A Holistic Supply Chain Integration theoretical framework within the Maltese Manufacturing SMEs

A Grounded Theory Approach

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Doctor of Philosophy

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Purpose: The thesis focus is to generate a theory on supply chain integration (SCI) within the Maltese manufacturing SMEs. Due to the current literature gaps there is lack of scholarly work associated with the theory of how to achieve SCI across the supply chain (SC) (Zhao et al., 2008; Flynn et al., 2010) and on holistic SCI frameworks (Holmberg, 2000; Mentzer et al., 2001; Flynn et al., 2010; Garetti & Taisch, 2012). The thesis seeks to address these gaps by trying to establish two main objectives: the SCI substantive theory; and the SCI holistic conceptual framework, needed to be adopted both within focal firm and beyond the dyad relationships across the SC.

Method: The Straussian Grounded Theory methodology (GTM) was used to inductively derive the SCI theory. The research data collection and analysis was performed on 22 in-depth interviews from 17 firms within various manufacturing sector, using both primary and secondary data. The grounded theory data analysis was based on both Computer Assisted Qualitative Data Analysis Software (CAQDAS) and storyline narrative approaches to serve as data analytic triangulation tools so as to validate the emerged theory. Analytic intricacies and iterative sense-making was pivotal in all theorising stages to arrive at the final substantive theory with its conceptual framework.

Findings: The research findings inductively established that the substantive theory is based on a cross-disciplinary approach mainly consisting of the following disciplines: management, leadership, business, manufacturing and SC strategies respectively and technology, both within information systems and manufacturing automated processes. The research established a substantive theory for SMEs to achieve SCI, which revolves around the integrative management and leadership approach (IMLA). The IMLA is considered to be an original conceptual term within the SCI theory, and it is defined to be both a driver and a binding force of all SC actors, based on the integration of a dual concept of management and leadership. The management approach maintains all the necessary quality standards and sustainable measures in place and at the same time streamline and optimise all activities to meet competitively all operational and business targets. The leadership approach focuses ideally on a shared leadership style, to promote a decentralised management approach based on teamwork initiatives, but it is not excluded that firms may adopt an individual leadership style, based on a centralised management approach. The research also established a set of propositions to contribute to the discipline scholarly work, which may also be tested by quantitative future research to increase the research robustness.

Limitations: The findings are based on a relatively small sample of 17 firms involved in various positions within the SC.

Practical & Methodological implications: The conceptual model with its underpinning theory and the recommended road map are to serve as a guide for all managers across the command chain in various SC positions to deploy the right IMLA, as the core theme within the conceptual model, to achieve outstanding competitive performance. This research also extends the applicability of GTM within the management discipline.

Originality: This research outlines an original concept within SCI literature, which is a core driver, represented by the term IMLA. Such an IMLA is able to achieve a holistic SCI management approach beyond the SC dyadic relationship by adopting four leadership traits, situated within the strategic perspective of the firm based on the business, manufacturing and SC strategies with the role of technology as an enabler and even a driver to achieve competitive capabilities.

Keywords: Supply chain management, Technology, Leadership, Management and Grounded Theory.

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List of abbreviations

Abbreviation	**Meaning**
3BL	Triple Bottom Line sustainable measures
BOM	Bill of Material
BSI	British Standard Institution
CAD	Computer-Aided Design
CAM	Computer-Aided Manufacturing
CAQDAS	Computer-Assisted Qualitative Data Analysis Software
CIM	Computer-Integrated Manufacture
CEG	Collaborative Enterprise Concept
CPFR	Collaborative Planning Forecast and Replenishment
CRM	Customer Relationship Management
CSF	Critical Success factors
CSR	Corporate Social Responsibility
DE	Defunct Enterprise
DREG	Dynamic Enterprise Reference Grid
DSS	Decision Support Systems
EAI	Enterprise Application Integration
EDI	Electronic Data Interchange
EE	Extended Enterprise
EFQM	European Foundation for Quality Management
EHS	Environmental, Health & Safety
EIS	Executive Information Systems
EPC	Electronic Product Code
ERDF	European Regional Development Fund
ERP	Enterprise Resource Planning system
EU	European Union
Eurostat	European Statistical System
FMS	Flexible Manufacturing Systems

FP	Framework Protocol
GDP	Gross Domestic Product
GMP	Good Manufacturing Practices
GSCM	Green Supply Chain Management
GTM	Grounded Theory Method
GVA	Gross Value Added
HVM	High Value Manufacturing
ICT	Information Communication Technology
IEA	International Energy Agency
IMLA	Integrative Management and Leadership Approach
IOS	Inter-Organizational Systems
IoT	Internet of Things
IS	Information Systems
ISA	International Society of Automation
ISIC	International Standard Industrial Classification of all Economic Activities of the United Nations
ISO	International Standard Organisation
IT	Information Technology
JIT	Just-in-time
MBNQA	Malcolm Baldrige National Quality Award
MESA	Manufacturing Enterprise Solutions Association
MFSA	Malta Financial Services Authority
NACE	European Classification of Economic Activities
NSO	National Statistics Office (Malta)
OECD	Organisation for Economic Cooperation and Development
OM	Operations Management
PESTEL	Political, Economic, Social, Environmental & Legal
PL	Party Logistics (e.g. 3PL & 4 PL)
PPS	Purchasing Power Standard
RBV	Resource Based View
RFID	Radio Frequency Identification Code
RoHS	The Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive
SaaS	Software as a Service
SC	Supply Chain
SCI	Supply Chain Integration
SCM	Supply Chain Management
SCOR	Supply Chain Operations Reference
SIS	Small Island State
SMEs	Small & Medium Enterprises
SOA	Service-Oriented Architecture
SSCM	Sustainable Supply Chain Management
SWOT	Strength, Weaknesses, Opportunities & Threats
TCA	Transaction Cost Analysis
TUV	Technical Inspection Association
UL	Underwriters Laboratories standard
VIE	Vertical Integrated Enterprise
VE	Virtual Enterprise
VMI	Vendor Management Inventory
WEEE	Waste of electrical and electronic equipment (amend)
WEF	World Economic Forum

Chapter 1: Introduction

1.1 Research general background: The role of Supply Chain Integration within manufacturing based SMEs enabled by technology to meet sustainability and competitiveness

Maltese SMEs, as all other SMEs across the globe, are considered the engine of the economy since they possess: the potential to pursue innovative investments in niche markets; the ability to generate opportunities for employment; and the capabilities to provide a pivotal contribution to the nation's economy (Curran & Blackburn, 2001; Demirbag et al., 2006; Ernst & Young, 2013). In spite of the SMEs potential within the worldwide economy, there exists limited studies covering research based on the supply chain operations within the SMEs (Curran & Blackburn, 2001; Bayraktar et al., 2009), especially in the Maltese Melitensia.

In general, SMEs in different sectors, lack the resources relative to large firms (e.g. capital, labour and equipment), where such resources are also function of the SME type, such as either being a Multinational based SME or else as a standalone contractor or else a family owned business (Curran & Blackburn, 2001; Bayraktar et al., 2009; Ernst & Young 2013). Such a lack of both resources and purchasing power is a well established phenomenon in SMEs and unless they are supported by Government initiatives and programmes or larger firms, they need to carry a greater burden, relative to large firms, to meet the demanding environmental, social and economical sustainable measures (Luken & Stares, 2005; Lee, 2008; Lee & Klassen, 2008; Glover et al., 2014; Hsueh, 2015). SMEs play a key role within the supply chain (SC) context, by taking various roles, such as suppliers, distributors, producers and customers (Hong & Jeong, 2006).

Within the manufacturing sector it is a well conceived requirement, that nowadays for firms to stay in business, there is the need for an integrated strategic relationship between various firms and not to operate as autonomous entities (Dyer, 1994; Cox, 1999; Lambert & Cooper, 2000; Fawcett & Magnan, 2004; Bagchi et al., 2005; Ketchen & Hult, 2007; Koufteros et al., 2007). Though, it cannot be excluded that a well organised SC set-up may still stifle or hinder a certain level of change and innovation due to the established adopted systems, traditional mindset, legacy applications and established procedures (Neuman & Samuels 1996; Sorenson, 2003). On the other hand, one has to consider that with SCI there is more to gain than to lose, as a result of the synergies and teamwork efforts with well committed and non-adversarial relationships with all SC actors (Gunasekaran et al., 2008; Cheung et al., 2012; Huo, 2012; Schoenherr & Swink, 2012).

Current manufacturing practices are focussing on high value manufacturing (HVM), which consist from the application of leading-edge technical knowledge and expertise for the creation of products, production processes and associated services, which have strong potential to bring sustainable growth and high economic value (Technology Strategy Board, 2012). Such a manufacturing context requires the effective management of supply chains to support the contemporary HVM manufacturing initiatives, having a distributed and fragmented SC stakeholders across the globe (Livesey, 2006; Martinez et al., 2008; Bayraktar et al., 2009). This manufacturing paradigm shift incorporates a change from vertical integration to virtual integration (Prahalad et al., 1994; Power, 2005; Wang & Wei, 2007; Gunasekaran et al., 2008). SCI integration initiatives are pivotal in such a challenging business scenario, since they are able to create a sound platform for optimizing and streamlining all manufacturing processes across all SC tiers up to the end customer (Cohen & Lee, 1988; Gunasekaran et al., 2008; Koufteros et al., 2007; Lambert, 2008; Bayraktar et al., 2009; Huo, 2012). Such a stance is achieved, since with SCI, the SMEs are in a position to gain from joint-commitments and synergistic collaborative effects, in all strategic, tactical and operational management levels, both from staff within the focal firm and also from teamwork efforts with all of its stakeholders.

The role of information technology (IT), within the above SC context, is considered part and parcel of such a manufacturing scenario, since IT has the capabilities to provide a platform for all inter-connections of all SC actors, both locally and globally. In fact, from the SC literature, it has been established that one of the key drivers of this change, is technology based on the internet platform to promote open technology based systems (Metcalfe et al., 2002; Muffatto & Payaro, 2004; White et al., 2005; Sanders, 2007). Furthermore, to meet such a design and development of new products and services, within this competitive manufacturing environment, SC actors need a technological-based infrastructure, as a source of information integration, such as enterprise resource planning systems (ERPs), for streamlining of all operations and for leveraging organizational competitiveness (Simatupang et al., 2004; Shi & Gregory, 2005; Cassivi, 2006; Gunasekaran et al., 2008; Sanders, 2008; Hoch & Dulebohn, 2013). A SC actor can either employ an in-house ERP system, covering all operations from customer relationship management to all daily operations' needs, by deploying an enterprise application integration (EAI) system to have interoperability between the multiple disparate systems across the SC (Loh et al., 2006). Else, a SC actor can exploit the cloud-based supply chain management application, through outsourced enterprise class solution at an attractive cost (Metcalfe et al., 2002). Such an ERP platform, with its interconnection of all SC actors, provides information visibility and supply chain flexibility, being the major advantages provided by IT support to achieve SCI (Fawcett et al., 2007; Wang & Wei, 2007; Gunasekaran et al., 2008; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014).

Furthermore, with today's current demands for sustainable operations, from the triple bottom-line perspective, it is much easier for the focal firm in-conjunction with all SC actors to employ an integrated approach so as to work in unison and share common standards and procedures to meet sustainability across the overall SC, so as to produce the expected sustainable product. As a result, this business scenario is creating a challenging strategic horizon, which can be transformed to success, once all opportunities in the market are exploited, but at the same needs an effective management approach, to manage the overall SC from a sustainable perspective, so as to promote competitive capabilities to survive and win in the market. SCI provides such an effective management solution.

1.2 The Maltese manufacturing scenario

Malta has a GDP of €6.4 billion and a population of around 400,000 living in an area of 316 sq. km, and is strategically located at the heart of the Mediterranean (Eurostat, 2012). Malta is one of the smallest and most densely populated countries in the world and is considered as a Small Island State. Malta is the smallest euro area economy, highly dependent on trade and tourism. Foreign-owned non-financial corporations dominate the domestic market and the economy relies on foreign direct investment (FDI) flows and European Union (EU) funds for investment. Over the last decade, the Maltese economy underwent a gradual shift from the manufacturing towards the services sector, but still manufacturing has still a pivotal role but with a declining contribution to the economy.

