healthcare industry. However, with the growing demand for cost reduction, health professionals are looking for cost reduction alternatives, but without reducing the quality of services provided.

A good supply chain management provides great opportunities to achieve this goal, as there is evidence that supply chain management practices result in competitive advantage and cost reduction (LA FORGIA; COUTTOLENC, 2009). Despite these positive evidence, the health sector is not being efficient in adopting these practices, due to the complexity of the industry and the little knowledge about chain management practices (ARONSSON; ABRAHAMSSON; SPENS, 2011).

Even in the face of major competitiveness challenges within the health sector, the benefit from efficient supply chain management is not yet well examined. When researched in academic literature, it is possible to verify that there are few studies about the hospital context compared to other industries. Moreover, the available literature does not provide much evidence of successful implementations, thus not providing evidence that helps identify which are the main barriers to implementing supply chain management practices.

An American study, conducted in 2011 in the healthcare industry, titled Efficient Consumer Response Health concluded that 38% of the cost of goods sold in the health sector can be attributed to supply chain activities supplies (SMITH; NACHTMANN; POHL, 2011a). The study also noted that this percentage is much higher than in other industries such as retail where this percentage varies between 6% and 8% (Burns et al ., 2002).

According to the study, there is potential industry cost savings of $ 11 billion that could be achieved through improvements in physical distribution, transportation, order management and inventory management. It is in this context of competitiveness and diffusion of supply chain management methods, and seeking to fill a gap of similar studies in the Irish context, which underscores the importance of a study of best practices in supply chain management involving an Irish hospital.

The theoretical relevance of the topic relates to the need for a better understanding of supply chain management methods and how this is managed by Irish private hospitals and also identifies the implementation difficulties and opportunities for improvement against good chain management practices of supplies cited in the literature.

The practical importance of this research stems from the possibility of serving as an information base for a better understanding of the main supply chain management Methods and their management within the hospital universe.

1.3 Research Objective

The search for improvements and gains in competitiveness in a supply chain means that more and more collaboration is needed among all those involved in the system, whether suppliers, customers, distributors, industries, retailers and transporters. Of course, the collaboration between companies demands a great effort from all the agents involved, requiring actions based on a good relationship between partners and a high level of integration.

For existing management barriers to be overcome, a new management model based on strategic alliances is needed, whose mission is to collaborate among partners within the same chain. In this process, the collaboration and sharing of strategic and operational information are essential between suppliers and customers, seeking to create collaborative processes that benefit the chain as a whole.

In this context, the use of collaborative initiatives is essential to reduce the negative consequences caused by changes in planning, demand errors and other unexpected supply and demand factors. So it can be said that with the adoption of collaborative strategies it is possible to obtain better levels of service, which directly impact the sales of the company, from the reduction in the costs of maintenance of stocks and transportation of materials along the chain.

A number of collaborative initiatives have emerged in recent years to achieve gains in competitiveness through better management of information along supply chains, based on the intensive use of information, technology and the adoption of partnerships among the participants in the chain. Known as rapid response programs (PRRs), these initiatives encompass both operational processes and institutional programs. Examples of these initiatives include CRP, VMI, ECR, QR and CPFR.

Following this trend can be observed improvements in the supply chain of several industries, but the supply chain in the health sector did not follow this movement (MCKONE *et al.*, 2005). One of the justifications for this fact is that the efforts of health professionals are generally focused on providing quality service to enable patients to recover quickly, leaving other factors behind. Usually, investments within the health area are directed to the research of new treatments and medications of greater effectiveness or for the acquisition of more modern equipment (SMITH, B; NACHTMANN, H; POHL,E, 2011).

In view of the above context, the aim of this research is the search for the characterization and identification of collaboration policies that bring benefits to the supply chain, enabling a company that seeks to adopt a collaborative initiative, to know its characteristics, advantages and disadvantages, thus helping in the decision-making process on which initiative to adopt according to the company's profile and also to investigate how the supply chain is managed in an Irish general hospital and what are the barriers that this business face for implementation.

1.4 Structure of the Study

The study is organized into five chapters, as follows:

• The first chapter presents the objectives of the study and its relevance.

• The second chapter brings a review of the literature, starting with the definition of the term “Supply Chain” and its origin and presenting the main factors that influence supply chain performance. Then this concept is approached in the hospital context, identifying the factors that influence the hospital supply chain performance and best collaborative methods associated with such factors, presenting each characteristic, advantages and disadvantages.

• The third chapter presents the study methodology, containing the questions research proposals, the method chosen, the selection of the case of study and respondents for the interview, the collection and analysis process and method limitations.

• The fourth chapter presents the case analysis with the objective of answering the three research questions proposed in the third chapter.

• The fifth and final chapter presents the conclusions, contributions, and limitations of study and suggestions for future studies on this topic.

2 Literature Review

2.1 Overview

In this chapter, the theoretical framework of this research will be illustrated, which will serve as a basis for the elaboration of the conceptual model, which will be used to guide the script of the interviews and to investigate how the studied hospital manages its supply chain. The bibliographic framework will address the models of collaboration in supply chain management as well as the main methods of collaboration.

Therefore, the literature review that underlies this research is organized as follows: First, the theoretical basis, addressing the aspects of business arrangements, chain management, and the main collaborative methods for the SCM, in order to clarify the process of collaboration in chain management and its typology, with the focus directed to the Supply Chain Management, and rapid response programs or better known as collaborative methods of chain management will be addressed.

The next part addresses the main theme of this research, where supply chain management will be addressed in the hospital context, through an illustration of the specifics of this context, the characteristics of hospital supply chains and critical performance points within the supply chain. The main five collaborative practices within supply chain management are also presented, as some studies indicate.

Finally, a survey of the most relevant points of each of the five main collaborative supply chain management methods, their characteristics, advantages and disadvantages according to the bibliographic survey.

2.2 Business Arrangements

The high competition between companies has been transforming the way in which the market behaves. As a result, companies have been organizing together to form so-called

business arrangements. There are several types of business arrangements, which differ from each other. One of the main objectives of the existence of the business arrangements is the creation of competitive advantages for the members that make up the arrangement.

According to PORTER (1980) there are three types of competitive strategies: cost leadership strategy, differentiation strategy and focus strategy. In the leadership strategy, the company can take advantage of offering products and services with costs more attractive than those of its competitors.

In the differentiation strategy, the company must provide the consumer with a differentiated product and service of greater value to the customer, so that the higher price can be justified. And in the focus strategy, the advantage may come from offering lower-cost products or services or by differentiating the product or service, but this strategy should be used in a narrower market segment.

Before the companies developed all the internal activities necessary for their productive process, now it can be observed that the organizations are more focused in the activities in which they have more dominion (GASPARETTO, 2003; NOVAES, 2004). This fact has made companies relate through business arrangements (GASPARETTO, 2003).

With the emergence of new forms of relationships between companies are being created new arrangements or business clusters, with this, making inter-company relations closer. Among the main arrangements, we can highlight the concepts of Filiére, Clusters, Supply Chain and flexible networks of small and medium-sized enterprises (KLIEMANN NETO; SOUZA, 2004; KLIEMANN NETO; HANSEN, 2002).

Some authors classify the units of analysis of the companies in three main units: value chain, supply chain and production chain (filiére). The definitions related to the value chain were created by PORTER (1992) who defended the idea those activities that generate value for the customer, give companies competitive advantages. KILIEMANN NETO and SOUZA (2004) argue that the concept of the value chain is confused with the concept of Supply chain. Similarly, the concept of the global value chain is confused with the concept of the production chain.

The following will be presented the concepts of the main business arrangements such as Filiére, Cluster. An analysis of the concepts of Supply Chain, which will also be presented.

2.2.1 *Filiére*

Since the early 1970s, the concept of Filière began to be widely used in France by members of various areas of operations relating to the production of goods. The progress of these operations is influenced by the techniques and technologies in progress that are defined through the strategies used by the agents that aim at the maximum valorization of their capital (MORVAN, 1991).

According to Batalha (1997), Filière can be defined as a succession of operations of dissociable transformations, capable of being separated and linked together by a technical chain and also a set of commercial and financial relations that establish between the states of transformation a flow of exchange between upstream suppliers and customers.

For Montigault (1992), Filière's vision encompasses all those involved in the production process, the transformation and marketing of a product. It encompasses suppliers, stockholding entrepreneurs, wholesalers and retailers, making it possible to move from production to consumption of the final product. Finally, it involves all governmental, market and trade-associated institutions that interfere with and control the paths to which the products flow. According to MORVAN (1991), the concept of Filière has been used in France with different objectives:

- As an instrument of descriptive of the paths necessary for the elaboration of a product;
- As a component of the production system composed of a set of filières;
- As a tool of industrial policy, since the state should act to develop companies that maintain integrated relationships between them;
- As a way of analyzing company strategies.

The analysis of the Filière model allows a company to identify processes to be improved, to gain in its performance and increase competitiveness, from the identification of the key points where the rules of the whole chain are established. You can also identify chain bottlenecks, which are the points that undermine your performance, as well as the strengths that exist (PIRES, 2001).

2.2.2 *Cluster*

For Porter (1999), Cluster can be defined as a concentration of companies that relate to each other by having similar characteristics and being geographically close to a particular field of activity, thus increasing their competitive capacity as their collaboration increases. Clusters are typical of some segments and regions and involve both collaboration and competition features.

Generally, these types of arrangements move towards customers and distribution channels, attracting themselves to manufacturers of complementary products and services.

According to Neto (1998), Cluster means agglomeration; its strategy is to stimulate the formation of economic groups constituted by companies installed in a certain region leaders in their branches, supported by other companies that provide products and services, supported by organizations that offer them inputs to become more competitive.

According to Porter (1999), the importance of clusters is dependent on modern competition in productivity and not on access to inputs or economies of scale of isolated enterprises, that is, productivity depends on the degree of sophistication of business management, which is influenced by the business environment in which it is linked to the different Clusters. Thus, Clusters affect the way firms compete in three ways (Porter, 1999): increasing the productive capacity of local firms; demonstrating the direction and speed of innovation that fuels future productivity; and stimulating the creation of new companies, which adds and strengthens the performance of the Cluster itself.

Zaccarelli (2000) argues that there are nine requirements to characterize a complete and competitive Cluster:

1. Geographical concentration;
2. Variety of types of companies and institutions;
3. High specialization of enterprises and institutions;
4. Many companies of each type;
5. Uniform technological progress of companies;
6. Utilization of by-products and recycling of waste;
7. Intense dispute and selective renewal of companies;
8. Cooperation between companies and institutions;
9. And local culture adapted to the business and interest of the Cluster.

These issues seem to effectively highlight the main characteristics of a cluster and point out their importance within the productive arrangements of this nature.

2.3 Supply chain and Supply chain Management

In the current scenario, organizations have been restructured to keep up with the constant global changes, such as increased competition, more demanding customers and lower product lifecycle. Companies are looking to adopt new management strategies, such as the use of lean manufacturing, information technology for better communication, improved supplier management and integration with their business partners (Fawcett and Magnam, 2001).

The Supply Chain Management (SCM) can be seen as an alternative for improvement in its processes, in order to approach the supplier to obtain gains with the end of the cycle. The Supply Chain can be defined as a set of geographically dispersed facilities interacting with each other. Examples of these facilities are raw material suppliers, production plants, distribution centres, transit stock, intermediate products and finished products between facilities (Yin, 1991). A supply chain can also be seen as a set of integrated processes through which raw materials are manufactured in final products and delivered to consumers (Beamon, 1999).

The Supply Chain is a subset of the value chain, with the focus on adding value to a product or service, which is mainly concerned with the production, distribution and sales of products, seeking to maximize efficiency by determining greater satisfaction for the end customer (Simchi-Levi et al., 2000).

On the other hand, Supply Chain Management - SCM, according to the Global Supply Chain Forum, can be defined as the integration of key business processes from the end consumer to the initial suppliers through products, services and information that add value to customers and for the other participants. This Forum identifies eight key processes that need to be implemented throughout the supply chain (COOPER, LAMBERT and PAGH, 1997):

1. Manage how customer relations will be developed and maintained;
2. Manage the CS's capacity to meet customer demand;
3. Manage the offer of services to customers by tracking how CS obtains and makes available information about the products, issuance and order status.
4. Integrate the processes of manufacturing, logistics and sales, in order to reduce shipping costs to customers, seeking to fill the orders according to their needs;
5. Manage production, so that only what is demanded is produced, thus avoiding the accumulation of inventories;
6. Manage the relationship with the suppliers, creating reliable relationships aiming the gain for both parties;
7. Develop and manage the products so that their introduction to the market is faster, through the integration of customers and suppliers and obtaining competitive costs for the final product; and
8. Manage reverse logistics, seeking to act in the cause of return, aiming at competitive gains for CS through the return of products for final disposal or repairs.

The processes described here take place throughout the CS, acting in an integrated way with the other sectors within the companies, establishing a process matrix (CROXTON et al., 2001).

2.4 Collaboration in supply chain Management

Collaboration within the chain management process usually occurs when there is information exchange between two or more companies, thus dividing the responsibility for planning, managing, executing and monitoring performance (PIRES, 2004). According to Mentzer (2001), collaboration in chain management can be defined as a means by which companies work in an integrated way with common objectives, characterized by the great exchange of information, knowledge, risks and even profits.

In order for the collaboration process to develop, it is necessary for the participating companies to have common interests, and to work transparently, with mutual assistance and well-defined objectives, some requirements that can facilitate the process, such as leadership, clear expectations, cooperation, trust, benefit sharing and technology are fundamental (MENTZER, 2001). Barratt (2004) has a similar vision, and for him, collaboration must be supported by a collaborative culture, based on elements such as trust, reciprocity, information exchange and communication.

According to HUMPHYSYS; LAI; SCULLY (2001), collaborative relationships among organizations must obey a structured balance in four dimensions:

1. Objective Consensus – an agreement between the parties, considering the rules and scope established;
2. Ideological Consensus - agreement on the nature of the activities and the ways in which they are to be performed;
3. Value Aggregation Consensus - A positive view that the activities of one organization will add value to the other and
4. Coordination of works - Creation of models of collaboration and cooperation between organizations.

For Arozo (2000), collaboration in chain management exists when two or more organizations share responsibility for planning, managing, executing, and reporting performance indicators. The author comments that the term collaboration is generically used in the market, sheltering several functional areas and, in this scenario, it is

fundamental to understand the functional areas of collaboration, as well as the collaborative methods used in these areas and the processes that are involved.

Therefore, based on the studies carried out by these authors reporting on the topic of collaboration, it is possible to say that collaboration occurs when the following criteria are present:

- goals and objectives common to all involved;
- integrated planning;
- shared information management;
- sharing of benefits, risks and costs; and
- trust and transparency between the parties.

2.5 Supply Chain Management Collaborative Initiatives

Pires (2004) affirms that there are currently several types of initiatives that collaborate to consolidate the concept of SCM, and that are generating many changes in certain industries, contributing to the increase of their efficiency and effectiveness. These authors claim that these initiatives bring gains in terms of reducing inventories, increasing inventory turnover, increasing product availability indices, reducing storage costs and product logistics; in addition, it provides an approximation between the manufacturer and the client.

According to Arozo (2000), several initiatives have recently emerged aimed at gaining competitiveness through more efficient information flow management along the supply chain, based on information technologies and the adoption of the concept of partnerships between the participants of the chain.

Known as the Rapid Response Program (PRR), these initiatives cover both operational procedures such as CR (Continuous Replenishment), QR (Quick Response), VMI (Vendor Management Inventory), ECR (Efficient Consumer Response) and CPFR (Collaborative Planning Forecasting Replenishment). Arozo (2000) complements this information by saying that these new practices are characterized by collaboration and

intensive information exchange, based on the assumption that through visibility of customer and supplier demand it is possible to obtain inventory reductions and service level improvements simultaneously.

Barrat (2004) says that it is possible to divide the scope of collaboration initiatives into two main categories: a) vertical category: includes integration with customers, suppliers and even internally between functions; b) horizontal category: includes integration with competitors, internal collaboration and even with other non-competing companies, this study will discuss the collaboration considered in the vertical category.

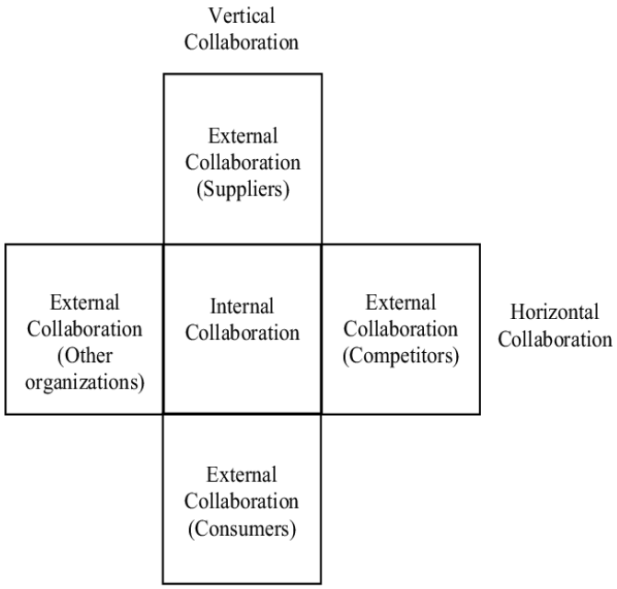


Figura 1scope of collaboration
source: Barrat (2004)

Christopher (2002), also comments on the Rapid Response initiatives and states that their adoption can bring huge gains for all participants, applying these concepts would reduce the total deadlines due to the acceleration of the processing time resulting in lower inventories and consequently shorter response times.

This section will present the key practices and initiatives used in collaborative supply chain management, including Continuous Replenishment (CR), Quick Response (QR), Vendor Management Inventory (VMI), Efficient Consumer Response (ECR), and Collaborative CPFR (CPFR). Planning Forecasting Replenishment).

2.5.1 *Quick Response*

The QR emerged through the garment industry, aiming to integrate suppliers and retailers, thus creating inventory planning and control mechanisms (WANKE, 2003). Pires (2004) says that QR originated in the USA in the 1990s, having its origin in the old logic of the replacement point and JIT. According to Wanke (2004), in the QR the suppliers receive the data collected at the points of sale at the customer and use the information to organize their production process and inventory in line with the actual sales. Customer orders continue individually, but point-of-sale data enables the vendor to improve their forecasting and scheduling.

Similar to the ECR, the QR is formed by the receipt of real-time sales information by the retailer, by the subsequent electronic sending of the information to the supplier and thus allowing the automatic activation of the resupply (WANKE, 2004). The practice of QR aims to respond in an agile way to the real demand of the product, thereby reducing the response time, allowing a reduction in stock levels. This practice is suitable for companies that have some data sharing system like EDI - Electronic Data Interchange, and have as standard the use of barcodes, the use of EpoS - Electric point of sales, and laser scanners, among others.

Table 1 advantagens and Desadvantagens of QR advantagens and Desadvantagens of QR

ADVANTAGES	DESADVANTAGES
• increase in the level of services; • decreased inventories; • decreased response time; • production synchronization; • better inventory turnover; • reduction of inventory costs; • decrease in storage area; • reducing the risk of product obsolescence; • reduction of losses due to expiration dates • decrease in administration costs; and • increased sales.	• high initial cost; • investments in information systems; and • high fixed costs;

Source: Author

The application of a QR system is indicated for companies that aim to increase competitiveness within the restlessness that the current market has been presenting, and the adoption of a more efficient production posture that allows foreseeing indigence and pleasing customers. Companies that seek to invest in computerized processes and whose

objective is to generate “zero inventory”, have in QR a good organizational form of rapid response.

According to Bowersox (1996), when deploying a QR system, a company needs to consider the following aspects:

- Recognize that customers and products are dynamic and challenge the company to keep an eye on innovation and rapid response processes;
- focus less effort on medium and long-term forecasts, and emphasize near-real-time decisions with continuous integration of resources and information;
- bring supply chain/network management closer to less conservative practices by focusing on innovation by making it possible to focus on delivery, service and availability;
- adopt flexible, selective positions whenever necessary;
- discipline movement as much as possible, making it quantitative;
- Adopt the latest technologies to support performance measurement and chain improvements;
- less bureaucratic control systems and leadership styles;
- information as the main support for decision making; and
- Management committed to the principles of continuous change, focusing on the coordination of the company inserted in a chain, with multiple contacts, both upstream and downstream.

2.5.2 *Continuous Replenishment (CR)*

According to Pires (2004), the CR is defined as the practice of partnership between the members of the distribution channel that changes the standard process of repositioning of goods and generation of orders created by the distributor, based on the convenient

quantities, for replacement of the product, from a forecast of effective demand, seeking to integrate the flow of information.

According to Wanke (2004), CR is a practice that eliminates the need for resupply orders, with the goal of forming a flexible and efficient supply chain in which inventory is continuously replenished. In this strategy, the sales point sends the data to the suppliers to prepare the shipments regularly, thus ensuring the fluctuation of the client inventory between maximum and minimum levels. These levels may vary according to changes in marking, promotions or seasonality of demand.

Pires (2004), points out that this practice serves as a complement or even substitute for the IMV in some situations since the CR represents a stage beyond the IMV, its inventory policy is based on sales forecasting and constituted through a historical analysis of and is no longer based on variations in customer stock levels. In addition, the CR seeks to attend to four processes: promotions, replenishment of stocks, a mix of stocks and introduction of new products.

According to Lummus (1999), the benefits that Continuous Replacement seeks are: increasing the availability of products at the point of sale; inventory reduction and working capital; reduction of logistics and administrative costs; decrease in order costs; decrease in errors in sales estimates. And according to the same author, for successful implementation of the CoR, key issues need to be addressed, so the key issues are:

- a stable business relationship model;
- performance indicators for buyers and sellers;
- quality at the service level;
- compatible operation and logistics;
- knowledge of logistics costs;
- agility in the exchange of information between companies;
- bar code availability and reliability; and

- An efficient, safe algorithm that calculates the quantities to be ordered or delivered.

Some advantages and disadvantages resulting from the implementation of the CoR, from the perspective of the supplier and the seller according to CARVALHO (2000).

Table 2 advantages and Disadvantages of QCR

	ADVANTAGES	DISADVANTAGES
PROVIDER	• reduction in stock levels; • reducing the likelihood of stock outs occurring; • improvement of service levels; • greater efficiency in warehouse management; • minimization of shipping costs; • optimization of transport management and distribution capacity; • reduction of administrative costs; • improved resource management; • increased number of sales; • reduction in ordering costs; • Decrease in returned products.	• the obligation to have a strengthened relationship between supplier and retailer; • A high degree of trust between the parties is required to share stock and sales information. • Dependency between parties can often be seen as a loss of control within organizations. • The beneficiaries in this process are often consumers and retailers, while the supplier is left with a greater amount of work; • Retailers still resort to processes such as ERP / MRP in more complex replenishment situations.
SELLER	• increased number of sales; • decrease in the number of returned products; • reduction in stock levels; • reducing the likelihood of stock outs occurring; • improvement of service levels; • improvement of customer satisfaction levels; • decreased storage costs; • reduction in order processing costs; • reduction of logistics costs.	

Source: author

2.5.3 *Vendor Management Inventory (VMI)*

The VMI or supplier-managed inventory is a widely used practice in convincing replacement programs, where the supplier, not the customer, decides when and in what quantities the customers' inventories will be taken back. That is, the supplier assumes responsibility for managing the customer's inventory levels, and acts as part of the customer's materials management department.

According to Pires (2004), the implementation and operation of the VMI is only relevant if it is based on a relationship of full partnership and trust, with significant

collaboration, integration of information and coordination of processes and operations among the companies involved. For this author, the following table describes some advantages and disadvantages in implementing VMI for both supplier and client companies.