Whereas in the year 2000, manufacturing accounted for 22.4% of Gross Value Added (GVA), in 2010, it only accounted for 13.6%. On the other hand, the services sector contributed to 59% of GVA in 2010, up from 53% in 2000 (Malta Council of Science and Technology, 2011). In their 2010 report on the subject, Angelou Economics (2010) recommended that the future economic development efforts must continue to support the transition to higher value added opportunities, founded on a knowledge-based economy. In the manufacturing sector, the majority of enterprises (92% in 2010) were engaged in medium to low and low-technological based activities, with only a minority (8% in 2010) of manufacturing enterprises falling within the high or moderate to high technological categories.

Small Island states (SISs), such as Malta, have always been labelled as non-viable and with a higher level of vulnerability than resilience (Bertram, 2004). Though, past wealth statistics, especially since Independence in 1964 and with the subsequent EU membership in 2004, depict Malta as a resilient country which performed competitively well, even when compared to larger countries performance statistics, such as UK and other European countries, as referred in the World Economic Forum (WEF, 2014a) performance statistics, throughout the last years. In fact, Malta has been scoring in economic wealth reasonably well in the last decade, especially in its main sectors, such as Tourism, Financial

Markets and Services, Information Technology (such as gaming and betfair), Healthcare and Value Added Manufacturing. A profile of the GDP outline for the last seven years' timeline by Eurostat (2014) for EU member states; the Maltese track record performance statistics relative to other EU countries; the Maltese economy assessment with respect to the 12 pillars of competitiveness by the WEF (2014a) in its Global Competitiveness Report (2014–2015); the Maltese outline of SMEs within manufacturing with the overall GDP contribution together with an overview of the different types of manufacturing sectors; and the manufacturing supply chain infrastructure, are all referred in Appendix 1.

1.3 Research purpose

The research aims to explore the role of SCI for Small and Medium Sized Enterprises (SMEs) within the Maltese manufacturing. In particular, the thesis looks at the interaction of all SC actors within the SC. The scope is to empirically explore what is happening within SCI initiatives taken by SMEs in the Maltese manufacturing sector, so as to generate a substantive theory to represent the reality of this phenomenon from practice. As a result the purpose of this study is to establish the required characteristics to achieve supply chain integration across the SC.

The research strategy is based on a Grounded Theory methodology, so as explore what the data are saying from 22 in-depth interviews based on two sampling phases. Various data analytic management tools are used to support all the data analysis during three main stages (i.e. Open, Axial and Selective Coding), to promote research scientific rigour, such as the CAQDAS and the storyline method supported by narrative based-memos and visual aids, in particular, logic diagrams as tables, code matrices as tree diagrams and conceptual frameworks as mind maps. The established SCI reality is subjective and with a multiple perspective, since it is socially constructed through a constructivist epistemological approach, but the generated theory still meets the credibility, plausibility and trustworthiness research quality criteria (Glaser & Strauss, 1967). Such research validity and reliability criteria are met, since the grounded theory method is employed with scientific rigour, where the generated substantive theory is generalizable to the theory grounded in data (Bryman, 2008), through the constant comparison process of verification (Strauss & Corbin, 1994), but it has contextual uniqueness and significance to the sample of the study (Bryman, 2008). Such a context is function of the sample of participants from the various firms with their different roles, which span different SC tiers within the manufacturing sector, such as suppliers, production plants, freight forwarders and IT contractors. All SC actors have their individual micro contextual conditions and a common Maltese macro context, which are all operating with an international scope, which is function of their supply chain operations within their destination market players (e.g. customers and manufacturers).

1.4 Research problem statement

In the SCM arena, SC practices show that innovative and holistic managerial and technological practices are still limited on how to achieve SCI (Holmberg, 2000; Mentzer et al., 2001; Flynn et al., 2010; Garetti & Taisch, 2012). It was also inferred that, 'Managing the entire supply chain is a very difficult and challenging task' (Lambert & Cooper, 2000, p.68). The SC strategy needs to decide on how to gain from the optimum performance from each SC members so as to eliminate the risks associated with sub-optimisation effect that may result from friction between SC actors optimal (Cox et al., 2004a; Narayandas & Rangan, 2004). There exist firms which are hesitating and are finding it difficult in integrating operations and are not convinced with the potential benefits and the competitive edge attained through the deployment of SCI initiatives (Braunscheidel & Suresh, 2009; Thakkar et al., 2009; Flynn et al., 2010; Zhao et al., 2011). Similarly, some firms are neither convinced by the benefits that can be attained from the investment in technology based applications (Dos Santos & Sussman, 2000; Devaraj et al., 2007). Furthermore, holistic SCI frameworks are lacking within the extant literature (Vickery et al., 2003; Pero et al., 2010; Schoenherr & Swink, 2012). The literature on the social element focused on people, regarding the labour, skills and the forming of relationships, are a neglected area of research (McCarter et al., 2005; Shub & Stonebraker 2009; Ashby et al., 2012; Lengnick-Hall et al., 2013). Finally, managing through a strategic leadership approach based on a distributed or shared leadership style is very challenging to achieve when one considers the pervasive influence of the single centric individual leadership approach due to the leading role that top management takes on all the people across all management levels (Tsui et al., 2006; Ling et al., 2008).

The Maltese Government, together with the EU established programmes, such as the new 2014-2020 'SME assistance' Programming Period (Ernst & Young 2013, p.8), are undertaking various incentives to encourage and support further all SMEs investments, so as to meet the contemporary competitive manufacturing global scenario. In fact, the Malta Enterprise is providing several supporting measures, such as soft loans, tax credits and loan interest subsidy, among other schemes (Malta Enterprise, 2012). In spite of such a positive business climate for all SMEs, a number of firms are still finding it difficult to invest and meet the challenges offered within their respective sectors.

One cannot exclude the fact, that Malta, as a Small Island State (SIS), all firms engaged within the supply chain cannot exploit the economies of scales advantages, due to the relative small sized orders, which are leading to higher costs per unit of production, which makes it more challenging to compete on a global scale. Such a low level of throughput has a domino effect on all associated SC actors, such as suppliers, distributors and carriers (i.e. freight forwarders). Furthermore, being a SIS, all SC actors also have to face the insularity and peripherality challenging characteristics, since they need to carry higher associated logistics costs, both with respect to the lack containers' volume efficient usage and for the greater transport distances that need to be covered to reach most of the destination markets.

Furthermore, all the above must be seen within the context of sustainable operations, both within all manufacturing design and operations and also for all logistics companies, who need to manage effectively, through dedicated processes, so as: to economize their operations to meet profitability; to manage all the human resources base to be social responsible; and to meet all environmental sustainable challenges through all the necessary investments and effective running of all sustainable processes. From all the three sustainable measures (i.e. 3BL), the environmental performance is determining all the other two sustainable measures, with today's stringent environmental standards and corporate social responsibility requirements (Elkington, 2002; Manderson, 2006; Bojarski et al., 2009). As a result, the customer, which can be a SC player or an end-user, is nowadays expecting that all their products are to be environmental sustainable from all aspects of materials, transport and manufacturing processes, otherwise they do not buy (Vachon & Klassen, 2006; Zhu et al., 2008; Caniels et al., 2013).

1.5 Research significance

The research significance is based on the fact that manufacturing is the source of all goods for a society and that SCM is undergoing a major paradigm shift, with great deal of changes and complexities, which are transforming the way the processes are being implemented. Such a paradigm shift is being attributed to several reasons such as: changing business environment (i.e. political, economical and legal), increased globalization, information technology developments, corporate social responsibility and sustainable green operations requirements and internet-based 24x7 management systems. This SCM dynamic environment is substantiated by various scholars such as Handfield & Melnyk (1998); Devaraj et al. (2007) and Flynn et al. (2010).

Furthermore, it was claimed that SCM is still in its embryonic/infancy stage (Pagell, 2004; Zhao et al., 2008) and as a result research is quite limited to explain how to achieve SCI (Zhao et al., 2008) and how to determine the influencing factors of SCI (Flynn et al., 2010). The study validity is further reinforced by assertion that the 'theory surrounding supply chain integration is still under developed' (Schoenherr & Swink, 2012, p.110). Finally, it was stated that the social element, 'in terms of labour, skills and the forming of relationships' area is a neglected research area (Ashby et al., 2012, p.506) and that 'downstream integration has received little attention in supply chain research' (Guan & Rehme, 2012, p.188). From the leadership literature, it was also asserted that within the 'management of integrated supply chain' is a 'largely ignored area' (Defee at al., 2010, p.764). There are few scholarly works which explicitly consider network based leadership in the macro context of inter-organisational networks (Sydow et al., 2011). Finally, the manufacturing sector needs further research in the area of 'holistic research approach integrating technological, managerial and business-model solutions together with a change in the customer behaviour, with the perspective of a more sustainable manufacturing for the production of more sustainable products and services' (Garetti & Taisch, 2012, p.88).

Such contextual complex requirements and the nature of SCM dynamic changes with the lack of theories and explanations on how to achieve SCI within manufacturing, makes the research exploratory and challenging to promote a significant contribution.

1.6 Research objectives and research question

The research aims to identify and analyse the supply chain integration (SCI) initiatives taken by all SMEs, as SC actors, within the manufacturing sector. The intention is to establish all the characteristics needed to achieve a holistic SCI approach within the contemporary contextual conditions, such as the economic challenges (e.g. recessions), the competitive environment and the demanding sustainable practices. Such characteristics are to be represented in a theoretical model, to outline the best practices which are to be adopted by SMEs within the Maltese manufacturing to achieve competitive capabilities.

Therefore, this research focuses on the holistic SCI practices within SMEs in the Maltese manufacturing. As a result, the two research objectives are:

- Research Objective 1 (RO1): To identify the characteristics needed to achieve SCI within SMEs in the Maltese manufacturing; and

- Research Objective 2 (RO2): To develop a SCI theoretical framework for SMEs in the Maltese manufacturing.

The research question that guides the study and supporting objectives is the following two-part question. First, which are the characteristics needed to achieve SCI within SMEs in the Maltese manufacturing? Second, which are the key factors that constitute SCI that promotes competitive performance within SMEs in the Maltese manufacturing?

1.7 Summary of the aim of the study within the manufacturing SC

From Malta's manufacturing profile with its assessment (Section 1.2), one can clearly refer, that Malta as Small Island State has a very strong logistics network, backed by an excellent port infrastructure and a knowledge-based economy with substantial EU support. With such a context, this research scope is to revamp the supply chain operations related to all SMEs within the manufacturing sector, both for local and international owned firms, since the SC is strong as its weakest link. The local scene based SC is able to gain from various advantages that promotes HVM, through easier proactive commitment and lean operations based on more sustainable practices, in view of the small size of the island. The focus of the research is to determine the SCI improvement initiatives needed on high technological and high value added manufacturing. Such a research is also in line with the global manufacturing SC perspective, which is also undergoing a major paradigm shift with great deal of change and complexity, and is transforming the way the processes are being implemented in line with HVM principles.

In summary it is a common understanding and a key current concern of all firms engaged in the manufacturing sector with their stakeholders across the SC, that for them to remain competitive, there is the pivotal need to work together in an integrated approach. Such a stance needs the right management approach supported by an investment in the latest technology manufacturing equipment and in the latest ICT applications to promote real-time flow of information with all of its stakeholders, backed by an efficient logistics backbone for all products movements. The SC needs the right management approach with all the necessary measures, so as to support the employees in all requirements and enhance their capabilities through on-going training initiatives. Such a stance enables the management to formulate high value manufacturing strategies with the right engagement of the human element and with the deployment of the right technology-based processes, in both information systems (IS) and manufacturing processes to produce high quality products with higher value-added activities and customised services. There is also the need to undertake a revamp in the approach to promote innovative processes and products through dedicated innovative initiatives, both by the private sector and even through the Government support initiatives, by providing access to special grants and incentives to maintain and improve on the business sophistication pillar stone, through change management commitment in research and innovation, as referred in the WEF (2014a) report. Such a context need to be seen through the diligent effort that needs to be undertaken by all stakeholders to promote economical, social and environmental sustainability, by adhering to all safety practices, by complying to all standards and legal requirements and also to protect and harness the environment apart from economic prosperity initiatives. With such an approach, Malta's SMEs, within the context of the contemporary worldwide severe competition, needs to sustain and improve so as to survive in the market, by leveraging its performance and innovative capabilities, through a high value-added manufacturing approach, so as to compete effectively, even relative to low cost countries, such as China, being one of the world's major economies.