Table 3 advantages and Disadvantages of VMI

	ADVANTAGES	DISADVANTAGES
SUPPLLIER COMPANY	• better customer service and customer loyalty; • better demand management; and • better knowledge of the market.	• inventory cost maintained at customer; and • cost of system management.
SUPPLIER CLIENT	• lower inventory costs and working capital; • better service from the supplier; and • Simplified inventory and purchasing management.	• greater dependence on the supplier; and • loss of control over your supply.

Source: Pires (2004).

Correa (2002) emphasizes that the VMI reduces the distance between companies, through the availability of goods in a shorter time and also dismisses the uncertainties arising from the logistics cycle, because as the inventories are in the customer the uncertainties and problems in the request and delivery disappear. The same author says that there are four elements necessary for VMI to be effective, they are:

- know the demand closest to the end customer;
- have constant access to information via ICT (Information and Communication Technology);
- Have knowledge of inventory control, sales forecasting and logistics processes so that you can use them for each type of customer, product, market, demand, etc .;
- Have skilled people to manage the process as a whole and still be able to overcome the adverse conditions imposed by the competitive environment.

Despite presenting many advantages as presented in Table 3, the implementation of VMI has some requirements. Barrat (2001) states that advanced information systems are needed and that senior management is committed to the process of information exchange and mutual trust between partners.

However, the same author states that during the last decade, VMI has lost its initial strength. The explanation lies in the fact that the initiative has limited visibility of the supply chain as it is applied locally in the supply chain. This led companies to look for alternative integration techniques, such as the CR.

2.5.4 *Efficient Consumer Response (ECR)*

The ECR movement began in the US in the late 1980s and was characterized by the emergence of new principles of "collaborative management" in the supply chain. In this process, it was definitively assumed that the producing companies could better serve the consumer, in a more agile and low-cost way, working together with the distribution partners (HARRIS, 1997).

According to Harris (1997), ECR's goal is to create an effective system in which distributors and suppliers work together with business allies to increase end-user satisfaction and minimize costs. The ECR initiative can be characterized as a strategy where the retailer, distributor and supplier work closely together to eliminate surplus supply chain costs and better serve the consumer (ECR Brazil, 2004).

For Harris (1997), the ECR is a redesign of the main processes of replenishment of the structured retail chain on four pillars of support: the efficient replacement of the products, the assortment of the products, the efficient promotion of products and the introduction of new products. The author also states that these pillars have two key processes: category management and continuous product replacement.

According to ECR Brasil (2004), the application of ECR has ensured significant cost reductions by eliminating inefficiencies of around 6% to 10% of the total turnover of the supply chain considered.

The practice of ECR provides continuous improvement of quality, simplification of routines and procedure, standardization and rationalization of distribution processes, its viability is based on the partnership between the members of the product chain: manufacturer, distributor, wholesaler and retailer, all focused on the final customer.

This practice aims to better meet the real demand of customers through a system of automated replenishment of stocks consumed at the points of sale.

Thus, it is possible to obtain a reduction in distribution costs, inventory minimization, re-fulfillment time, order processing, transportation and handling cost (ECR BRASIL, 2004). Below is a table with the benefits of ECR and its difficulties for implementation.

Table 4 advantages and Disadvantages of ECR

BENEFITS	DIFFICULTIES
• facilitates price changes in SC, enables joint demand planning; • brings the supplier closer to actual demand, as well as facilitating inventory control and enabling the use of more accurate and cost-effective inventory control techniques; • enables identification of the product mix that the market wants; and • Collaborates with the introduction of new products through relevant data such as demand, trends, target audience preferences.	• the lack of commitment of those responsible for the SC; • lack of knowledge of the practice; • the need for investment in time and resources; • the need to adapt the information systems of those involved; • lack of qualified people to implement the ECR; and • the lack of an adequate costing system that can evaluate the benefits of the ECR.

2.5.5 *Collaborative planning, forecasting and replenishment (CPFR)*

Collaborative Planning, forecasting and Replenishment is a tool that aims to facilitate the relationship between companies, especially regarding sales forecasting, addressing issues such as influence of changes in demand patterns; inventory maintenance to ensure the availability of products on the shelf; greater coordination between the companies in the chain; allow greater synchronization between the various processes of the manufacturing sectors; and forecasting processes.

At CPFR, manufacturers and retailers share sales forecasting systems and processes. The main objective, in this case, is to identify which company generates more accurate sales forecasts for a given product, region and planning horizon (WANKE, 2004).

According to Barratt (2001), CPFR is a set of rules and procedures created in 1986 by representatives of several companies to increase supply chain efficiency, particularly in the retail sector by setting standards to facilitate the physical flow of information. The

standards allow buyers and sellers to contribute to the forecast of demand and order. It is also possible to obtain greater accuracy in forecasting and resupply plans. As a result, it is possible to reduce inventories of manufacturers, wholesalers and suppliers, reduce the lack of products, increase service levels and sales. These features have made CPFR a complete management tool, especially collaborative management. Thus, Barratt (2001), highlights the main features that make this method a unique tool; they are:

• the extent of the effects of changes in the price of the product or service in the chain and inventories when forecasting demand;

• the influence on-demand behavior in the chain and inventories;

• the use of inventory to maintain the level of service;

• lack of coordination between participants;

• lack of synchronization/integration between processes in SC; and

• the union of the various forecasting methods used in the same company or SC.

Below is Table 5, highlighting the advantages and disadvantages of implementing CPFR.

Table 5 advantages and Disadvantages of ECR

	ADVANTAGES	DISADVANTAGES
RETAILER	• Increase in sales; • Increase in service level values; • Faster response to requests; • Reduction in stock levels, obsolete and deteriorated products.	• Distrust / discomfort in sharing information, considered delicate, by organizations; • Lack of internal collaboration regarding sales forecasts; • Costs associated with obtaining technology and specialization / training inherent in such a process; • Breaks in an information sharing pattern that must necessarily exist; • The factor of aggregation of information, namely knowing the number of forecasts and how often it is generated; • I fear that other parties will not establish a true trust-based partnership.
MANUFACTURER SELLER	• Increase in sales • Best adapted production plans and rates; • Reduction in stock levels; • shorter cycle times; • Storage capacity requirements are reduced.	
SUPPLY CHAIN PARTNERSHIP	• Decrease of intermediate points in the material flow, making it more direct; • Reduction of uncertainty in sales forecasting; • Decrease in expenses throughout the process.	

Source: author

2.6 Healthcare Supply Chains

The healthcare supply chain is very similar to other chains, not only in terms of quality demands by customers but also in their processes, whether they are purchasing, distribution, storage and their management structure (Walters e Rainbird, 2007).

Also, due to the high degree of complexity and diversification of items, the supply chain in the health sector presents a great degree of difficulty. This high degree of complexity is given due to a large number of parties participating in the chain, and effectively managing the interaction of this high number of companies involved is no easy task. Burns and Wharton School Colleagues (2002) conducted a study in which they suggested grouping organizations that perform similar tasks within a chain. The division into five groups of entities was suggested:

- Providers, within this group, would be related to hospitals, doctors, divisions, doctors' offices, operating rooms and outpatient pharmacies.

- Purchasers, within this group, would relate to resellers such as pharmaceutical wholesalers, medical-surgical distributors, product representatives, independent contracted distributors, group purchasing organizations.
- Contributors, within this group, would be related to government, employers or any other individuals.
- Tax intermediaries, which would include insurance companies, health maintenance organizations, pharmacy benefit managers.
- Producers, this group would cover pharmaceutical manufacturers, medical device manufacturers, medical surgery manufacturers, information technology providers, and capital equipment manufacturer services.

Another aspect that impacts the complexity of the hospital chain is the focal entity and its internal organization which is often divided into numerous independent departments, pharmacies and hospital staff. It is also noteworthy that productivity processes in a hospital usually have strict forms of control and are usually managed by medical specialists who are not fully aware of the process (Vissers, Bertrand and de Vries, 2001).

In the hospital environment, having simplified and efficient processes is a difficult task that is often exacerbated by hospital staff, as they can make the system more complex and inefficient. For Kelle, Woosley and Schneider (2012), an example of this lack of sync in processes is decisions about the drugs prescribed by doctors, pharmacists and pharmacy managers, which are generally not synchronized. This is due to the lack of alignment when choosing which drug to use as a standard, with each party choosing the product according to their preference.

Situations like this cause problem in product inventory management, due to excessive variability and large portfolio, which minimizes the possibilities of inventory improvement and reduction and good purchasing practices even cost reduction.

This excessive product variability is caused by differences between the organizations, divisions and individuals involved. Each department has its metrics and processes to

follow as well as differences in human capital and resource availability, which ultimately impact the chain as a whole (Fisher 1997).

Mustaffa and Potter (2009) highlight the possible problems of chain distribution, in particular from the wholesaler to the hospital, because due to the high product portfolio it is difficult to control the product life cycle, values, operating profit margins, makes it difficult procurement planning and generates supply chain education.

Regarding the categorization of products, the following differentiation is proposed by Hpra (2017), which identifies the allocation of products in the following distinct supply chains that are: pharmaceuticals, medical-surgical supplies, medical devices, Health devices (e.g. bandage, syringe), office supplies (e.g. printer cartridges, printing paper) and clothing supplies (e.g. uniform, sheets, towels). Each product chain must meet the specific demand patterns of its segment.

Because it is an unstable segment with a high degree of difficulty in forecasting demand, the healthcare industry has difficulties in forecasting drug supply and demand, so a double effort is required from health organizations demanding that processes be efficient (Mustaffa and Potter, 2009; Samuel et al., 2010).

Due to this scenario of instability in product demand, healthcare organizations need to be efficient in their forecasting of consumption, in the chaos of products with predictable demand, and responsive in case of need to supply products with unpredictable demand. The volume and demand of health products vary between each hospital unit, in this context, the possible benefits resulting from the construction of collaborative relationships throughout the health chain, becomes a necessity and this is the focus of this study.

2.6.1 *Health sector in Ireland*

The Irish health care system is considered comprehensive, where the government funds public services and private service is constantly expanding. Investments in the health sector in Ireland exceed 9.9% of GDP, which is in line with the European average.

The health sector in Ireland is very relevant in the country scenario, according to the results of the Census Report 2016, the prospect of population growth between the years 2016 and 2018 would be around 2%. It is also expected that people's life expectancy will continue to increase, and the number of the population over 65 will increase by around 20,000 per year. This estimate will result in a major impact on the demand for health services in the country.

This growth has been driven mainly by the improvement and modernization of Irish health services, private and government investment and the trend towards market consolidation.

Investments in health sector spending in Ireland between 2017 and 2018 increased considerably by 6.3% and, as can be seen in the table below, the evolution of health spending in the country has been increasing since 2009 in one year constant.

Figura 2Public Health Expenditure in Millions of Euro, 2009 to 2018

											% change	
	2009	2010	2011	2012	2013	2014	2015A	2016 A	2017	2018	2009-2018	2017-2018
Total Public Non-Capital Expenditure on Health	14,431	13,818	13,181	13,218	13,084	13,276	13,879	14,581	15,316	16,287	12.9	6.3
Public Non-Capital Expenditure on Health (excluding treatment benefits)	*14,321*	*13,762*	*13,156*	*13,197*	*13,063*	*13,246*	*13,846*	*14,548*	*15,263*	*16,204*	*13.2*	*6.2*
Total Public Capital Expenditure on Health	447	366	347	350	347	386	398	414	465	493	10.3	6.0
Total Public Expenditure	14,878	14,184	13,528	13,568	13,431	13,662	14,277	14,995	15,781	16,780	12.8	6.3

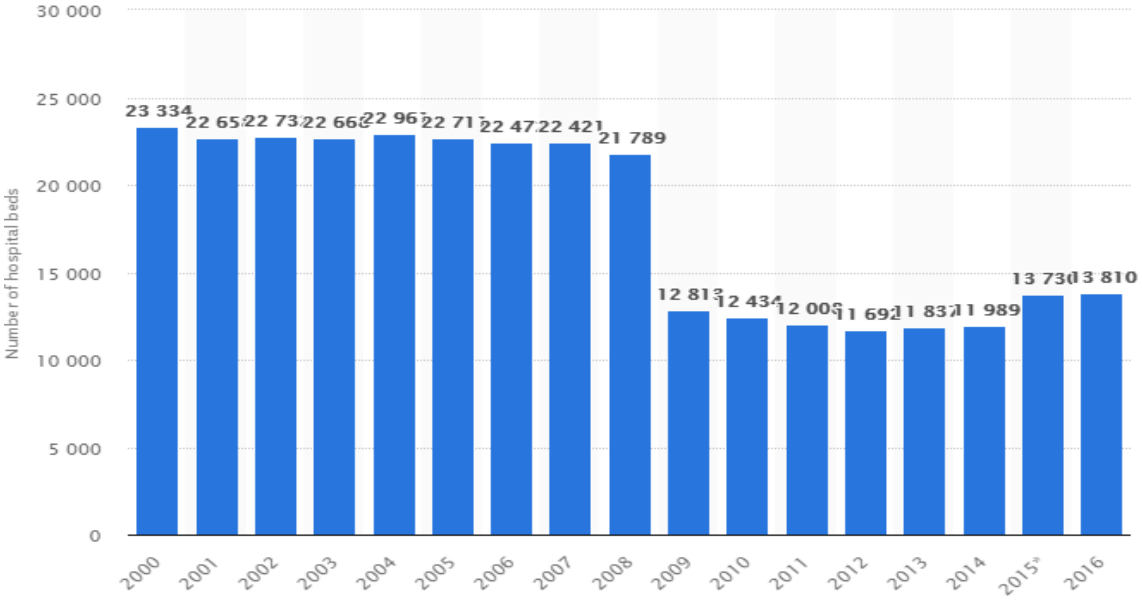
Source: Non-capital expenditure - Revised Estimates for Public Services and HSE Performance Assurance Reports.

The public health system receives great investment from the government, but individuals have their contribution in certain types of services, such as the use of the emergency department without a prior medical indication.

Most hospitals in Ireland are operated directly by HSE, however many are performed voluntarily by public funding, such as a teaching hospital, in conjunction with a religious ethos or as private hospitals. The number of active hospitals in Ireland has declined in recent years compared to population demand, which consequently has a strong impact on the number of beds available for care. The result of this reduction was

a bed crisis in Ireland, with more than six thousand patients awaiting care in hospitals, with some visits exceeding the six-hour waiting mark.

Figura 3Number of hospital beds in Ireland from 2000 to 2016



Source: Statista 2019

This figure shows a reduction in the number of hospital beds in Ireland from 2000 to 2016. The number of hospital beds in Ireland decreased from a peak of 23,000 beds in 2000 to approximately 13,800 in 2016.

In the Irish health care setting, the hospital sector is one of the hardest to overcome because of high investment costs and inefficiency. Given this scenario, organizations are looking for cost reduction alternatives either through verticalization or consolidation. As a result, there is a tendency for mergers between health plan operators, hospital networks, pharmacies and laboratories.

In an attempt to reduce costs, supply chain management in hospitals has intensified. Hospitals and health systems represent the greatest demand for products in the health supply chain (EVERARD, 2001). According to COLLETTI (1994) study, expenditures on hospital supplies and related services account for 30 to 40 per cent of a hospital's annual expenditure budget. Of this total, fifty per cent is related to activities in the logistics chain of the hospital.

Given this scenario, the study on supply chain management has been gaining prominence in the literature. Studies such as MCKONE *(*2005) address the challenges to implementation and knowledge limitation of health professionals on supply chain methods. Another study by SHAH (2008) focuses on improving processes in the supply chain of a hospital. In the study by NEDER.A (2015) the results of the research suggest that hospitals are investing in supply chain management practices, but there are still possibilities for further development.

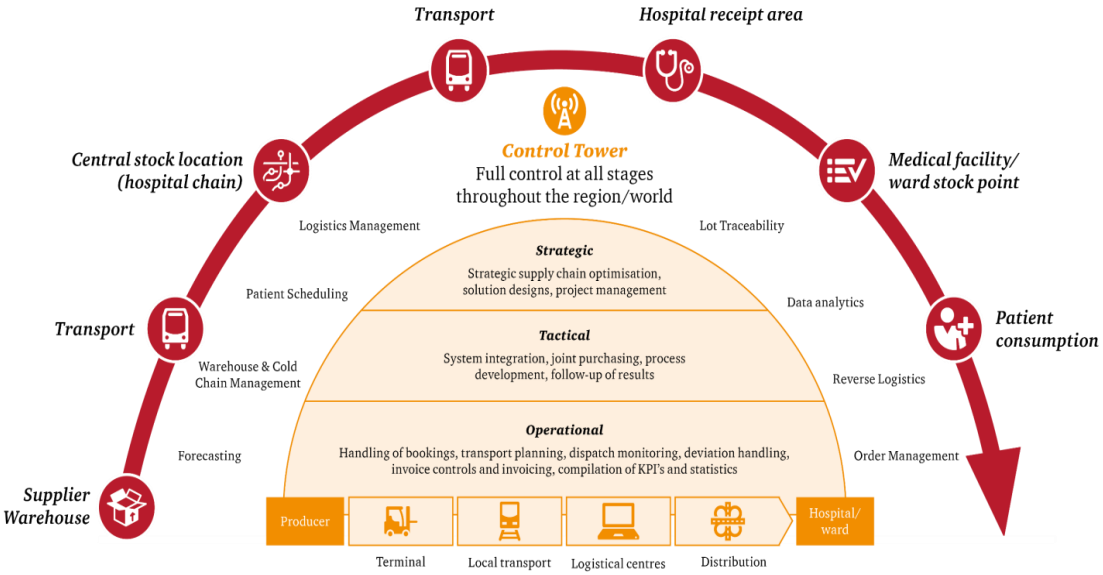
2.7 Hospital Supply Chain

According to SMITH, B; NACHTMANN, H; POHL,E (2011), the supply chain in the health segment is a relationship between information, finances and inputs necessary for the acquisition and circulation of goods and services from the supplier to the final consumer, aiming for improvement results and cost reduction.

Controlling the logistics of patients within a hospital has become a major challenge because of the large flow of patients, hospital logistics becomes complex, as it is not based only on products, such as medicines or equipment, but varies according to demand. This complicates the application of the practices of hospital chain management.

In the literature, the hospital supply chain is characterized by its composition of four components, producers, buyers, service providers and patients (SMITH; NACHTMANN; POHL, 2011a). Producers are responsible for supplying equipment and pharmaceuticals, for example. Buyers are responsible for purchasing the products on behalf of the hospital, with the power to negotiate to increase the volume of purchases and reduce costs through competitive prices. Service providers are hospitals that use the products purchased from producers to carry out their procedures. Many authors consider that patients are the final clients of hospitals, but some say that doctors are also considered as clients, since they indicate many patients to the hospital, except in the emergency sectors.

Figura 4Hospital Supply chain



Source: PWC

There are many challenges in the hospital supply chain, due to their complexity, but it is believed that it is possible to improve processes, reduce costs and still be able to maintain a quality service. To continue describing how is the operation of the hospital supply chain, the following bibliography will be further examined: ARONSSON, ABRAHAMSSON and SPENS (2011) and Center for Innovation in Healthcare Logistics (2011).

2.7.1 *Specificities of the Hospital context*

Proving great potential for process improvement and cost reduction, supply chain management methods have been considered highly relevant by healthcare organizations (AL-SAADA ET AL., 2013). While this recognition is on the rise, the application of these techniques, methods and best practices is often problematic, unlike the industrial sectors where the practices originated. This is due to the complexity of the health sector, the high number of stakeholders involved, the complex external and internal environment and the health sector's characteristics impact the application of collaborative methods in a hospital supply chain (VRIES; HUIJSMAN, 2011).

When compared to the complexity of existing processes in the industry sector and similarities are found with the health sector, it is possible to indicate that the implementation of collaborative supply chain practices will bring positive results to the hospital chain. Like the industrial sector, the hospital chain faces the challenge of maximizing its resources, using them most efficiently and maintaining a high-quality standard of customer services (VRIES; HUIJSMAN, 2011). However, because it is a service delivery process, where the customer (patient) is part of the production, it is not possible to stock up. The patient is part of the entire process until their care is completed, and as each needs a different kind of treatment the only alternative is to have a queue of patients waiting for care (ARONSSON; ABRAHAMSSON; SPENS, 2011).

In addition to these criteria, other health sector characteristics make it difficult to implement collaborative supply chain management methods. Some specific health chain issues such as regulatory issues, lack of upstream or downstream supply chain planning, lack of partner suppliers, unable to predict stock turnover of some products in this way and having to act reactively and non-proactively, the wide variety of items in stock, customer demand vulnerability and focus on quality of care (Smith et al. 2011).

Hospital management involves the use of a large mix of products and services, such as medical supplies, pharmaceuticals, food, cleaning, laundry, waste management, information technology, and general supplies (KUMAR; OZDAMAR; ZHANG, 2008). Due to the fragmentation of the parties involved, the elaboration of integrated processes is difficult, thus not allowing the connection between the parties and also makes the purchasing and relationship processes with suppliers more complex.

According to Burns et al. (2002), another problem within the hospital supply area is that this process is usually performed by people who have no experience or administrative background, purchases are made with a focus on maximizing product availability rather than reducing costs inventory maintenance. Due to the high risk of product shortages, many hospitals end up with high inventory levels, which could be avoided.

This behaviour can be aggravated by the fact that the purchase requester is generally not responsible for paying the purchase order. Also, products are chosen according to the doctors' clinical preference and not on a formal cost-benefit basis (BURNS ET al., 2002).

Hospitals eventually follow a strong trend within the healthcare industry and end up directing their resources towards investing in quality management practices. Many hospitals seek to improve patient care and experience by providing quality services to influence outcomes in relation to hospital performance (JIANG; FRIEDMAN; BEGUN, 2006). Another trend in the healthcare industry is low investment in information technology. Hospitals and healthcare providers often focus on investing in new patient care technologies, setting aside other important areas such as new management processes and information technology. This decision ends up directly impacting the hospital supply chain (BURNS ET al., 2002).

2.7.2 *Benefits of adopting Collaborative Methods in supply chain Management*

Collaborative methods of supply chain management through their adoption can bring many benefits. According to Koh et al (2007), through the adoption of practices, it is possible to achieve short-term productivity improvement and reduction of inventory levels and lead time. Long-term goals are related to gaining market share and supply chain integration. It is possible to verify the adoption of chain management methods in various sectors, with the focus directed to production improvement, quality and delivery goals and waste disposal (YAP; TAN, 2012) and as a result increase customer satisfaction, cost reduction and competitive advantage for the chain as a whole (MENTZER et al., 2001).

Adopting collaborative chain management practices results in major benefits such as supplier-consumer integration, sharing of stock level information, sales forecasting, and market strategies among different chain members. Such methods also help in the management of risks and rewards, integrating activities performed among the chain participants (ELROD; SUSAN MURRAY; BANDE, 2013).