1.8 Thesis structure

The thesis consists from a Grounded Theory based research methodology which requires that the researcher undertakes two literature reviews to meet the requirements of such a research strategy. The thesis structure is referred in Figure 1.1 and is also explained below.

Following this introductory chapter, the thesis proceeds with Chapter 2, which provides the literature review. Chapter 2 contains two literature reviews, dedicated to the a priori and the post literature reviews. The scope of the **a priori literature review** is to establish the: research objectives; research question; the design of the initial interview guide; literature gaps; and a broad in-sight of the phenomenon understudy with the establishment of the key significant concepts, which are provisional, in line with the Straussian Grounded Theory Method (Strauss & Corbin, 1998). The scope of the **post literature review** is to undertake a systematic literature review on all the emerged themes building the generated substantive theory and also to establish the literature gaps, so as to situate the emerged theory within the extant literature. This approach serves as a platform for Chapter 7 theoretical integration process, which is in line with both Straussian and Glaserian GTMs (Strauss, 1987; Glaser, 1998).

Chapter 3 justifies, selects, examines and outlines the Straussian Grounded Theory research methodology. It also justifies the role of the literature review, with special reference to the a priori and the post literature reviews. It includes an outline of the two sampling stages and the three coding techniques, with the support of the CAQDAS and storyline narrative approaches. It also explains the philosophical approach used to generate the theory from the data. Finally, reference is made to the adopted research quality criteria and the research ethics.

Chapter 4 is dedicated to the Open Coding (Phase 1) and Axial Coding (Phase 2) stages of the data collection and analysis process using the CAQDAS and storyline narrative approaches, with the support of memos and visual aids, in particular, logic diagrams as tables, code matrices as tree diagrams and conceptual frameworks as mind maps. Such two coding stages with all the tools referred, assist the theorising process, which finally establish a set of 22 tentative categories with their conceptual summaries.

Chapter 5 is dedicated to the refinement of the tentative categories, established from the previous chapter. This is achieved by designing a new interview guide based on the previous chapter emerged categories to undertake theoretical sampling as the research third phase (Phase 3), with a set of new interviews. Such a data collection and analysis process is focused on such emerged themes to achieve theoretical saturation of all the emerged theory. Such a chapter covers the Selective Coding stage, which as a result establishes the core theme that links all the emerged final action categories and outcome categories, within their contextual conditions, in line the coding paradigm (Strauss & Corbin, 1998).

Chapter 6 is dedicated to the generation of the SCI substantive theory, by outlining a summary memo of the final theory, which is a direct result of these iterative analytic processes of the two previous chapters in line with the research objective 1 (i.e. RO1). It also builds up the SCI holistic framework that represents the SCI phenomenon in line with the research objective 2 (i.e. RO2), based on SMEs within the Maltese manufacturing.

Chapter 7 outlines how the emerged theory from the data is integrated within the extant literature, in line with the GTM for logical extension and comparison of the emerged theory with the literature, by identifying the commonalities, the differences and the new (Strauss, 1987; Glaser, 1998) and also for theory building (Eisenhardt, 1989). The scope of this chapter also answers the research question and derives the study implications to the extant literature and also refines the emerged theory (Strauss, 1987; Glaser, 1998; Strauss & Corbin, 1998) and addresses the literature gaps.

Chapter 8, is the final chapter, it concludes the thesis by outlining the key findings and the research contributions generated from the data. In particular, the researcher draws out the research key ideas, some original insights and the substantive theory outline as the roadmap for practitioners. The researcher also establishes a set of propositions and the substantive theory implications to the extant literature. The research study further establishes the contributions to the methodology and to policy and practice and also includes the research limitations and ideas for future research.

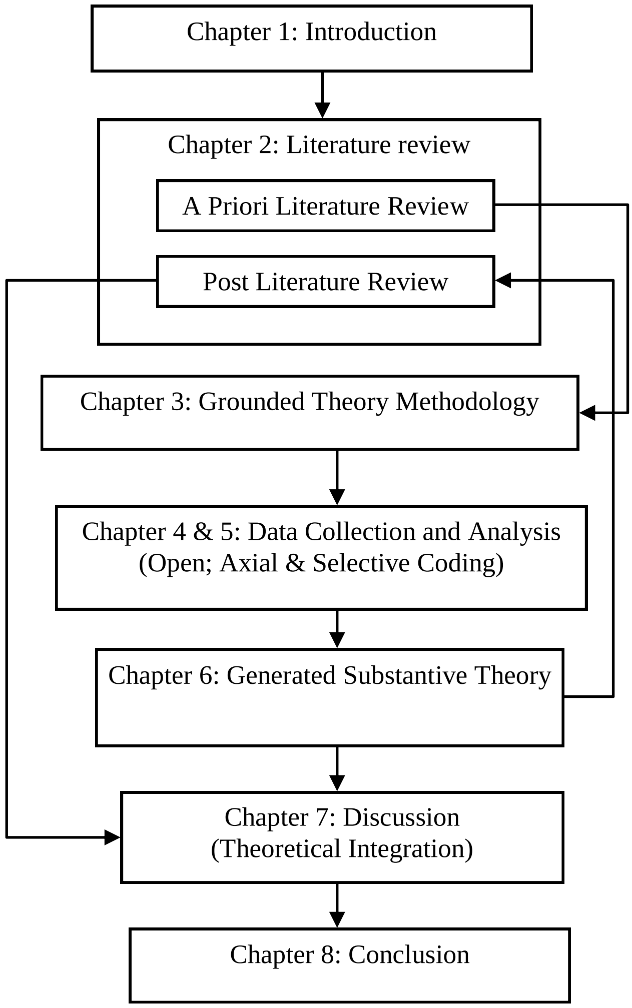

Figure 1.1: Thesis structure (Author)

Chapter 2: The A Priori and Post Literature Reviews

2.1 Introduction

This chapter explains the role of the a priori and the post literature reviews, as the two main sections of this chapter. The first part (Section 2.2) is dedicated to the **a priori literature review**, which provides an overview of the literature that informs the research area. It establishes the foundations of supply chain integration (SCI) initiatives within manufacturing together with all the related literature, such as supply chain management (SCM), information technology (IT) and other concepts which define and explain the issues and challenges underpinning the phenomenon. It also establishes the literature gaps from both a SCI and an IT perspectives, the research objectives and question and leads to the decision of the research methodology, with its initial interview guide to kick-off the data collection and analysis process. The second part (Section 2.6) is dedicated to the **post literature review**, which is driven by Chapter 6 emerged theory from the data, as referred in Figure 1.1. The post literature review is used by the researcher to undertake the core part of the systematic literature review of the thesis, by focussing on the generated substantive theory with its emerged themes and establish the contemporary literature gaps in leadership, SCI, sustainability and manufacturing. The literature review, with its established gaps, is used in the discussion chapter (Chapter 7) to establish the commonalities and the differences from the emerged theory so as to derive the research contribution.

2.2 The a priori literature review

The systematic literature review is performed on the SCI phenomenon and its related topics for the researcher to be informed and understand the phenomenon understudy from a broad perspective through multidisciplinary theories within the extant literature. As a result several themes are derived from the extant literature to give a sound understanding of what constitutes SCI within manufacturing. Basically, the literature review within this section is used to establish the: research significance and its context; manufacturing supply chain (SC) outline; virtual networks within the SC; HVM within the SC; SCM challenging perspective; SCI within SCM; SC strategic review; SCI theoretical foundations; and technology deployment within the SC and manufacturing; and four significant concepts from the extant literature: information integration, strategic integration, strategic collaboration and information technology. Finally it is also established the: SCI challenges; literature gaps, both within SCI and IT; research objective; research question; and first interview guide.

2.3 The outline of the a priori systematic literature review

To achieve the systematic literature review, both standardised and customised search filters are used through established keywords under the researched phenomena, since the discipline of SCM has a broad spectrum of published research. The search inclusion criteria in the title, keywords and abstract are: supply chain; supply chain integration and manufacturing; and information technology. Sources used in the search are books from academic journal publishers, commercial academic search engines (such as Google Scholar), university catalogues and databases (such as EBSCO, ProRequest and Science Direct), trade journals, conferences proceedings and recognised websites with unpublished work which are more targeted to practitioners, such as such as Supply Chain Council (SCC); Global SC Forum; The Chartered Institute of Logistics (CILT); Council of SCM Professionals (CSCMP); Supply Chain Standard.com (SCS); Toolbox.com for IT; and Realtime NEXUS for IT.

The initial searches are based on relatively recent publications (i.e. 2000 to date). From the gathered academic papers, all cites which are considered very useful in assisting the systematic literature review, are also manually retrieved from the respective journal, to get the original sources, to promote better evaluation and synthesising of the literature to promote research rigour.

2.4 Overview of the supply chain integration theory within the a priori literature review

The term SCM was introduced by consultants in 1980s (Oliver & Webber, 1992) and started to gain structure as a management term and was being treated as logistics management outside the firm with suppliers and customers (Lambert & Cooper, 2000). Today SCM is being treated differently and is being defined to comprise from the integration of logistics together with the integration of all business processes (Lambert & Cooper, 2000; Cooper et al., 1997). Hence, logistics was then being treated as part of SCM. With the drastic increase in the global competition, the SCM paradigm has shifted to global sourcing with: worldwide distributed customers; low inventories or fast inventory turnovers; low cash-flow; low cost; and faster product (order) fulfilment cycles. This made the SC more sensitive to information and products flow with deeper engagement with all SC entities.

Similarly, the SCI evolution passed through several stages, with several descriptive terms and with the support of different information systems applications, such as JIT, cellular, lean, mass customisation, concurrent engineering (CE), flexible manufacturing systems (FMS), business process re-engineering (BPR), enterprise resource planning (ERP), customer relationship management (CRM), vertical integration and virtual integration (Stonebraker & Afifi, 2004). Another perspective, adding to the previous list of developments, included SCM, materials requirements planning (MRP), manufacturing resource planning (MRP II), suppliers relationship management (SRM), advanced planning systems (APS), electronic data interchange (EDI), agile IS, decision support systems (DSS), extended enterprise application (EEA) and enterprise application integration (EAI) (Bayraktar et al., 2009). With such a timeline of activities made each SC set-up contingent of its employed technologies and processes, which also made a difference on the nature of the management approach requirements across the SC.

The concept of SCM is well established in the literature and is defined as ‘a set of three or more entities (organisations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer’ (Mentzer et al., 2001, p.3). Though, the SCM concept lack consensus, since there exists 173 definitions on such a concept (Stock & Boyer, 2009), which is impinging that SCM is a complex concept. SCM is used to achieve competitive performance vis a vis cost, quality, flexibility and time performance (Daugherty et al., 1998; Lambert et al., 1998; Ketchen & Hult, 2007; Swafford et al., 2008; Flynn et al., 2010).

To achieve SCM, there is the need of SCI both within and outside the focal firm (Ketchen & Hult 2007; Swink et al., 2007; Ketchen, et al., 2008; Kim, 2009). The SCI concept, from a simplistic definition, is the linking of suppliers, manufacturers and customers (Calantone et al., 2002). From a more detailed perspective, SCI is defined as ‘the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes’ (Flynn et al., 2010, p.59). The SCI effectiveness is dependent on the context of the supply chain (Gimenez et al., 2012).