According to Haavik (2000), the adoption of collaborative hospital supply chain management methods can result in a significant reduction in estimated operating costs between 2% and 8%. This reduction comes as a result of the efficient management of inventories and other resources in an integrated manner with suppliers, thus increasing the resources for investment in the care area and consequently increasing patient

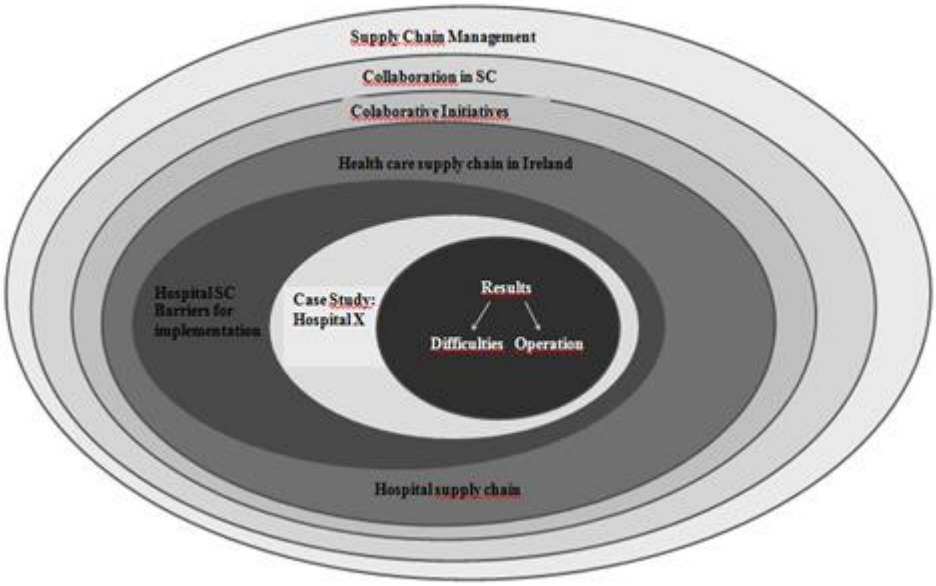
satisfaction (BURT, 2006). Another point that can be identified as a benefit is the sharing of information among supply chain members, resulting in positive gains in delivery time, process flexibility and quality, and consequently costs (ARMISTED; MAPES, 1993).

2.8 Conceptual Framework

The conceptual framework is applied for development and contextualization of various analyzes. This tool can be applied in various ways usually for the development of ideas and conceptual distinctions. Conceptual frameworks are used in research for outlining possible options or for presenting the preferred approach, namely defining the problem and purpose, conducting a literature review, devising a methodology, data collection and final analysis. These are very close to empirical inquiry and take different forms according to the research question or problem, example exploration, description, understanding, deciding and consequential explanation.

The development of a conceptual framework can be accomplished through the relationship between the literature review, the hypothesis of the author and other thinkers. Through data analysis whether past or present this evidence should be efficiently organized in order to be able to develop relevant and concise arguments. The figure below aims to illustrate the present conceptual framework of the research:

Figura 5 Conceptual framework



Source: author

2.9 Preliminary findings and conclusions

The main objective of the literature review was to present the main collaborative policies or strategies applied in supply chain management, thus enabling the identification of their main characteristics, advantages and disadvantages. By using an integrated management initiative, it is possible to map customer needs enabling better knowledge and thereby adapt SCM to their needs.

By presenting the characteristics of the main collaborative supply chain management methods, it is possible to identify a common characteristic among all methods that is information sharing. According to Bailey and Francis (2008), to be successful within the supply chain, it is essential to combine collaborative technical factors and information sharing within the supply chain, so that it is possible to plan the actions to be taken in the management of the supply chain.

Within this topic, it was possible to conceptualize the main business arrangements as Filiére, Clusters and Small and Medium Business Networks, focusing on supply chains, presenting their typologies and the process of collaboration at SCM. Next, a table will be presented with the data to make a comparison between the main collaborative

methods highlighting their main characteristics, advantages and disadvantages. This way, the first question raised by this study will be answered.

Table 6 Characteristics, advantages e disadvantages of collaboative initiatives

	CHARACTERISTICS	ADVANTAGES	DISADVANTAGES
QR	• Initiative that emerged in the clothing industry; • Objective of integrating suppliers and retailers in inventory replenishment; • The literature does not mention the explicit need for IT and decision support systems;	• Efficiency in deliveries; • Higher inventory turnover; • Reduction in delivery lead time; • Reduction of shipping errors in transactions.	• high initial cost; • investments in information systems; and • high fixed costs;
CR	• Aim to create greater control over inventory levels at retailers; • CR can be characterized as one of the ECR processes, continuous replacement; • CRP is a step beyond VMI as it considers sales forecast and historical demand; • Unlike QR, the literature mentions the explicit need for IT;	• Reduction of stock levels; • improvement of service levels; • greater efficiency in warehouse management; • minimization of shipping costs; • reduction of administrative costs; • improved resource management; • increased number of sales; • reduction in ordering costs; • decrease in returned products.	• The obligation to have a strengthened relationship between supplier and retailer; • A high degree of trust between the parties is required to share stock and sales information. • Dependency between parties can often be seen as a loss of control within organizations. • The beneficiaries in this process are often consumers and retailers, while the supplier is left with a greater amount of work; • Retailers still resort to processes such as ERP / MRP in more complex replenishment situations.
ECR	• Global movement structured in four pillars: replacement, assortment, promotion and efficient introduction of new products; • Has as a key process: management by categories and continuous replacement of products; • Objective is to pursue common standards, chain-wide efficiency and better customer service;	• Efficient replacement of products; • Larger assortment of products; • Constant focus on providing a better product, better quality and better price.	• the lack of commitment of those responsible for the SC; • lack of knowledge of the practice; the need for investment in time and resources; • the need to adapt the information systems of those involved; • lack of qualified people to implement the ECR; • and the lack of an adequate costing system that can evaluate the benefits of ECR.
VMI	• The supplier performs all inventory management at the customer; • Acts localized (between two companies) in a reactive logic, as it does not consider sales forecast; • When it is the retailer who has responsibility for the stock, the RMI occurs;	• Reduction in inventory levels; • Increased flow of information between partners; • Faster response from deliveries.	• inventory cost maintained at customer; • cost of system management; • greater dependence on the supplier; and • loss of control over your supply.
CPFR	• Collaborative planning of demand and replenishment; • Logic of external collaboration between partners; Great complexity of implementation by scope size; • It is one of the most complete and proactive initiatives, being an extension of other initiatives such as the ECR, VMI and the CR.	• Overall increase in sales levels; • Better management of demand forecasting; • Overall reduction in inventory levels; • Greater product availability; • Provides a “Win Win” for all CS participants; • Greater trust among CS partners.	• Distrust / discomfort in sharing information, considered delicate, by organizations; • Lack of internal collaboration regarding sales forecasts; • Costs associated with obtaining technology and specialization / training inherent in such a process; • Breaks in an information sharing pattern that must necessarily exist; • The factor of aggregation of information, namely knowing the number of forecasts and how often it is generated; • I fear that other parties will not establish reliable partnerships.

Source: Author

3 Methodology and Research Design

3.1 Overview

This chapter aims to illustrate the method used in the present study. Initially, the research philosophy and approach will be described; following the research questions will be presented to delimit the objectives and scope of the study. Afterwards, it will be described the research method that was used in this research and the reasons for choosing it. In the following part, respectively, are discussed the criteria for choosing the hospital object of study and the selection process of the interviewees. Next, it will be described how the data collection and analysis were performed, and finally, the limitations of the research method will be presented.

3.2 Research Philosophy and Approach

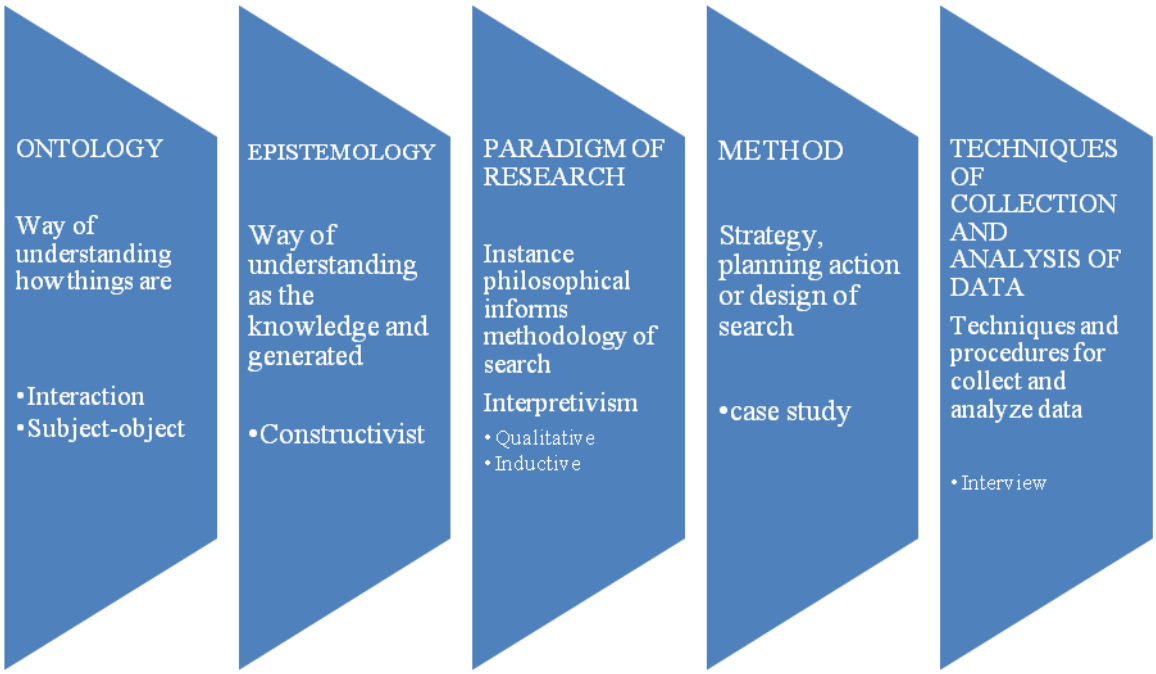
In this chapter will be discussed the research philosophy that was applied in this research, it is necessary to keep in mind that before defining a research method it is necessary an understanding about the different paradigms of research and this way in combination with an analysis of the scenarios of the proposed study, opt for the methods that allow a better approach.

A research paradigm directly related to certain beliefs and assumptions about the worldview in general, that is, from an ontological perspective, the way we understand things (Epistemology). The paradigm resulting from these assumptions is that it should guide the research method to be used as well as the techniques of data collection and analysis (CROTTY, 1998).

Collaborative methods in hospital supply chain management are a complex concept to explore because it involves varied parts in the same process, with different processes and limitations. One of the objectives of this research is to identify how a small general hospital performs its supply chain management and the challenges encountered to

implement collaborative methods of the supply chain; it is believed that the best research paradigm to be adopted would be as shown in the diagram below:

Figura 6 Model of research definition (interpretivism paradigm)



Source: Developed by the author based on the research of Saccol (2009).

To better understand the choice of the interpretive philosophy as a method of this research, it is necessary to go through the aspects of Ontology and Epistemology. Firstly must be verified that the interpretive ontology is composed by an interaction between the subject-object, not considering an objective or subjective reality, but rather the interaction between object and the interpretation that humans create about it. In the case of this research, this was given in view of the interaction with the researched object and construction of the situation through the interviewees' perception. With this, the interpretive epistemology is constructivist (ORLIKOWSKI and BAROUDI, 1991).

Some basic considerations about interpretivism according to some authors are:

- Interpretive, holistic, and symbolic nature of all social processes, including research (BARROS, 2005).
- Context as a constitutive factor of social meanings (Cervo.A, 1989).

- The aim of the research is human action (as opposed to human conduct), and the causes of these actions lie in their meaning, interpreted by the people who perform them, rather than in the similarity of observed behaviors (Steban, 2010).
- The object of theoretical construction is teleological understanding rather than causal explanation (wright, 1980).
- Objectivity is achieved by accessing the subjective meaning action has for its protagonist (Glaser and Strauss, 1967).

The central research logic of Interpretivism is the Inductive because the researcher tries to remain neutral without impositions of understanding about the researched situation. In this research, this model is adequate due to the need of a researcher's impartiality, so that it is possible to know the researched scenario through the view of the people interviewed.

In view of the above, the model of approach Interpretive that best fits to have a in-deep knowledge of how the supply chain is managed in the hospital surveyed and what the main challenges in its implementation is the qualitative research through interviews (total of 5), for the collection of data. Through the case study method, which is one of the methods most used in this paradigm, mainly in the area of administration (BURREL and MORGAN, 1979).