2.5 The foundational themes within the supply chain integration literature

2.5.1 The manufacturing supply chain theoretical outline

In today’s industry, manufacturing is being based on lean, as an enhancement of mass production, and agile manufacturing (Yusuf & Adeleyei, 2002; Gunasekaran et al., 2008) that implements just in time (JIT) practices. The overall SC uses a pull-based system (Kros et al., 2006) to align the production and business processes throughout the SC to the changing demands of the chain’s ultimate customers (Green & Inman, 2005). Pull strategies are customer focused and are employing a JIT-II-selling strategy tactics that integrates fully empowered sales representatives within the customer’s purchasing process (Green & Inman, 2007). The industry, in the current economic situation, is consumption and not production limited (Pinto, 2009). The principle behind the pull strategy is sustained by Lambert (2008, p.32), where he declared that the ‘supply chain starts with your customer network and flows back through to your supplier network, and all the functions of the business need to be involved in managing the combined network'. Yusuf and Adeleyei (2002, p.4545) in an empirical paper in lean and agile manufacturing in UK, argue that 'integration is the means by which a company can deliver concurrently on a wide range of competitive objectives' and 'competing simultaneously on multiple competitive capabilities enhance performance better than a rather narrow focus on cost and quality'. In the new manufacturing paradigm, mass-produced components are distributed widely to dispersed factories around the globe that constitute a part of the supply chain according to the local markets key characteristics (e.g. cheap labour, labour skills set and proximity to markets). This is leading to the importance of the SC virtual enterprise (VE) environment.

From the above theory, VEs are an alliance of independent business processes or enterprises with each contributing 'core competencies' in areas such as design, manufacturing and distribution to the SC network (Gunasekaran, 1999; Rupp & Ristic, 2000; Kovacs et al., 2003). In manufacturing, lean and agile SCs constitute the competitive environment based on pull-SCs located in a global network forming up the VE to deliver the product faster and at a minimum total cost (Gunasekaran et al., 2008).

2.5.2 Global virtual networks within the manufacturing supply chain

Recent literature suggests that the process of fragmentation and global dispersion of firms' value chains has entered into a new paradigm shift based on a network of inter- and intra-firm relationships. Initially it has been advocated that all types of activities are potential subject to a shift to locations with the appropriate technological competencies, skills and knowledge to achieve the routine transactional tasks (e.g. Goldman et al., 1995; Adler et al., 1995). However, in retrospect, this shift is also applicable to more knowledge-intensive and proprietary tasks, including research and development (R&D) and innovation (Lewin & Couto, 2007; Kennedy & Sharma, 2009).

Such a change consists from a paradigm shift based on vertical integration, consisting of a well-integrated single firm with an intra perspective, to an enterprise management approach, involving effective collaboration of several SC actors (Fine, 1988; Boardman and Clegg, 2001; Davis & Spekman, 2004). The enterprise management perspective outlines that the collaborative strategies may consist from a selection of either a vertical integration (VIE) or an extended (EE) or a virtual (VE) or a defunct (DE) enterprise respectively (Binder & Clegg, 2006, 2007; Clegg et al., 2012; Clegg & Wan, 2013). As a result the SC set-up may either deploy VIE or else a mix of both a EE or VE or DE collaborative relationships with various SC actors in its inter-organisational approach, according to the Collaborative Enterprise Governance (CEG) concept, which outlines the continuum of the operations strategy, in line with the Dynamic Enterprise Reference Grid (DERG), to achieve competitiveness (Boardman & Clegg, 2001; Binder & Clegg, 2006, 2007; Clegg et al., 2012).

The enterprise term has been defined to cover all entities that through partnerships or associations are engaged in economic activities (European Commission, 2003). The extended enterprise is based on SC set-ups where SC actors work closely together to consolidate their operations and add value in their value stream processes (Davis & Spekman, 2004; Binder & Clegg, 2006, 2007; Clegg et al., 2012; Clegg & Wan, 2013). The virtual enterprise refers to SC actors which exploit all collaborative relationships which are more focused on temporary and highly agile relationships by being proactive and innovative to meet such added value (Binder & Clegg, 2006, 2007; Clegg et al., 2012; Clegg & Wan, 2013). The defunct enterprise refers to no engagement between SC actors at all (Ibid).

Starr (1984, p.22) argues that 'global networking is crucial for gaining the competitive edge' within manufacturing. Today, the competitive edge is based on how companies are capable to organize their FMS factories and discrete value-added activities on the global scale, which results in the emergence of global manufacturing virtual networks (Shi & Gregory, 2005). Such networks are made up from the production plant and other firms which build up the SC under a contractual collaboration. The SC tiers, forming the virtual manufacturing organisations' environment, consist of manufacturers and service providers to provide a holistic approach (Shi & Gregory, 2005). This new paradigm is enabling the manufacturing environment to incorporate a more integrated solution-based service, where firms within the SC act as 'system integrators' to meet the needs of each other (Shi & Gregory, 2005). Such system integrators also meet the customers' diverse and fragmented demands.

From the above theory there is the need to adopt a holistic SCM approach in today's competitive scenarios, based on a global manufacturing virtual environment based on a number of SC actors as service providers to each other. Such an approach is needed both to meet the demanding industry requirements and the customers' demands, which needs to be based on all entities capabilities and core competences, ranging from repetitive manual operations to more knowledge intensive tasks, to achieve a holistic collaborative approach so as to promote a win-win mindset.

2.5.3 The High Value Manufacturing supply chain

An extended definition of manufacturing has been developed by the Institute for Manufacturing (Livesey, 2006) which equates manufacturing to the full cycle of activities from research and development, through design, production, logistics and services, sales and marketing and to end of life management, within an economic, environmental and social context. This view is based on the approach that treats organizations as open systems with various management roles that in order to be successful have to interact with their environment.

A key distinction that this extended definition makes is that manufacturing and production are not the same. Production is but one activity of a manufacturing company. It may or may not be the defining activity of the company. For example, if a company has outsourced all of its production activities and is focusing on brand management or R&D, that company can still be a manufacturer. This definition is in-line with the new VE manufacturing paradigm.

High Value Manufacturing (HVM) is a relatively new concept that encourages the manufacturing sector to think about whole businesses and to consider a wider range of aspects, such as time-to-market, societal and environmental issues and a global strategy at a new level of focus (Livesey, 2006).

It has been defined that 'High value manufacturing is the application of leading-edge technical knowledge and expertise for the creation of products, production processes and associated services, which have strong potential to bring sustainable growth and high economic value' (Technology Strategy Board, 2012, p.10).

Such a HVM definition drives the need to establish business models to have superior value by managing the 'fragmented value chains including distributed manufacturing to support HVM' (Technology Strategy Board, 2012, p.5).

The use of SCM such as 'supply networks and value chains' are enablers of HVM and are a 'strategic and operational manufacturing management' (Technology Strategy Board, 2012, p.21). This leads to the importance of managing effectively the supply chain to act a sound platform for optimizing all manufacturing processes across all SC tiers up to the end customer.

This perspective leads to today's current theory that the manufacturing SC must be managed, through integration, collaboration and coordination as a single entity (Chan & Qi, 2003; Sanders, 2007). This enables that all players within the SC are to be linked to deliver the products at the right place and at the right time in the most efficient method (Copacino, 1997). Logistics is that part of the supply chain process that monitors and implements the flow of goods and information from the point-of-origin to the point-of-consumption in order to meet customers' requirements' (Bowersox, 1997, p.124). Logistics enables the integration and management of key business processes across the supply chain (Cooper et al., 1997) to remain competitive (Ragatz et al., 1997; Giunipero et al., 2005). Intermodal platforms requires efficient and flexible integration with the right consideration of technical, legal and commercial aspects and an integrated management throughout the SC to decrease logistics costs and improve on the service levels (Cambra-Fierro & Ruiz-Benite, 2009).

Most discussions about value-added, in the context of HVM, assume that value is added at each stage of a SC from raw materials extraction, production, assembly and sales and services to the end customer, with a build-up on the relationships between companies, customers and suppliers. Such a value may take two forms along the SC: use (i.e. subjective value based on all parties in the SC) and exchange value (i.e. transaction value between parties) (Bowman & Ambrosini, 2000).

Value is also seen as a function of all stakeholders both within the micro and macro perspective and may take basically three types: financial, strategic and social value (Livesey, 2006). Such value types capture all stakeholders' interests, which includes financial indicators, strategic competitiveness and all sustainable and corporate social responsibilities respectively. The theory of value extends quite broadly from a concept of price of a good to abstract units of measurement, that bring together a variety of fields, such as manufacturing, distribution, operations management, marketing, strategy, location selection, finance, energy efficiency and so on (Livesey, 2006). From a marketing perspective value is considered a driver of customer satisfaction (Woodruff, 1997).

From the above theory, such a high value-added manufacturing approach throughout all the SC tiers, includes a holistic baggage of challenges based on the full cycle of activities, which is in-line with today's HVM based SC and is needed to remain competitive.

2.5.4 The manufacturing SCM challenging perspective

SCM important role, within the industry, has been described by Lambert and Cooper (2000, p.65) by the stating that 'one of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as solely autonomous entities or brands, but rather as supply chains'. This statement is supported by various scholars such as Dyer (1994); Chopra and Meindl, (2001); Davis and Spekman, 2004; Fawcett and Magnan (2004); Patnayakuni et al. (2006); Binder and Clegg (2006, 2007); and Clegg and Wan (2013). Such a paradigm shift is also supported by Kovacs et al. (2003, p.166), where they stated that: 'Supply-chain management is one of the leading business process re-engineering, cost-saving and revenue enhancement strategies in use today'. This leads to the fact that the management of manufacturing is more complex since it has to deal with all the SCM roles (e.g. distribution, production and supply) and not only on the focal firm resources (Dyer & Singh, 1998).

The SC consists of both upstream and downstream tiers around the focal firm. The upstream tiers refer to all entities that supply the focal firm, such as suppliers, whilst the downstream tiers refer to all customers, distributors and other firms that are supplied by the focal firm. The importance of the downstream SC tiers is clearly demonstrated since 'Executives would want to manage their supply chains to the point of consumption, because whoever has the relationship with the end user has the power in the supply chain' (Lambert & Cooper, 2000, p.68).

From the above theory, SCM from a manufacturing perspective outlines that 'a one size fits all solution' does not exist to any group of SC actors forming a SC (Childerhouse & Towill, 2000, p.338), due to the various modes of processes to be managed within different contexts. SCM needs a complex management approach of all SC actors' processes forming up the SC network, so as to achieve the coordination of all resources and the optimisation of all activities across the SC to obtain competitive advantages (Gunasekaran et al., 2008).

2.5.5 Supply chain integration within SCM

SCI originates from the Value Chain Model (Porter, 1985) with linkages between the firm's value chain (horizontal integration) and that of suppliers and customers (vertical integration) to achieve superior performance such as low cost and high speed (Frohlich & Westbrook, 2001). Supply chain management (SCM) is defined as the integration of materials and information based activities through improved supply chain relationships, to achieve a sustainable competitive advantage (Handfield & Nicols, 1999). Early SCI efforts ended up to a vertical integration approach, but nowadays, with the advent of a more competitive environment, the SCs are being set-up on a relationship between different SC entities to promote greater flexibility, but without ownership of the SC entity, but through dedicated collaborative arrangements, such as partnerships with contractual obligations (Stonebraker & Afifi, 2004). The term partnership was defined by Ellram (1995, p.41) as 'an ongoing relationship between two organisations which involves a commitment over an extended time period, and a mutual sharing of risks and rewards of the relationship'. Koh et al. (2007) reinforces the role of the SCI concept, by the declaration that successful organizations must now integrate and collaborate with supply chain partners to maintain competitive advantage.

Power (2005) classified SCM practices under three perspectives, namely SCI, strategy and planning, and implementation, where:

(a) SCI covers issues relating to integration of core processes across organizational boundaries through improved communication, partnerships, alliances and cooperation which may lead to removal of barriers between firms, better decision making, more efficiencies between firms, better SC visibility, identification of bottlenecks, more trust and commitment between firms, increased outsourcing by focal firm, cycle time reduction, reduced inventory and shorter lead times due to real time communications based on IT, which all lead to reduce the operating costs and improvement in the customer service level.