3.3 Research Strategy

The main objective of this chapter is to present the methodology used in the research, so this topic will be organized as follows:

1. First, the research questions will be presented in order to delimit the scope of the research.

2. Second, it will be presented the research method that was applied in this study and the justifications for the choice of method.

3.3.1 *Research questions*

The problem of this research focus is presenting the main collaborative methods of supply chain most widespread, showing their characteristics, advantages and disadvantages. And also investigate how an Irish general hospital performs its supply chain management and what the difficulties and challenges in the implementation of collaborative methods in this hospital.
The main issues that will guide this research are:

1. What are the characteristics of the five main collaborative methods of the supply chain?

2. How does one small Irish general hospital manage its supply chain?

3. What are the difficulties encountered in the implementation of collaborative supply chain methods in this hospital?

Based on these questions, the research will be structured in order to approach the relevant topics in order to direct the answers relevant to this research.

3.4 Research Methodology

This research was conducted in two stages divided into literature review, that aimed to answer the first question proposed by the study, which is what are the characteristics of the five main collaborative methods of the supply chain? The review of the literature was based on past studies conducted.

In the second stage of this study was used the methodology of case study to direct research on the subject of the research, with the intention of answering the two remaining questions initially proposed. As already mentioned, this study used the qualitative method of research, to which the process of data collection was given through interviews.

According to (YIN, 2005), the case study is a widely used method and having as one of the main data sources the interview. For this reason, data collection toke place through face-to-face interviews with high-level management professionals, directly and indirectly involved in hospital supply chain processes.

3.5 Collection Primary Data

In order to investigate how supply chain operation and management operates at an Irish general hospital, a case study was conducted at a general hospital located in Dublin County. The hospital analyzed in this study belongs to a group of hospitals and is also an academic hospital teaching. The choice of this hospital was due to the ease of access to information and the interviewees needed to perform this study.

In a preliminary conversation with potential interviewees, it was possible to verify that the collection of information necessary for an in-depth understanding of the case study would be provided by the corporate hospital area, which in a sense is responsible for the processes of all hospital supply chain. As an example, the processes related to supply chain management is performed by the hospital pharmacy area, laboratory, catering team, chirurgical centre and the administrative purchase team, each will not be addressed in this research due to the difficulty in collecting data. Given this, it was decided to interview people (5 in total), from all areas involved in the hospital purchasing process and professionals from the management area of the hospital.

The interview respondents were managers and staffs of the focus areas and director of the hospital, as these professionals have great knowledge about the researched area and a holistic view of the business, essential characteristics for a more in-depth research.

It was used as the primary data source the interviews carried out with the professionals selected from each area. These were structured through a semi-structured interview script, in order to allow greater flexibility to the interviewees, thus allowing them to report the facts according to their experiences, vision, avoiding the loss of important information.

According to (ZIKMUND, 2003), the method of data collection via Interviews allows a greater wealth of information and high level of accuracy, since it is possible to access more efficiently the interviewee, even the corporal and gestural reading of them. The intention was that each interview lasted from 40 minutes to 1 hour, according to the availability of each interviewee, also was requested according to the ethical procedures to be followed, the recording permission of interviews and also the transcription so that all points could be covered.

As a second source of data was used academic literature as relevant studies carried out in the area of supply chain management and its collaborative practices, relevant newspapers and magazines of the supply chain area, hospital websites, and other available public domain documents. The use of a variety of data sources enabled greater credibility of information and even the creation of convergent lines of research.

3.5.1 *Sources*

The primary source of data was interviews conducted in-depth with the professionals mentioned. They were guided by a script of a semi-structured interview to allow respondents to report freely, without the critical points for the study being forgotten, the interviews were recorded with the permission of the interviewees. The interviews, held between December and January 2019/2020 were on average one hour long, according to the availability of each interviewee and were transcribed to facilitate the writing of the case studies and enable their further analysis.

As secondary sources, although electronic magazines and newspapers were used, as well as websites of the hospital itself. The use of more than one data source was intended to perform the triangulation of information in order to validate and substantiate the information allow the development of convergent lines of research.

The first contact to schedule the interviews was made by email the essential information about the content and purpose of the research was clearly explained to potential interviewees. It was also sent to the interviewed, by email, the agenda of topics that

would be addressed in the interview. Such the objective of this measure was to identify the most appropriate professionals to respond to questions as well as allowing the interviewee to prepare in advance, as some questions required more specific information. Later Contacts were mostly made by telephone, during the analysis of the interviews, sought to identify the elements that met the survey questions.

3.5.2 *Access and Ethical Issues*

As part of the research was conducted through interviews with professionals who work in the hospital that are the subject of the case study, it is extremely important that high ethical standards are adhered. To ensure that the process of access to interviewees was within ethical standards, the researcher must be sure that all pre-interview and post-interview procedures have been properly established.

Among the ethical standards are the principles of the report, the right to withdraw from research, data protection, and respect for human rights and equality as well as sensitivity to issues arising from inequalities of power.

It is imperative that from the first contact with the possible interviewees, the information is clearly exposed. For this research, the first contact to schedule the interviews was conducted by email, which contained all the essential information about the content and the intentions of the research. It was also sent by email, as well as a physical document to the possible interviewees, an agenda containing the topics that would be covered in the interview so that they would be aware of the issues to be raised and prepared to respond.

Before leaving for the interviews, the interviewer should have prepared a checklist with the relevant ethical aspects to be taken into consideration, and the same procedure should be performed for the post-interview. Below are some examples of ethical procedures to consider during the interview:

- Description of the main interview procedures for participants.
- Inform the participants' voluntary participation.

- Obtain written consent for participation in the interview.
- Inform the participant of their right to withdraw from the research at any time.

Post Interview:

- Ensure confidentiality of participants, company and confidential information.
- Data protection.

The author should, at all times, maintain the integrity and trust that is consistent with Griffith College's predefined agreements (including The Social Research Association's Ethical Guidelines) and the terms and conditions of the College.

3.6 Approach to Data Analysis

After collecting data through the chosen instruments, the researcher must organize to analyze all the material obtained during the research, that is, the reports of observations, transcripts of interviews, analysis of documents and other available information, for this research the method used was thematic analysis, which allowed a more flexible analysis of the data.

There are many methodologies of analysis, and all relate to the epistemological conceptions of the researcher. From the moment of the data collection, a type of analysis must already be adopted, since from the initial procedures of the research, it can be said that the researcher is already analyzing his data. In this sense, the analysis is present in several stages of the investigation, becoming more systematic and more formal after the closing of the data collection (Clarke, 2017).

For this study was applied the thematic analysis method of data, which is a qualitative data analysis method to identify, analyze, interpret and report patterns (themes) from qualitative data (Clarke, 2017). The least thematic analysis provides is to organize and describe the database in rich detail; at most, "the sky is the limit," as this analysis is very helpful in generating an interpretive analysis of the data (Clarke, 2017).

Thematic analysis has characteristics similar to procedures traditionally adopted in qualitative analysis. Aspects such as search for patterns, recursion, flexibility, internal homogeneity in categories /themes and external heterogeneity among categories, themes are fundamental characteristics of qualitative analysis.

Thematic analysis can be used either through an inductive and data-based approach that is, that it does not intend to start from a ready grid of categories or themes to analyze the data, as well as deductive or theoretical, which departs from a pre-established set of well-defined categories or themes. Whatever the approach, thematic analysis contributes for its practicality and broad applicability, as it can be used in almost any kind of qualitative analysis (Clarke, 2017).
In this study was applied the method of thematic analysis of Braun and Clarke (2006) and tried to follow the six stages of TA proposed by these authors:

1. Familiarization with the data
2. Initial Code Generation
3. Search by themes
4. Theme Review
5. Definition and naming of themes
6. Report Production

As it is qualitative research, this method of analysis allows the identification and registration of one or more text passages or other items of data that explain the same theoretical and descriptive idea. These codes are developed in order to relate similar ideas; the coding was a way to index and categorize these ideas, thus establishing a structure of thematic ideas, tool used for data organization and analysis were Microsoft word and excel. This categorical analysis was developed in three stages:

1. The pre-analysis - phase of the organization, which can be used several procedures, such as reading, hypotheses, objectives and elaboration of indicators that support the interpretation (Clarke, 2017).

2. Data Exploitation - data were encoded from the record units.

3. The treatment of results and interpretation - Categorization will be carried out, which consists of the classification of the elements according to their similarities and by differentiation, with later regrouping, due to common characteristics (Clarke, 2017).

After these steps, the research objectives should be kept as the main focus in order to relate the results obtained in the qualitative research with the research questions. After that, the researcher must confront the results found with the concepts raised in the literature review, in order to analyze the information sets and collaborate with the hypotheses raised through the data analysis.

3.7 Method Limitations

According to Yin (2005), the case study method has three specific limitations. According to this author, regardless of the number of companies analyzed, it is not possible to generalize to the entire population. Given the above, it should not be assumed that the results of the analyses performed in this study can be applied to the universe of Irish hospitals that are adhering to collaborative supply chain methods in their operations.

Yin (2005) also highlights as a research limitation the subjectivity arising from data collection, the recording of information provided by the interviewees, as well as their analysis. The third limitation highlighted by Yin (2005) is the interviewees' bias, given that the interviews are personal, it is not possible to eliminate the possibility that the information collected has bias, either due to interest, forgetfulness, omission, distortion, or the interviewee's judgment what information is relevant at the time of the interview.

In order to avoid these biases, at the time of the interviews was tried to leave the interviewees as free as possible to give their answers, turning the interview into an informal conversation.

In addition to the three limiting points mentioned by Yin (2005), it is important to highlight another limiting point that refers to the fact that all respondents work in the same hospital and are managed by the same managers and directors. This fact may lead

to some answers being very similar in terms of management practices since, although each individual has a different view on the subject under consideration, there is a global guideline that guides the way some activities are performed. For this reason, this is an important point to highlight, as some results may be linked to the management model adopted by the group to which the hospital belongs and not reflect the reality of other Irish hospitals.

3.8 Conclusion

The potential outcomes of this research are to present the main policies or collaborative strategies applied in the management of the supply chain, in order to identify its main characteristics, advantages and disadvantages. By using an integrated management initiative, it is possible to map the needs of the clients, allowing a better knowledge and with that to adapt the SCM to the needs.

Another intention is to conceptualize the main business arrangements such as Filiére, Clusters and the Networks of small and medium-sized companies, focusing on supply chains, presenting their typologies and the collaboration process in SCM.

It can be said, therefore, that this research will bring contributions both in academic and business terms. The literature review, for example, contributes to the consolidation of concepts related to SCM, especially in relation to initiatives and collaborative practices, thus serving as a tool for consulting the academic environment. On the other hand, the business environment can make use of knowledge about collaborative methods. A company can orient itself, evaluate its level of collaboration and thus determine what kind of action can be taken to expand its collaboration in the chain.

The results of the case study may bring benefits to the group of hospital studied, because at the end of this research it may be used for reorganization of its supply chain management processes, and even avoid and correct possible problems within its chain management.

4 Presentation and Discussion of the Findings

4.1 Overview

This research was conducted at a small Irish general hospital. It is known that the central objective of this study is the search for the characterization of the five main collaborative policies that bring benefits to the supply chain, enabling a company that seeks to adopt a collaborative initiative, to understand these collaboration methods and also demonstrating the main advantages and disadvantages of each method pointed out in the literature. Thus serving as an information base for organizations that are seeking to adopt a collaborative initiative most appropriate according to the company's profile, which was based on the theoretical framework of this study and also to investigate how the supply chain is managed in one Irish general hospital and what are the barriers that this business face for implementation of collaborative supply chain methods.

In view of this second objective, an interview protocol was designed to gather information about the supply chain management of the hospital studied from the interviewees' point of view.