(b) Strategy and planning examines supply chain management as a strategic matter for trading partners, along with factors relating to planning activities. The strategic approach for a manufacturing firm within the SC should be based on collaborative partnerships with suppliers, strong and direct relationships with customers and the coordination of disparate supply chain elements, without undergoing vertical integration, referred as virtual integration.

(c) Implementation issues concern factors critical for successful implementation, as well as issues specific to inter- and intra-organizational aspects of SC initiatives, such as staff involvement in the decision making, suppliers' involvement in the productivity measures, business processes optimisation and adoption of performance measurements (e.g. SCOR).

The virtual integration approach, referred by Power (2005) above, under the strategy and planning perspective, constitutes the SC paradigm shift from the traditional vertical integration approach to an innovative virtual integration approach. Within the SCM literature, vertical integration (forward and/or backwards) approach is a well established fact that any business takes to improve the performance of the firm through ownership of either upstream and/or downstream SC activities (Guan & Rehme, 2012). Nowadays the theory is focussing for the SC to deploy a virtual enterprise approach to optimize a global supply chain (Gunasekaran et al., 2008). This is in-line with the claim by Prahalad et al. (1994) where they stated that vertical integration is being replaced by virtual integration, where each firm within the SC concentrates on the processes that it performs best, leaving the rest to others. This approach is also substantiated by Magretta and Dell (1998, p.74) by stating that 'virtual integration [is a] means [where] you basically stitch together a business with partners that are treated as if they're inside the company'. Though, it is of pivotal importance that the entire process within the SC tiers is to be 'designed, managed and coordinated as a unit' (Bagchi et al., 2005, p.276). Furthermore, the enterprise management perspective, is also in line with the above, and outlines the various collaborative strategies based on vertical integration (VIE) or an extended (EE) or a virtual (VE) or a defunct (DE) enterprise respectively (Binder & Clegg, 2006, 2007; Clegg et al., 2012; Clegg & Wan, 2013), as referred in Section 2.5.2.

From the above theory it is deduced that SCI with its virtual integration approach and its value-added activities, forms up a VE made up from all the SC members which needs to perform effectively as a unit, to promote success and maintain competitive advantage, since the integrated management approach can reduce the negative effects associated with any of the SC members shortcomings (Simchi-Levi et al., 2000; Guillen, et al., 2007).

2.5.6 Supply chain integration strategic review

It is well established in the literature that the process by which management of a business evaluates the future opportunities and decides on any strategic action, in the long or short term, is referred as strategic planning. The objective of an integrated SC strategy is to synchronize the requirements downstream throughout all the SC tiers to reach a balance between high customer service and cost (Stevens, 1989).

The strategic perspective and importance of integrating suppliers, manufacturers and customers within the SC has been cited by various authors (e.g. Reck & Long, 1988; Power, 2005; Giunipero et al., 2005). Strategic action plans need to be generated based on the operations strategy specifications and then building on these plans, to design a set of performance measurements (PMs) across the SC tiers. The PMs are to be used to build a SC strategic performance management system to promote a learning and a continuous improvement approach. According to Neely et al. (2005), PMs are a set of metrics to quantify the efficiency and effectiveness of all actions. In view of the high levels of competition, the integration of all the business operations' activities and agents within the supply chain has become a strategic concern (Cambra-Fierro & Ruiz-Benite, 2009).

From the above theory a SC undertakes strategic planning and SCI as a strategic approach to synchronise all actions across the SC. Such a strategic approach with the right deployment of PMs, enable a SC group to quantify efficiency and effectiveness.

2.5.7 Supply chain integration theoretical underpinning foundations

The term 'integration' is defined as the 'act or process of combining two or more things so that they work together' (Oxford Dictionary, 2010, p.807) or as 'the unified control of a number of successive or similar economic or especially industrial processes formerly carried on independently' (Webster's 1966, p.1175). Integration was also defined as the 'quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment' (Lawrence & Lorsch, 1967). Such collaborative actions depend on the personal and cultural differences from one firm to another, since these determine the organisational climates in all interactions (Lawrence & Lorsch, 1967; McKinnon et al., 2003).

The SCI concept is widely deployed in practice and has been defined to have two underpinning variables: the degree and the direction of the shared activities between two or more actors (Frohlich & Westbrook, 2001). The degree has been defined by the extent (i.e. depth) of the integration, which has been further denoted by the term 'arc' of integration, with a continuum of narrow to broad state, to indicate the integration magnitude (Ibid). The direction has been defined on whether the integration is in the customer (i.e. downstream) or supplier side (i.e. upstream) or both respectively (Ibid).

Within the SC, the need for an integrated relationship between manufacturers and their supply chain partners is a well conceived requirement (Lambert et al., 1978; Hayes & Wheelwright, 1984; Watts et al., 1992). Empirical evidence shows that by integrating-specific internal supply chain functions, such as manufacturing and purchasing, will also lead to higher performance (Narasimhan et al., 2001; Stank et al., 2001; Frohlich & Westbrook, 2001; Flynn et al., 2010). In view of the above and from the extant literature, internal integration is a necessary step of the SCI process (Stevens, 1989; Rosenzweig et al., 2003; Vickery et al., 2003; Flynn et al., 2010). This is also substantiated by Pagell (2004), where it was advocated that a well-managed SC is then an integrated SC, since lack of integration indicates processes working at cross-purposes to reduce performance or else cases may exist when integration may be inhibited, if competition for resources among processes occurs within the organisation, that were ultimately serving the same end customer. Such an internal integration between different functional areas requires inclusive communication, joint accountability, strong working relationships and senior management involvement (Ellinger et al., 2006). The scope of the integration is to move from a traditional 'functional silos' approach to a more coordinated or concurrent approach, with both internal functional areas and external SC tiers working together (Pagell, 2004).

Integration has become a new core competence (Narasimhan et al., 2001), it increases value (Porter, 1985; Stank et al., 2001), and create the lowest total landed cost without sacrificing superior service (Stank et al., 2001), but requires separate parties to work together in a cooperative manner to arrive at mutually acceptable outcomes (O'Leary-Kelly & Flores, 2002), referred as a win-win situation.

Effective SCI involves mutual understanding, a common vision, shared resources, investments in the relationship and achievement of collective goals and integrated business processes which includes boundary-spanning activities by drawing suppliers and customers into the value creation process (Kahn et al., 1996; Tan et al., 1998) together with the focal firm, as the core of the integrated activities. Such an integration creates interweaved processes that cannot be easy replicated and as a result creates a competitive capabilities (Daugherty et al., 1998; Lambert et al., 1998; Ketchen & Hult, 2007; Swafford et al., 2008; Flynn et al., 2010).

Other researchers go on to argue that firms need to invest in their supply chain business processes and not only in information technology to perform effectively (Heinrich & Simchi-Levi, 2005). The SC must have integrated: the flow of information (Lee et al., 1997); physical materials (Stevens, 1990); and financial information (Mabert & Venkatraman, 1998) with its value chain trading partners. Such an action should promote less variability, better forecasts, better lead times and an improved customer

service with information flow (Simchi-Levi et al., 2004), promote cost savings and improvements with improved products flow (Malhotra et al., 2005) and better cash flow through workflow systems for monitoring all financial information (Malhotra et al., 2005).
SCI is considered to consist of a comprehensive collaboration among supply chain network members (Bagchi et al., 2005) and also as a source of leverage of resources and knowledge from suppliers (Fawcett & Magnan, 2004). The collaboration concept is defined as an 'interactive, constructive and knowledge-based process' leading to synergy (Hartono & Holsapple, 2004). High interactivity leads to innovation within the three areas of collaboration: 'across departments, within a department and inter-firm networks' (Maccoby, 2006). Literature also includes that collaboration facilitates streamlining of operations across the supply chain by 'replacing inventory and excess capacity with accurate information' (Taylor, 2004). According to Ajmera & Cook (2009), the drivers of collaboration are: responsiveness to variability, resource sharing, cost, and joint decision-making.

From the above theory, SCI is about collaborating firms who achieve economies of specialization through the SC, by exploiting the core competencies of all SC actors to optimize operations through a VE approach (Dyer, 1994; Cox, 1999; Lambert & Cooper, 2000; Fawcett & Magnan, 2004; Bagchi et al., 2005; Ketchen & Hult, 2007; Koufteros et al., 2007; Gunasekaran et al., 2008) instead of working alone. Schoenherr & Swink (2012, p.110) defined 'a theory of integration, i.e. a confirmation of the significant benefits that firms can realize by being strategically interconnected and aligned with their supply chain partners'. SCI results in streamlined processes and leverage of resources from all SC actors to promote higher performance and competitive capabilities (Pagell, 2004).

2.5.8 Technology deployment: SC information systems (ISs) and manufacturing processes

To date studies have suggested that high levels of coordination between organisations, which are necessary for improved supply chain performance, demand high levels of integration between partners' information systems (White et al., 2005). Such information sharing facilitates joint-decisions synchronisation across the SC to improve on the business performance (Simatupang et al., 2004).

Nowadays, IT is transforming the industry and quite recently, with the advent of innovative and diverse technological based applications, it has become feasible for firms to have the access to information that is accurate, timely and affordable (Bowersox & Calantone, 1998). The internet-enabled supply chains have become powerful strategic weapons due to their unparalleled integration of information among partners at relatively low transaction cost (Sanders, 2007), which also enables organizations to integrate different legacy systems (Muffatto & Payaro, 2004). Nowadays the e-mail, containing text and cad files, trading documents, etc, has streamlined the SC operations, bridging the constraints associated with time and distance. Christopher (2000, p.38) substantiates the use of IT, by stating that it is 'creating a virtual supply chain. Virtual supply chains are information-based rather than inventory-based'. This argument is reinforced by Dell (1999, p.33) where he outlined that the 'new eBusiness technologies facilitate quick information sharing between downstream and upstream partners and enable companies like Dell Computer to trade inventory for information'.

Such an IT platform facilitates and meets effectively the SCI virtual enterprise approach (Gunasekaran et al., 2008). IT promotes value-chain transparency by allowing companies to reposition themselves in the chain and dynamically collaborate with companies to optimise their business position (Shi & Gregory, 2005; Cassivi, 2006). The contribution of IT within manufacturing extends beyond the role of providing an information systems, since it directly assists people in performing certain tasks or replaces them by doing the tasks that they once performed, through the use of advanced manufacturing technologies, through the use of productive tools (Gunasekaran & McGaughey, 2002), such as CAD, CAM, CIM and FMS. Though it is to be kept in mind that 'Collaboration is a result of human interactions which can only be supported by IT, one of which are e-business technologies, but not replaced' (Sanders 2007, p.1343).

White et al. (2005, p.397) state that 'the agility paradigm is the ability to form deeply integrated links with a wide range of trading partners and be able to quickly dissolve these and reform such deep linkages with new partners as required by changing market conditions'. Such an agility paradigm is enabled by agile information systems (White et al., 2005). The agility in SC can be defined as 'a business-wide capability that embraces organisational structures, information systems, logistics processes and, in particular, mindsets' (Christopher & Towill, 2002). Such SC agility, within a manufacturing context, is also substantiated by Gunasekaran et al. (2008) which is said to improve on lead times and cut on costs across all SC activities.

Inter-organisational systems (IOS) are used to transcends organisational boundaries to communicate with all SC actors, by deploying various IT applications, such as electronic data interchange (EDI), electronic funds transfer (EFT), ISs and SCM systems (White et al., 2005). IT, through dedicated ISs, is making such an enterprise management a technical reality to promote a competitive edge (Rodon et al., 2011; Clegg & Wan, 2013). The traditional ERP, referred as ERP I is undergoing a paradigm shift from a single organisation management approach to an inter-organisational collaborative environment based on e-commerce and web base technologies, referred as ERP II (Eckartz et al., 2009; Clegg & Wan, 2013). Such technology deployment (e.g. EAI, SOA and SaaS) is also supporting agile manufacturing (Banker et al., 2010).