This interview protocol was applied to 5 people directly involved with the hospital supply chain process since it is a small hospital, it is believed to be an adequate number to obtain a relevant level of information.

4.2 Findings and Discussion

4.2.1 *Understanding the complexity of hospital operation*

As said by SMITH, B; NACHTMANN, H; POHL,E (2011), the forecasting of hospital supply-demand has become a significant challenge because of the large flow of patients, hospital logistics becomes complex, as it is not based only on products, such as

medicines or equipment, but varies according to demand. This complicates the application of the practices of hospital chain management.

The first analysis from the interview description was about the complexity of a hospital supply chain operation such as the difficulties encountered in making product demand forecasts as highlighted by interviewee 3, as shown below:

" We order as we need it, it is not like in the retail that you are able to count to forecast an item, here all patients have a different situation we do not know who is going to come in and for how long going to stay, they might stay two days or two weeks" (Respondent 3,L467).

However, what can be seen is that due to the variety of cases presented by patients in a hospital and the different types of treatments received, the product utilization forecasting and supply chain management process becomes more complex, making it difficult to plan input demand.

Other points that should be taken into consideration regarding the operation of a hospital supply chain are general hospital features and medical specialities and the parties involved in a hospital supply chain which according to the interviewees are characterized as follows:

> we have many different departments we have A&E that is from 8 a.m. to 8 p.m. we have theatres surgery I believe we do not do Major surgery here it is more minor procedures we also have endoscopy unit we have a high dependency unit for we have also a number of wards including 5 day wards which is for more day cases and smaller procedures.
> The main people involved are suppliers within the laboratory here we actually do our own ordering we do not go through Central stores for our day to day ordering capital equipment would go through centre but for the most part reagents, consumables would ordering here ourselves we also have a kind of delivery company which involved we have the finance here within the hospital the accounts department look after the invoice in payments and their users as well (RESPONDENT1, p2, L48, L83).

Hospital management involves the use of a large mix of products and services, such as medical supplies, pharmaceuticals, food, cleaning, laundry, waste management, information technology, and general supplies (KRUMAR; OZDAMAR; ZHANG, 2008). Due to the fragmentation of the parties involved, the elaboration of integrated processes is difficult, thus not allowing the connection between the parties and also makes the purchasing and relationship processes with suppliers more complex.

Given the facts presented, it is observed that due to the studied hospital attending general cases, the supply chain management becomes more complex, requiring the involvement of several parties and also the management of a large products portfolio.

Table 7 shows the four largest categories of suppliers of the hospital according to each segment in which the purchase order process is carried out such as laboratory, surgical centre, pharmacy and catering. For each segment, data is provided relation to various product-related aspects such as product portfolio range, ordering decision, delivery frequency, an average number of supplier per input, ordering frequency, warehouse considering this table 7 shows the four most significant categories of hospital supplies based on respondents' perceptions.

Table 7 Broad categories of Hospital supplies

Product Aspects	Broad categories of Hospital supplies			
	Laboratory	Surgical Theaters	Pharmacy	Catering
Product portfolio	>100	>120	>200	>190
Ordering frequency	Weekly	Weekly and fortnight	Daily	Daily
Number of suppliers	10 till 15	10	20	14
Average Nº of supplier per input	1 per time	1 till 3	2	2
Inventory Management	Periodic review & Replenishment	Periodic review & Replenishment	Periodic review & Replenishment	Periodic review & Replenishment
Distribution & wearhouse	Sector stock	Sector stock and Central store wearhouse	Sector stock and wards stocks	Sector stock and wards stocks
Orderin Decision	90% labs and 10% Purchase	100% Purchase	100% pharmacy	100% catering
Delivery Frequency	Weekly	Weekly	Daily	Daily

Source: Developed by the author based on the interviews

Given the information presented, it is noted that due to the extensive portfolio of products required for the operation of a hospital supply chain, it triggers a higher volume of processes and activities to be managed by the parties involved in the chain management. An example is the ordering process of input purchases that are made daily by 50% of respondents. Another point to note is the purchasing power of the surveyed segments where, 75% of respondents have 100% autonomy in their purchasing process, and only 25% of respondents do not perform the entire ordering process.

4.2.2 *Hospital Supply chain Management*

The second analysis was about the interviewees' perceptions about how supply chain management is managed in the hospital under study, in order to demonstrate how the interaction processes between suppliers and hospital occur at the moment of purchase of inputs and also demonstrate the parties involved in the ordering process until the invoice of the order.

Based on the information provided by the interviewees, the following table 7 and 8 were developed.

Table 8 Supply chain Management

Process	**E1**	**E2**	**E3**	**E4**	**E5**
Processes performed manually	X	X	X	X	X
Activities performed by area members	X	X	X	X	X
Selection of suppliers	X		X	X	X

Source: Developed by the author based on the interviews

It was observed that the processes performed within the chain management are performed manually in all segments within the hospital studied, activities such as inventory conferencing, purchase order creation and submission, receipt of deliveries and distribution of products to entire users, are performed by employees in each area responsible for purchasing. According to INTERVIEW 4, "we would take responsibility for a lot of our ordering, and when we come in, we would supply the other departments". Interviewee 3 also states that:

> I have to order those in, there is a basic stock for a hospital run, so an order those in what was requested by the wards. The wards have a list of drugs agreed with us that they should have. Our job is to go to the wards to make sure they have the stock level on the agreed sheet in stock if it is not we order the drugs they need. The pharmacist go up to the wards and review individual patients as well and they come to review patients every day so can have a new request every day, and if there is any drug we do not keep we have to order them (RESPONDENT3).

Table 9 Supply chain Management - Participants

Participants	E1	E2	E3	E4	E5
Area staff	X	X	X	X	X
Purchase	X	X			
Supplier	X	X	X	X	X
Delivery	X	X	X	X	X
Finance	X	X	X	X	X
Accounts	X	X	X	X	X
Procurement					X
Government body					X

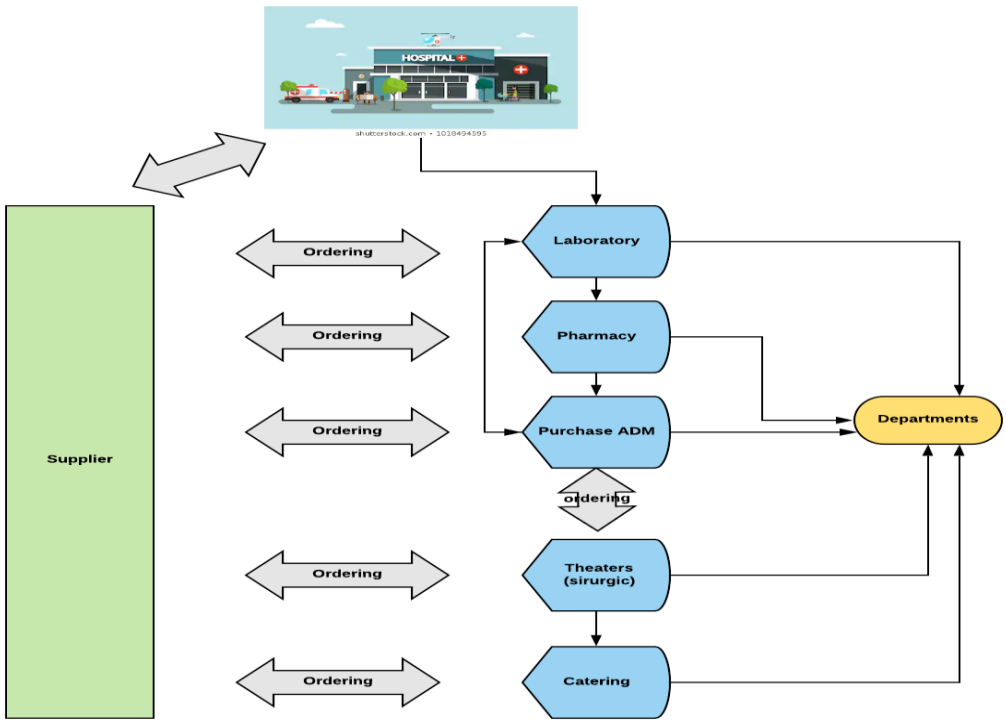
Source: Developed by the author based on the interviews

Regarding the participants in the hospital supply chain case study, it is observed that all respondents indicated as part of the management process the employees of the areas responsible for purchasing, suppliers, delivery companies, the finance and accounting team. Only respondents 1 and 2 indicated the purchasing team as a participant and only respondent 5 cited procurement and government body.

The hospital supply chain has characteristics similar to other chains, not only in terms of processes (e.g. purchasing, storage, distribution), but also in terms of demanding customers and organizational structures (Burns, 2002). There are also differences in the chain that are related to the characteristics and specificities of the sector. In general, hospital supply chains are very complex, diverse and dynamic. This high degree of complexity is due to the high number of chain participants who interact in all processes.

The following is the hospital supply chain flowchart developed based on information provided by respondents.

Figura 7 Hospital supply chain



Source: Developed by the author based on the interviews

4.2.3 *Collaborative practices in the hospital supply chain*

The third analysis sought to identify the type of collaborative method being practiced by the hospital in question, based on the data provided by the interviewees and data reported in the literature.

Pires (2004) affirms that there are currently several types of initiatives that collaborate to consolidate the concept of SCM, and that are generating many changes in certain industries, contributing to the increase of their efficiency and effectiveness. Arozo (2000) states that a number of practices have recently emerged to make supply chains more efficient in this way becoming more competitive through efficient management of flows along the supply chain based on information and utilization technologies practices of partnerships between the members of the chain.

Known as the Rapid Response Program (PRR), these initiatives cover both operational procedures such as CR (Continuous Replenishment), QR (Quick Response), VMI

(Vendor Management Inventory), ECR (Efficient Consumer Response) and CPFR (Collaborative Planning Forecasting Replenishment).

The literature review presented the characteristics of the methods studied in this research that were compared with the data obtained from the interviews and the table 10 was elaborated, in which the left column presents all characteristics of collaborative methods practiced in the hospital supply chain raised according to respondents. The right column presents the characteristics that coincided with the information of the researched literature.

Table 10 Collaborative methods characteristics

Characteristics presented in the research	E1	E2	E3	E4	E5	Incidence	Characteristics presented in the Literature
Inverntory Management manually	X	X	X	X	X	5	Inverntory Management automatized
Ordering process manual	X	X	X	X	X	5	Ordering process manual automatized
Individual planning processes	X	X	X	X	X	5	Integrated planning processes
No systems or limited systems	X	X			X	3	Good information systems
Demand management manually	X	X	X	X	X	5	Demand managemnt automatized
Limited forcasting process	X		X	X		3	Efficient forcasting process

Source: Developed by the author based on the interviews and literature

It is observed that in only two aspects identified by the interviewees did not obtain 100% of divergence with the researched literature. Given the above can be identified the non-use of collaborative practices by the hospital case study and most of its processes are performed manually, without integrated systems with suppliers and only performs information sharing at the time of purchase.

It can also be observed according to the interviewee one report that there is a movement for planning for implementation of collaborative practices in the laboratory sector "we are looking towards in the future that would be the case that would be done automatically supply when the stock is running low that would be a kind of agreed levels with suppliers currently, they are not but they will be it is just a plane" (RESPONDENT1, p16, L521). Given this, it is important to analyze the barriers to the implementation of collaborative practices in the hospital, so this will be the next point to be discussed.

4.2.4 *Barriers for Implementation of collaborative methods of supply chain*

The fourth analysis was about the difficulties encountered in implementing collaborative methods in hospital supply chain management. With the interview data, a table was created, in which the left column presents all causes raised according to respondents. This column was divided into two areas: upper area, with the difficulties that coincided with the researched literature, and the lower area with the difficulties that did not coincide with the researched literature. At causes of both areas were arranged in descending order regarding the amount of citations by the interviewees.

Table 11 Perceptions about the difficulties in implementing collaborative methods

Dificulties presented in the research	E1	E2	E3	E4	E5	Incidence	Difficulties presented in the Literature
Suppliers capacity	X		X	X	X	4	Greater dependence on the supplier
High investments	X		X		X	3	High initial cost
Company not ready for collaborative activities			X	X	X	3	Lack of knowledge of the practice
Lack of conviction in collaborative methods			X	X		2	The lack of commitment of those responsible for the SC
Lack of IT structure	X				X	2	Investments in information systems
Stock levels accuracy	X					1	A high degree of trust between the parties is required to share stock information
Hospital size			X	X	X	3	
Transport efficiency	X					1	

Source: Developed by the author based on the interviews and literature

It is observed that more than half of the difficulties pointed out by the interviewees coincided with the researched literature and that almost 100% of respondents rated as concern the supplier ability to meet the demands of the hospital chain. It was also pointed out by three respondents as a barrier to the implementation of collaborative methods the high investment costs and the lack of structure of the company to adopt the practices, being mentioned to the area of information technology as a crucial point of attention and lack of appropriate resources.

4.3 Conclusion

The first objective of this study highlighted the characteristics of the five main collaborative supply chain management methods and highlighted their broader aspects, such as the advantages and disadvantages of adopting the methods. Research has also shown that supply chain collaboration methods are poorly disseminated and adopted by hospitals and healthcare organizations when compared to other chain collaboration initiatives.

The second objective of this study, which was to analyze how the supply chain is managed in a small general Irish hospital and what are the barriers that this business faces for implementation of collaborative supply chain methods, was based on the application of a case study at the hospital studied. The results showed that the analyzed hospital does not adopt any kind of collaborative supply chain management method and among the causes pointed out by the interviewees are the lack of IT structure in the hospital, the lack of preparation for adopting such methods and also the high investments that would be needed for implementation. The study also indicated that organizations need minimal structure and experience before starting the process of implementing some chain collaboration method. This preparation makes organizations more open and confident when they enter a collaboration process.

Many studies argue that implementing a collaboration method in a supply chain yields many positive outcomes such as productivity gains, cost savings, efficient resource allocation, and improved performance levels. However, the typical information shared is about inventory levels, production plans, and demand forecasting and supply capacity.

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

The description of the cases and the analysis of the results allow answering the two questions regarding the case study of this research. Following are the two questions proposed in chapter 3.

How does one small general Irish hospital manage its supply chain?

The studied hospital organizes its supply chain management by dividing it into five segments which are: laboratories, pharmacy, catering, administrative purchasing and surgical Theaters. Each segment is responsible for managing its supply chain, except for the operating room that is shared with the purchasing team.

The hospital supply chain in question has a large portfolio of products being laboratories the sector with the smallest portfolio with about 100 different items and the pharmacy team the largest portfolio, about 200 items.

Regarding their frequency of issuing purchase orders and receiving deliveries, it was found that these processes are performed daily, weekly and biweekly, with deliveries received by team members from each segment and stored in central stocks and some items in alternative stocks.

The results of each of the segments can be seen in table 6 in chapter 4 of this study.

What are the difficulties encountered in the implementation of collaborative supply chain methods in this hospital?

Research suggests that the major difficulties encountered in implementing collaborative methods in hospital chain management are:

- Greater dependence on the supplier - which is related to the reliance on the supplier's ability to supply and the dependence generated by the need for inputs for hospital operation.
- High initial cost - which is related to the high investments required to implement collaborative methods in a hospital chain.
- Lack of knowledge of the practice - Lack or low knowledge of supply chain collaboration practices by those involved in the hospital chain.
- The lack of commitment of those responsible for the supply chain - there is no one committed to implementing collaborative practices and resistance to change.
- Investments in information systems - lack of efficient and modern IT systems that can work seamlessly with the parties involved in the chain.
- A high degree of trust between parties is required to share stock information

The results of each of the segments can be seen in table 6 in chapter 4 of this study.

5.2 Contributions of the Research

As a theoretical contribution to this study, it is noteworthy that the research sought to fill a gap of similar studies in the Irish context and can provide support to stakeholders on the “hospital supply chain” issue. In addition, the study consolidated the five main collaborative methods of supply chain management to assess whether such practices can be extended to the Irish hospital context.

The importance of research theory is also associated with the need to understand which practices impact hospital supply chain management and how the adoption of these practices can bring benefits to hospitals. The research suggests that the hospital context has some specificities that impact opportunities to improve supply chain performance, including the identification of several aspects that are not in the literature on the subject.

The survey also points to a set of supply chain management practices that can be used by managers as a reference for improving hospital supply chain management, and suggests practices that impact network supply chain performance. The results of this study can be used by health professionals.

In addition, the practical importance of this work also stems from the ability to use the study results as an input to improve supply chain planning and management at various public or private hospitals.

5.3 Recommendations for Practice and Future Research

The research in question has shown that the topic of hospital supply chain management is quite broad and involves many opportunities for future study. The results obtained suggest that the hospital studied does not practice collaborative supply chain management methods, and its processes are in a cast and performed in most cases manually.

To verify the authenticity of this study, it is interesting to do the same research, considering suggested supply chain management practices in other hospitals in the network, to verify if the same results are found or if the context described here is specific to the hospital studied. Another interesting study is to conduct the same type of research at Irish general hospitals in order to verify the differences in supply chain management practices adopted by these hospitals. In addition to applying this research to hospitals in different contexts, there are opportunities for future studies related to supply chain management in the hospital sector. Some suggestions are:

- What are the main difficulties faced by Irish hospitals in implementing supply chain management practices and how do these hospitals seek to overcome such difficulties?

- What are the financial benefits of hospitals implementing supply chain management practices?
- What is the role of suppliers in improving hospital supply chain performance?
- What are the main differences between the implementation of supply chain management practices by Irish and foreign hospitals?
- What are the main differences between the implementation of supply chain management practices by hospitals located in large cities and hospitals in smaller cities?

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Appendices

Appendix A – Interview Protocol

1. Characterization of the interviewee and the hospital

1.1 Respondent Identification (confidential information that will not be disclosed):
• Name
• Department
• Interviewee Function
• How long have you been in this function?
• How long have you been in this hospital?

1.2 General Hospital information (confidential information that will not be disclosed)
• Name
• Year of hospital construction / year of incorporation into the group
• Hospital general features
• Medical specialties
• Number of beds
• Profile of patients treated

1.3 General Questions

1. How do you understand the hospital supply chain? What are, in your opinion, the main members?
2. Describe the challenges that the healthcare sector is facing?
3. What are the major weaknesses in terms of operations that the hospital is facing?
4. What are the immediate of future action that you are thinking of undertaking to improve your performance?

2 Warehouse and inventory management

1. Which are the major product categories in your warehouse, and which are the challenges and problems you face in managing them?

- Product portfolio range (number of different items)
- cost contribution of each product category (as a percentage of total procurement expenditures)

2.1 Selection and relationship with suppliers

• What is the total number of suppliers?
• What is the average number of suppliers per input?
• What is the criterion for choosing suppliers?
• Is there a tendency to decrease the number of suppliers?

• What are the types of supply contract?
• Are long-term relationships with suppliers sought?
• Is there any forecast of input demand? How is this forecast made? IS used any system?
• What areas participate in the preparation of this demand forecast?
• What is the time horizon of this forecast? How often is it reviewed?
• What information is shared with suppliers? How often?
• Does the supplier have visibility into the stock levels of that input?
• Does the supplier have access to demand forecasting? How accurate is this information?
• Are suppliers involved in planning and improvement activities?

2.2 Internal Process Management

A) Shopping
• How does the purchase of inputs happen?
• Are inputs purchased or consigned?
• What percentage of centrally purchased inputs?
• A purchase order must be placed or the order is triggered automatically upon reaching a certain inventory level?

• How often are major inputs purchased?
• How is product delivery tracked?
• Hospitals have visibility into material delivery times /medicines?
• How often are inputs delivered late?

b) Storage and distribution
• How is inventory management performed?
• Is there a centralized warehouse?
• Where is the stock located?
• How many different items are in stock?
• Is any effort made to decrease this number of items? As?
• How are items in stock classified?
• How does this classification impact inventory management?
• What is your opinion about the accuracy of the information contained in the system?
• What is the average inventory coverage? What do you think of it?
• How often do supplies lack in stock?
• Does the lack of medicines impact the quality of service provided?
• How is the distribution of materials / medicines within the hospital?
• How are products tracked from the moment they enter the hospital?
• Are products lost due to expiration?
• What are the main initiatives conducted by the hospital to eliminate waste?
• How do suppliers contribute to these initiatives?

3 Collaborative Methods of Supply Chain implementation

3.1 General Characteristics of the department
1. Describe your department in terms of product portfolio range, product characteristics etc.
2. Motivation for implementing a CSM?
3. What was the extent of CMS implementation?

3.2 Benefits and problems in CMS implementation

1. Describe the key benefits as a result of CSM implementation?
2. What were the main problems encountered in establishing CMS (e.g. operational changes, ICT requirements etc)?
3. Provide a comparison to previous non CMS status

3.3 Analyse the relationship with vendors

1. Discuss the evolution of relationships with vendors?
2. What are the most common sources of conflicts with vendors?

Appendix B – Plain Language Statement

Plain Language Statement

Plain Language Statement (or Participant Information Sheet)

Collaborative Methods of Supply Chain Management

Researcher:

Jonathan W. Malgor das Neves

Supervisor:

Dhafer Alahmari

Course:

MSC Accounting and Finance

You are invited to participate in the above research project, which is being conducted by Dr Dhafer Alahmari (supervisor) and Mr Jonathan Neves (master's student) of the Faculty of Business, at the Griffith College. The aim of the study is to increase the understanding of the nature of supply chain collaborative practices and to provide empirical evidence on the impact of hospital-vendor collaborative practices by comparing reported and actual outcomes related to these practices.

Before you decide if you want to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the information on

this page carefully and discuss it with researcher if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

I hope that this sheet will answer any questions you have about the study.

What will I be asked to do?

Should you agree to participate, we would ask you to participate in a interview of about 30 minutes, so that we can get a more detailed picture of the current scenario and what improvements could be made. With your permission, the interview would be digitally recorded so that we can make an accurate record of what you say. When the recording has been transcribed, you would be provided with a copy of the transcript, so that you can verify that the information is correct and/or request deletions. We estimate that the total time commitment required of you would not exceed 30 minutes.

How will my confidentiality be protected?

We intend to protect your anonymity and the confidentiality of your responses to the fullest possible extent, within the limits of the law. Your name and contact details will be kept in a separate, password-protected computer file from any data that you supply. This will only be able to be linked to your responses by the researchers, for example, in order to know where we should send your interview transcript for checking. In the final report, you will be referred to by a pseudonym. We will remove any references to personal information that might allow someone to guess your identity, however, you should note that as the number of people we seek to interview is very small, it is possible that someone may still be able to identify you. The data will be kept securely in the Faculty of Business, for five years from the date of publication, and may be destroyed after this time.

How will I receive feedback?

Once the thesis arising from this research has been completed, a brief summary of the findings will be available to you. It is also possible that the results will be presented at academic conferences and in published papers.

Do I have to take part?

Participation in this study is voluntary. Should you wish to withdraw at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without prejudice. Your decision to participate or not, or to withdraw, will not affect any relationship you may have with this department or University and will not affect any services you may receive now or in the future.

Where can I get further information?

Please contact the researchers if you have any questions or if would like more information about the project please do not hesitate to contact the researchers at the contact details above.

Student Jonathan Neves

Mail: jmalgor@gmail.com

Tel: +353 0838323091

If you have any concerns about the conduct of the project which you do not wish to discuss with the research team please contact:

Dr Garrett Ryan,

Griffith College Research Ethics Committee

South Circular Road, Dublin 8, Ireland

Mail: garrett.ryan@griffith.ie

Tel: +353 1 4163324

How do I agree to participate?

If you would like to participate, please indicate that you have read and understood this information by signing the consent form and returning it in the envelope provided. The researchers will then contact you to arrange a mutually convenient time for you to complete the interview.