One cannot exclude to mention the 'IT paradox' (Brynjolfsson & Yang, 1996) or 'productivity paradox' which still exists within the people's mind (Lim et al., 2004; Sriram & Stump, 2004).

Numerous explanations have been offered for this lack-of-productivity paradox (Sanders, 2007), since IT does not only always meet the expected benefits (Stratopoulos & Dehning, 2000).

From the above theory, ISs and IT applications are enabling information integration across the global markets and are also improving on manufacturing processes efficiencies and effectiveness. IT enables a virtual SCI environment, with the possibility of deeply integrated links, such as web based IOS. Such technology deployment promotes also SC agility in line with agile manufacturing, to meet the competitive market conditions and improved performance, but still does not replace the role of the human element.

2.5.9 Supply chain (SC) integration literature gaps

A coherent view of SCI and its measures has yet to be developed due to the different definitions between various scholars (Croom et al., 2000; Palomero & Chalmeta, 2012). SCI within the literature is rare (Pagell, 2004). Limited research has been conducted beyond the dyadic relationship or in parts of SCs containing smaller organisations (Cachon et al., 2007; Harland et al., 2007). SCI is still in its infancy (Harland et al., 2007). Research is quite limited to explain how to achieve SCI (Zhao et al., 2008) and how to determine the influencing factors of SCI (Flynn et al., 2010). Integration so far was associated with the operational processes without integrating the planning and design, so the returns have been limited (Ajmera & Cook, 2009). The development of models and approaches for an integrated SCM system will be a major step towards the optimization of SC priorities (Gunasekaran, 2004). Performance measurement is challenging because it is difficult to attribute performance results to one particular entity within the chain, both when the SC tiers are locally and globally (Hervani et al., 2005). There is a lack of investigation on understanding the SC measures which relates the objectives and motivations of various SC entities for the overall maximization of SC profit (Thakkar et al., 2009). Many conceptualizations of SCI are incomplete, leaving out the important central link of internal integration and also lacks a taxonomy of SCI that incorporates internal integration, as well as customer and supplier integration (Flynn et al., 2010). A holistic approach with a set of measures covering all SC actors (Holmberg, 2000) and how such processes can be coordinated within the focal firm and across the SC (Mentzer et al., 2001) are both lacking within the extant literature. This perspective is also substantiated by (Vickery et al., 2003, p.529), where they declared that ‘the literature lacks a holistic theoretical framework’ on SCI.

2.5.10 Information technology literature gaps within the supply chain context

Some firms have successfully integrated eBusiness technologies into their traditional bricks-and-mortar business models, but others still struggle to implement and justify eBusiness initiatives (Devaraj et al., 2007). Our knowledge is especially weak concerning modern internet-based integration in all sectors (Bowersox et al., 2000; Frohlich & Westbrook, 2002). There is lack of empirical evidence on eBusiness technologies impact on performance within the context of SC (Devaraj & Kohli, 2003). To date there has been little empirical research within connected supply chains containing SMEs exploring larger and smaller firms' perceptions of the value of supply chain information integration (Harland et al., 2007). The payoff on SCM from IT investment has been referred as the 'IT paradox' or 'productivity paradox' (Freeman & Soete, 1990; Brynjolfsson et al., 1996; Lim et al., 2004).

2.5.11 The tentative research question

There is an extensive research on SCI and as a result this literature review has been focused on various parts of the SC since the researcher was not in a position to walk through all the diverse definitions and theories of SCI, due to the complexity and broadness of the discipline. Furthermore, this literature review is also supported by an overview of the **literature gaps** from a SCI and IT perspective (Sections 2.5.9 & 2.5.10) and also from the **systematic evaluation** of set of papers from the extant literature in a tabulated format, as referred in Appendix 2.

As a result the literature gaps outline that the extant literature lacks a comprehensive study on the key concepts that establish the intra- and inter-holistic SCI management approach. The evaluation of the set of papers (Appendix 2) provides a wide spectrum of the literature from which it is identified key four significant concepts building up SCI within the manufacturing sector that promote SC competitive capabilities. The identified four concepts are: information integration, strategic integration, strategic collaboration and information technology, as the independent variables, together with operational and financial performance measures, as the dependent variables that constitute the SC competitive capabilities. It is to be noted that these significant concepts are defined by several dimensions by undertaking a content analysis of all the studies, as referred in Appendix 2, so as to promote an in-depth level of understanding of SCI to assist the researcher to build on his theoretical sensitivity on the phenomenon in line with the GTM (Chapter 3).

As a result the outcome from such a literature review enabled the researcher to achieve two objectives:

(a) The formulation of the research question.

The research question that guides the study and supporting objectives is the following two-part question. First, which are the characteristics needed to achieve SCI within SMEs in the Maltese manufacturing? Second, which are the key factors that constitute SCI that promotes competitive performance within SMEs in the Maltese manufacturing?

(b) The design of the first open ended interview guide, as referred in Appendix 3.

2.5.12 Summary of the a priori literature review

The manufacturing SCI strategy should capture the internal integrated firm, together with the customers' and suppliers' external to the focal firm, beyond the dyadic relationships. Within the manufacturing sector, it is a well conceived requirement, that nowadays, to stay in business there is the need for an integrated strategic relationship between various firms and not to operate as autonomous entities (Dyer, 1994; Cox, 1999; Lambert & Cooper, 2000; Fawcett & Magnan, 2004; Bagchi et al., 2005; Ketchen & Hult, 2007). An integrated SCM operations strategy, design and implementation are defined by the term SCI. The extant literature from a cross disciplinary approach, based mainly on SCM, SCI and IT within the manufacturing context, reveals that SCI is depends on internal integrated efforts within each firm (i.e. internal integration) and all integrated activities across all firms (i.e. external integration) to leverage resources and knowledge (Fawcett & Magnan, 2004; Flynn et al., 2010). SCI ideally breaks down all functional 'silos' within and across the firms (Pagell, 2004; Stonebraker & Afifi, 2004).

A manufacturing SC is not about production but covers all the value-chain activities of the focal firm and all other firms building up the suppliers and customers' networks (e.g. OEMs, sub-contractors, third-parties, distributors and end-customers) within a context to meet the sustainability challenges (Livesey, 2006; Bayraktar et al., 2009). The new emerging manufacturing paradigm, is being referred to as HVM and is being based on distributed firms performing a full cycle of activities, such as R & D, innovation, production, distribution, advertising and customer support, around the globe, leading to the virtual enterprise (VE) concept (Livesey, 2006; Martinez et al., 2008). This management paradigm shift incorporates a change from vertical integration to virtual integration (Prahalad et al., 1994; Power, 2005; Gunasekaran et al., 2008), based on unity of efforts, to optimize the use of all core and distributed resources to form a single holistic SC. The manufacturing sector is also focussing on an ever changing improved automation and efficiencies, to produce with lower amount of people and lower costs, in-line with the globalised economy requirements (Droge et al., 2004; Gunasekaran, 2004). This new industry environment is being driven by a context having dynamic customers' needs with various other competitive SCs and a scenario based on a set of challenges, such as social, environmental, economic and legal responsibilities, regulations and standards compliance and stringent and turbulent economic conditions.

Such a new paradigm requires organisations to adopt a more decentralised management approach to focus on the individual competences and outsource others (Sink & Langley, 1997). At the same time all firms need to employ all strategic efforts to collaborate with all SC members, to achieve the pull SC strategy approach, originated by customers in line with the pull-SC management approach (Kros et al., 2006; Green & Inman, 2007; Lambert, 2008). Such a strategic stance is attributed to lean and agile manufacturing, which promotes agility, flexibility, adaptability and responsiveness in all operations but also maintains cost effective solutions and quality (Yusuf et al., 1999; Sanchez & Nagi 2001; Yusuf & Adeleyei, 2002; Sherehiy et al., 2007; Gunasekaran et al., 2008). Though, it is to be noted that the shift to lean and agile manufacturing is primarily attributed to a cumulative build-up of the individual resources of all the firms, within the intra- and the inter-enterprise (Binder & Clegg, 2006, 2007; Clegg et al., 2012), to focus on improvement mechanisms, not only to eliminate waste, but also to promote flexibility and responsiveness across the SC (Gunasekaran et al., 2008; Clegg & Wan, 2013).

One of the key drivers of this change associated with lean and agile manufacturing is technology based on the internet platform to promote open technology based systems (Metcalfe et al., 2002; Muffatto & Payaro, 2004; White et al., 2005; Sanders, 2007). Such a change is promoting an IT integrated solution based service approach, to build and integrate the current and various legacy information systems, through systems integration, which is being deployed by each member within the SC. The technology driver is enabling the possibility for a high level of integrated information systems between all SC tiers to enhance all collaborative efforts (e.g. CPFR and VMI) (Maccoby, 2006; Baratt, 2004). This is also leading to information integration based on a high SC visibility and transparency (e.g. to minimize the negative effects from the bull-whip effect) and to meet the demanding trend of the agile and lean manufacturing concepts, by replacing inventory for information (Kearns & Lederer, 2003; Wang & Wei, 2007; Gunasekaran et al., 2008).

This level of integration within and across the SC is promoting effective and efficient operations with synchronised and real-time joint decision-making (Bagchi et al., 2005; Ajmera & Cook, 2009; Kim, 2009). The investment in IT based systems by all SC actors are sustaining the information-based virtual SC environment, which is in-line with the VE manufacturing environment (Christopher, 2000; Wang & Wei, 2007; Gunasekaran et al., 2008) together with the use of advanced manufacturing technologies (CAD, CAM, CIM and FMS) (Droge et al., 2004; Gunasekaran, 2004). It is a well conceived fact that IT, as a stand-alone resource does not create the edge in operations, but the mix of the components parts of the organisation human competences and all processes with IT, is what dictates IT value (Sanders, 2007). All these synergies between SCI and IT deployment, within the manufacturing context, are leading to the value-added concept, which is a cumulative build-up by each SC member, through strategic, financial and social value (Shi & Gregory, 2005; Livesey, 2006). To meet such a design and development of new products and services within the VE manufacturing environment, needs a technological based infrastructure, such as enterprise resource planning systems (ERPs), for leveraging organizational competitiveness. The ERP centralised approach, which is focused on the individual firm, needs to be transformed through a distributed approach (Rupp et al., 2000; Kovacs et al., 2003; Clegg &Wan 2013), to enable the optimisation of the globalised SC, by adopting integrated based application software, based on a cloud-based SC environment (Metcalfe et al., 2002) or else on an enterprise application integration (EAI) systems to have interoperability between the multiple disparate systems (Loh et al., 2006). Interconnected ERPs through the VE environment using IT, would enable leaner production (Newell et al., 2003) and provide information visibility and supply chain flexibility, being the major advantages provided by IT support to achieve SCI (Wang & Wei, 2007; Gunasekaran et al., 2008; Clegg &Wan 2013).

2.6 The post literature review associated with the emerged theory

The post literature review is needed since the *a priori* literature review is based on a broad perspective on SCI theory within the extant literature and not focused on the emerged theory from the data. The role of the post literature review is used as a literature based platform for Chapter 7, since the latter chapter is used to integrate the emerged theory within the extant literature, as referred in Section 3.9. Though, it cannot be excluded that reference is also made to sources within the a priori literature review, so that Chapter 7 can fulfil its objective with a more comprehensive approach.

The core emerged theory from the substantive area, is based on a core theme and all of its five main themes and the set of sixteen sub-themes, as referred in Table 5.1. The post literature review objective is to systematically review the literature from the perspective of the emerged theory, by selecting the relevant scholarly work associated with such emerged themes, in a theme-by-theme approach, as referred in Section 2.6.2 below. To make this chapter more manageable, all the themes are included within this chapter but the other sixteen sub-themes, are referred in the Appendix 4. Finally, it is also established the literature gaps, focused on these four themes based on the extant literature: leadership; supply chain integration; sustainability; and manufacturing respectively (Section 2.6.10).

2.6.1 The outline of the post systematic literature review

The post literature review keywords used for the systematic literature review are based on the emerged themes. The main keywords are ‘supply chain’ AND ‘integration’, which was logically operated with a dedicated sequence of searches with an ‘AND’ logic with technology, manufacturing, leadership, strategy, management and holistic terms respectively. Further on, within such a systematic literature review, further keywords are used to cover all sixteen sub-themes as emerged under the holistic SCI management approach, obtained from Section 6.3.6 and listed in Section 2.6.2 below. To ensure that the literature review covers a substantial number of papers which are relevant to the emerged theory, other keywords that emerged from this literature review itself, such as ‘partnership’; ‘power’; ‘dominant players’, are also included in the search, under the same logic referred above, to enrich the scholarly work on the SCI phenomenon. Throughout the systematic literature review, attention is also given to the papers ranking quality in area of OM and SCM, as referred in the Academic Journal Quality Guide by Harvey et al. (2010), to promote a high level of research quality.

Initially, this literature review includes a cursory analytic approach on a substantial number of papers that are found in the search, so as to classify their relevance, after going through their abstracts and contents to confirm their suitability. A systematic content analysis is then performed on a number of such selected papers to derive a rigorous review of the literature, which is initially broad but thorough and becomes more focused, to be relevant to the emerged theory. Further papers need to be selected during the papers’ content analysis, from a substantial number of selected papers, due to their relative importance to the research focus, so as to enhance the literature synthesis quality, by including all the relevant and valid original sources, such as seminal works on each respective theme. Furthermore, the literature review also includes a special focus on the latest papers that are published in 2014/15 and those to-be published in 2015 to make reference to the latest contemporary research.

2.6.2 Overview of all the themes within the emerged theory

The study emerged substantive theory, is based on the core theme, together with a set of other five (5) main themes and sixteen (16) sub-themes. All the themes emerged from the substantive theory which are used in the systematic literature review are:

The core theme: **Integrative Management and Leadership Approach** (IMLA).

The six Main themes: **Business Strategy; Manufacturing Strategy; and Supply Chain Strategy; <u>Holistic SCI management approach</u>; and Technology deployment**; and **Competitive capabilities**.

The sixteen sub-themes under the **<u>holistic SCI management approach</u>** are: lean management; managing quality and sustainability; managing performance measurements; auditing operations; supply management; managing cash-flow; managing change and innovation; managing collaboration; managing culture; managing knowledge; managing customer service; managing information sharing; managing logistics; planning/forecasting; managing risks and managing trust.

2.6.3 The core category: Integrative Management and Leadership Approach (IMLA)

The concepts building up the emerged core category/theme, are referred as the Integrative Management and Leadership Approach (IMLA), namely it includes the 'leadership' and 'management' conceptual elements. From the data, the integrative management role is to integrate all people through the established organisational practices according to the planned objectives through a process approach to reach the necessary performance targets, both within and outside the focal firm. Similarly, the integrative leadership role shifts to a broader approach to meet organisational objectives by transforming and inspiring people, through an effective leadership approach, so that the business becomes innovative, empowered and adopts a dynamic approach based on a culture of teamwork, so as to create outstanding performance, both within the focal firm together with all of its stakeholders. Both the above concepts, together with all the other emerged concepts, emerged from the substantive theory, as referred in Section 2.6.2 above and in Table 5.1, are now reviewed in the literature.

2.6.3.1 The management concept synthesis within the IMLA core category

2.6.3.1.1 The management timeline

Management in the 20th century period has mainly been associated with a hierarchy of managers with a **formal organisation set-up**. The management theory passed through several phases between concern for production and concern for people. It started with the scientific or classical management approach, whereby Taylorism and Fordism movements advocated that there exist a set-of rules and procedures under a rigid hierarchy and with a division of labour with a top-down level of control with a mechanistic structure to achieve **efficient operations** (Kinicki & Williams, 2003). Henry Fayol identified the administrative model based on key management functions of **planning, organizing, leading and controlling** (Kinicki & Williams, 2003). Such an approach led the way to bureaucracy (e.g. Max Weber's concepts) which was associated with a formal organisation approach with clearly defined hierarchical structures with defined responsibilities at all levels that promoted rigidity and a lack of flexibility in the management approach (Mullins, 2005). The next management phase was more focused on the **human relations approach**, which generated a focus on the human social and psychological aspects, such as **motivation** (e.g. Maslow's hierarchy of needs) and **empathy** for the human element to promote empowered initiatives (such as the informal organisation), with an organic structure to promote performance improvements (e.g. Elton Mayo; Mary Parker Follett, Herzberg and McGregor). Then, the system theory followed, whereby managers need to view the organisation as a whole system with a number of sub-systems and where the system is located within an external environment. Such a system theory referred that for an organisation to be a success needs to adopt an

open system approach, to demonstrate the importance that an organisation needs the interaction of both the internal and the external environments for it to be effective (Von Bertalanffy, 1969).

2.6.3.1.2 The management role

The above management theoretical timeline is very simplistic but is presented to show the basic key principles from the seminal works behind the management theory. The management theory clearly outlines the need of managers to **manage effectively and efficiently** to meet both the **financial and human element** perspectives. It cannot be excluded that the way forward to date still makes reference to such classical management frameworks.

To-date, the role of management is to achieve objectives through people with some form of an organised structure, which tends to ensure that the **human element** is more **flexible and empowered** to **adapt to changes** due to the dynamic environment. The managing change approach was referred by Kurt Lewin (1951), where he derived the theory that explains the process of change management with a three stage model: unfreezing the current process; change to a new process; and freezing at the new level. From then on, the concept of change management has been embedded in various scholarly works associated with management of operations to promote radical (transformational) or incremental change (Johnson & Scholes, 1999; Kadar et al., 2014).

The management role is to make things happen, by developing people and reaching objectives to achieve results through people (Crainer, 1998). The role of the employees and the managers is also substantiated by one of the management gurus who stated that: 'Management is tasks. Management is a discipline. But management is also people. Every achievement of management is the achievement of a manager. Every failure is a failure of a manager' (Drucker, 1979, p.14). Management is not a label to a person but it is all about the activities to be performed, the authority and the responsibility (Mullins, 2005). The manager needs to manage complex and sometimes ambiguous situations making the management discipline to be not only a science but also an art (Watson, 1986). Furthermore, Drucker (1977) outlined that the manager, apart from **meeting the objectives, productivity and social responsibilities**, must also establish measurements on the individual and the organisation to **monitor performance improvements and optimisation** (e.g. performance measures, best practices and benchmarking).

2.6.3.1.3 SCM perspective

From the perspective of the SC, Lambert et al. (1998, p.5) identified that to ‘integrate and manage all process links with all members across the supply chain, in most cases, be counter- productive, if not impossible’, and that it is critical to identify the SC members who shall be ‘allocated managerial attention and resources’. They further added that ‘integrating and managing all business process links throughout the supply chain is likely not appropriate’ (Lambert et al., 1998, p.7). They also advocated that the management of the business processes are to be classified into four approaches: managed; monitored; not managed and non-members. This perspective outlines that **some processes need to be integrated and managed but others just monitored** (e.g. audited) and the other two approaches, undertakes business as required with no integration and management at all. They further postulated that the ‘lack of intercompany consistency is a cause of significant friction and inefficiencies in supply chains’ (Lambert et al., 1998, p.9), which justifies the **need for SCI initiatives**. Though, it was clearly outlined that a decision needs to be taken to identify which ‘key business processes need to be integrated and managed’ (Lambert et al., 1998, p.11).

The SCM processes, as shown in Figure 2.1, are classified into two groups: ‘physical and technical management components’, which are tangible, and the ‘managerial and behavioural management components’, which are less tangible and visible, where the latter group determines the implementation of the former group to promote competitiveness (Lambert et al., 1998, p.11). The SC members need to focus on the management for the common good of the overall SC, so as to promote holistic optimised performance, even if there is the need to sub-optimise their individual performance (Cooper et al., 1997).

Figure 2.1: SCM processes two key components (Source: Lambert et al., 1998, p.12).

In fact, there is a **SCM paradigm shift** regarding the managerial and behaviour components, referred above, from a platform based on differentiation (i.e. specialisation of functional areas), untrusting attitudes, centralized decision-making, narrow and mechanistic tasks with untrained employees, to a new platform based on integration (i.e. formalization/collaboration), systemic trust, distributed decision-making, and broader and more participative, organic structures through continuously trained employees (Stonebraker & Afifi, 2004). The role of people with the right human resource management, within the SC context, is crucial to the success of the SCM approach (Ashby et al., 2012; Ellinger & Ellinger, 2014). Such a new paradigm implies that SCM is multifaceted, dynamic and highly complex, since there are instances where integration is useful but in other situations it is to no avail and where it varies from **short term adversarial to long term relationships** (Stonebraker & Afifi, 2004). Though, it is a generally accepted notion, that there is the need for **process improvements and an effective management approach** of all the intra- and inter-organizational processes across the supply chain (Flynn et al., 2010).

The management role within the SC context is to ensure that all SC members, especially buyers and suppliers, through operational linkages need to have in place 'the systems, procedures and routines that facilitate the more effective flow of goods, services and information'(Cox et al., 2003, p.137). Furthermore, they also added that such linkages 'can extend beyond a single dyadic relationship and operate across many exchange partners within the supply network' (Cox et al., 2003, p.137).

2.6.3.1.4 The summary of the management concept from both the focal firm and SC perspectives

In summary, managing an organisation refers to a **formal organization structure**, which has been defined as: 'the planned co-ordination of the activities of a number of people for the achievement of some common, explicit purpose or goal, through division of labor and function, and through a hierarchy of authority and responsibility' (Schein, 1988, p.15). Management occurs at all levels of the organisation within the command chain and there is the need for technical and social skills and also conceptual capabilities (Katz, 1974). Within the contemporary management literature it is pivotal to have cross-collaborative initiatives between people within the formal organisation set-up and also the acceptance of the **informal organisation structure**, that further breaks down the presence of any silo between people to promote teamwork and performance improvements (Stonebraker & Afifi, 2004). From a SC management perspective, the management approach to be adopted by the focal firm needs to include all the SC members, **beyond the dyadic members** (Cox et al., 2003), through all the necessary **dedicated collaborative initiatives** depending on each SC member role, since the SC needs to be managed from a holistic approach. The roles of **planning, organizing, leading and controlling operations** remain the core elements of the management functions, but nowadays such elements are taking different forms to meet the dynamic and complex changes together with the introduction of the ever changing technology based applications.

Managing change and innovation are both crucial in today's challenging business environment due to such dynamic scenario in the manufactured products and processes being deployed to meet the competitive market and the demanding customers' expectations with a level of **flexibility and responsiveness**. Nowadays, managing effectively is not only considered from both a **social** and an **economical perspective**, in line with the classical management approach, but also needs to cater for an **environmental perspective**, by employing environmental friendly measures and 'green operations' to promote environmental sustainability in line with the 3BL sustainability (Elkington, 2002; Bojarski et al., 2009; Buyukozkan & Berkol, 2011; Ashby et al., 2012; Gimenez et al., 2012; Lee et al., 2012; Caniels et al., 2013; Glover et al., 2014).

2.6.3.2 The leadership concept within the IMLA from the focal firm perspective

2.6.3.2.1 The leadership timeline

In the late 1960s and 1970s new emerging theories about the central role of people within the organisation led to the distinction between management and leaders. This divide is also debatable to-date, but it had driven managers to accept the facts that leaders need to align, involve and motivate people, whilst managers need to plan, organize and control people (Levine & Crom, 1994; Rue & Byars, 2005). In the **industrial era**, the leadership theories focused on the **individual leader** (Gronn, 2002), based on the tripod ontology resting on three main pillars of leadership theories: leader, follower and common goals (Bennis, 2007). Northouse (2007, p.3) defined leadership as a leader-to-follower relationship based on a 'process whereby an individual influences a group of individuals to achieve a common goal'. The literature clearly advocates that effective leadership contributes to organisational performance and competitive advantage (Avolio, 1999; Bass, 1990; Yukl, 2002; Ardichvili & Manderscheid, 2008). Effective organizational leadership vis a vis the organisational performance, employees and customers, is a determining factor for the success or failure of any business (Xu & Thomas, 2011). The human element, apart from the commercial element, is a crucial factor within the global business so as to have the right people with the appropriate skills and talent (Rothwell, 2002; Tarique & Schuler, 2010; Xu & Thomas, 2011).

2.6.3.2.2 Strategic leadership/shared leadership against individual leadership

As advocated by McCauley-Smith et al. (2013, p.85;99) within the educational sector, an effective leadership approach needs a shift from an '**individual leadership**' stance based on a dualistic or dyadic nature, to an '**integrated leadership**' based on empowerment across the 'organisation structures' and by 'sharing of good practice through an interdependent leadership approach'.

The contemporary leadership literature, within this **knowledge era** (Uhl-Bien et al., 2007), due to the current competitive environment, is driving an increased awareness for corporate intelligence (McKelvey, 2001) so as to promote learning and exploit all organisational stakeholders' contribution for performance improvement. Such a current leadership approach is ideally focused on a collective leadership or **shared leadership** approach and not based on a **single individual** (House & Aditya, 1997), which is referred as connected leadership (Martin et al., 2007). This means that the current business scenario shall be based on leadership at all management levels (O'Reilly et al., 2010). Such a strategic leadership approach is inferred to be based on absorptive capacity (i.e. ability to learn), adaptive capacity (i.e. ability to change) and managerial wisdom (i.e. ability to understand all social actors) which all contributes to both strategic leadership and organisational effectiveness (Boal & Hooijberg, 2000).

Strategic leadership, within the strategic management literature, refers to a leadership approach within the organisation that shifts beyond the dyad set-up to a relationship across different organisations (Hunt, 1991; Finkelstein & Hambrick, 1996) which is referred as a macro perspective. Whereas supervisory leadership is a sub-set of strategic leadership since it primarily focuses on the dyad relationships and on the organisation lower levels tasks and individual performance (House & Aditya, 1997), which is referred as a micro perspective. Other leadership theories, such as transformational leadership among others, have built the set of leadership portfolio who emphasize the interpersonal processes between leaders and followers (Boal & Hooijberg, 2000).

2.6.3.2.3 Transformation leadership trait

Transformational leadership drives the followers to see the deeper purpose in their work, treats them as unique and valuable human beings, and instils in them a belief in what the leader is trying to achieve (Ardichvili & Manderscheid, 2008). The transformational leadership is based on engagement of both the leader and the follower/s to promote motivation and commitment to perform effectively. Such a transformational leadership approach produces powerful outcomes (Wang & Zhu, 2011). Bass & Avolio (2000) outlined the five basic components of transformational leadership: idealized attributes, idealized behaviours, inspirational motivation, intellectual stimulation and individualized consideration.

These five components advocated by Bass & Avolio (2000), which are also referred as the 4 I's, are defined as follows: **'idealized influence (attributed)'** develops a relationship between the leaders and the followers attributed to the charisma of the leader, based on the leader's moral attributes such as ideals and values; **'idealized influence (behaviour)'** considers their followers' needs before the leader's needs, with a collective concern focussed on values, beliefs with a moral and ethical concern for all decisions; **'Inspirational motivation'** provides a motivational element for the individual and the organisation with a challenging approach to all problems; **'Intellectual stimulation'** encourages followers to adopt an innovative approach by heuristic methods to discover new ways of doing things; and **'Individualized consideration'** refers to particular concern to the individual needs and individual development.

The above five elements comprises charismatic and ethical leadership values from the idealized influence attributed and behaviour and also from the inspirational motivation components (Kreitner et al. 1999), which together promote social responsible business practices, which are pivotal in today's institutional environment to promote social sustainable operations. The human element plays also a key part from the individualized consideration component, in line with the servant leadership style. Though, it cannot be underestimated that new emerging forms of leadership are focussed on leadership and power sharing respectively, to promote empowerment in a decentralised leadership approach, as McCauley-Smith et al. (2013, p.85) advocated that: 'New organizational forms, in particular, those of a collaborative nature, imply a sharing of leadership and an espoused sharing of power enabled and facilitated through empowerment and disbursing of prior centrally controlled leadership behaviors'.

'Power has been defined as 'the ability of an actor to influence another to act in the manner that they would not have otherwise' (Emerson, 1962, p.32). This is leading to the need of the integrated leadership concept, with a shift from **individual leadership** to **interdependent leadership** style (McCauley-Smith et al., 2013). Such a stance is creating a leadership mechanism which is shared and not focused at the top levels but is distributed at all management levels, which is referred as distributed leadership structure (Carson et al., 2007), where people across the organisation structure, through a cross-functional approach, are involved in decision-making, build on common values and beliefs and also share common practices to keep the 'big picture' always in mind. Such a distribution of leadership and power is also substantiated by Deming (1986, p.54), where it was stated that 'Management must adopt and institute leadership at all levels of organisation'. To view the individual leadership power and its influence over the interdependent leadership in the right perspective, the extant literature clearly indicates the pervasive influence of the leading role of top management (i.e. individual leadership style) on all the people across all management levels (Tsui et al., 2006; Ling et al., 2008).

2.6.3.2.4 Servant leadership trait

Greenleaf (1970) also introduced the concept of the servant leadership with his foundational essay, named as 'The Servant as Leader', where his theory advocates that a leader's primary motivation and role is that as a service to others, where he stated that: 'The great leader is seen as servant first, and that simple fact is the key to his greatness' (Greenleaf, 1970, p.2). The **Servant Leadership style** (Greenleaf, 2002) is another key theory of leadership focused on the leader's approach, where its premise is based on the **distribution of power to followers**, which goes a step further from the transformational leadership 'individualized consideration' component, by giving a **deeper concern to the individual**, by considering also his/her self-actualization. Furthermore, in transformational leadership, the individual concern is used as a means to achieve effective performance, whilst in servant-leadership the individual is the aim of the leadership approach, assuming that such an employee relationship leads to the achievements of the goals (Smith et al., 2004).

2.6.3.2.5 Transactional leadership trait

The **transactional leadership approach** is the most pervasive used approach with a set of established objectives and tasks, as an exchange process between the superiors and the subordinates, based on **reward or punishment vis a vis performance** (Burns, 1978; Bass & Avolio, 1994, 2000; Bass, 1997). Such an approach may be useful in some cases but may rigidify and stifle improvement and innovation.

2.6.3.2.6 Situational leadership trait

The **situational leadership**, which falls under the umbrella of contingency theory of leadership (Fiedler, 1967; Lawrence & Lorsch, 1967; Thompson, 1967), was developed by Hershey and Blanchard (1969), who shifts from the leadership traits or behaviour to **contingencies of the situations**, and who advocated that there is no one best way to influence people, but different leadership styles are needed to meet each unique situations depending on the maturity of the followers. It is to be noted that the leader and the followers influence the micro conditions of the firm, as advocated by Liden and Antonakis (2009, p.1597), by stating that: 'the context of the organization is heavily influenced by individual characteristics of leaders and followers'.

2.6.3.2.7 The role of power and control in leadership: Empowerment and trust

Nowadays, in view of the demanding changes in the market, it is considered pivotal to have more effective measures of control through leadership. As a result such conditions are transforming leadership through a paradigm shift to decentralisation and empowerment (Gretton, 1995; Lucas, 2000; McCauley-Smith et al., 2013). This is substantiated by Obeng (2001, p.85) where it was advocated that 'Control is the hallmark of the Old World while leadership is a measure of the New'. The control element was already referred as one of the management key functions in Section 2.6.3.1.1. Though, one cannot exclude the fact that control is also considered as a common element in both the leadership and management concepts, since it is a measure of how people behaviour is influenced in the course of all actions. The **power concept** in leadership is the **key source of control**, where within a business it refers to the leader's power to influence people's behaviour (Mullins, 2005). As advocated by French and Raven (1968, p.259): 'The phenomena of power and influence involve a dyadic relation between two agents which may be viewed from two points of view: (a) What determines the behavior of the agent who exerts power? (b) What determines the reactions of the recipient of this behavior?'

Furthermore, the control over the employees' performance differs as a function of trust the employees perceive about their managers, where the more trust perceived, the less is the need for an exerted control and vice versa (Handy, 1993). Such a **level of trust** determines the **level of empowerment** adopted by the employee, since the level of authority allotted to each employee determines his/her level of autonomy and self-control adopted to decide and act (Mills & Friesen, 2001). The empowerment approach is used to decentralise the organisation, so as to improve its performance with the increase in the assigned authority and responsibility to all employees across the command chain, in a top-bottom approach, to promote greater flexibility and responsiveness (Rue & Byars, 2005).

The influence of any leader is function of the leadership approach adopted in the leadership process (e.g. transactional and transformational style), which in turn influences the employees for unity in actions. Furthermore, French and Raven (1968) identified five main sources of power to achieve the change: **reward power; coercive power; legitimate power; referent power; and expert power**. Such sources of power create a perception by the recipient (e.g. employee) to undergo a **psychological change depending on each power type** (e.g. reward power will give a perception in terms of reward; coercive power will give a perception of punishment in case of failure; legitimate power will give a perception in terms of the assigned role within the organisation; expert power will give a perception of the skills and knowledge possession; and referent power will give a perception of the identity associated with the person). The change within the recipient is associated with the employees' behaviour, opinions, attitudes, goals, needs and values and any other aspect from the psychological field (French & Raven, 1968).

Another power oriented classification which determines the level where decision-making occurs, is the based on **three leadership styles: autocratic, democratic and laissez-faire styles** (Mullins, 2005), where the democratic style focus on the group dynamics to share the power and promote teamwork mentality in all decisions and established management policies and procedures and not as it happens in the autocratic style, where the focus is on the leader, having an absolute control. On the other hand, the laissez-faire leadership style is considered as a passive approach due to the absence of leadership (Antonakis et al., 2003).

2.6.3.3 Leadership theories from the SC perspective

2.6.3.3.1 The strategic leadership approach across the SC

The main focus of the leadership approach in the previous review focused on the leaders and followers within an organisational context, but it excludes the wider contextual perspective to include inter-organisational systems, with both a national and international scope (e.g. Osborn & Marion, 2009), such as SC set-ups. This macro perspective falls under **strategic leadership**, which covers beyond the dyad set-up to a relationship across different organisations (Hunt, 1991; Finkelstein & Hambrick, 1996). The leadership approach, within a wider context, also needs to apply both soft (e.g. trust, commitment and attitude) and hard (e.g. contractual obligations, product design, process and information technology) skills between all SC actors, so as to collaborate together (Whipple & Frankel, 2000; Shub & Stonebraker, 2009). Such a leadership approach, which runs across the SC, is a challenging approach, since all SC members are independent entities, and not as it happens within the organisation based set-up with a direct command and control approach (Sydow et al., 2011) or as it happens under a merger or acquisition with established common managerial practices (Palmer et al., 1993). Though, from any form of leadership stance adopted by any SC member on each other, the power and leadership structure surely affects the level of commitment of SC members (Cooper et al., 1997).

From a SC perspective, it is postulated that 'when the leadership role is taken, a firm's internal business process can become the supply chain business process' to promote synergies across the SC (Lambert et al., 1998, p.10). From the research carried out by Lambert et al. (1998, p.8) it transpires that there is no need to manage effectively all the SC business processes, but it is advocated that at least the focal firm surely needs to **integrate the key processes** with particular selected SC members, which are referred as the 'managed process links'. Such an integrated management approach across the SC is a very challenging task since 'executives are striving to interpret and determine how to manage the company's supply chain network and achieve the potential of SCM' and also several measures need to be taken not ‘to waste valuable resources when supply chains are not integrated, appropriately streamlined and managed’ (Lambert et al., 1998, p.15).

2.6.3.3.2 The Leadership trait within SCM: A stakeholder theory perspective

For an effective SC set-up, from the perspective of the stakeholder theory, the leadership role within the SC context, need to classify all interactions between the focal firm and its stakeholders as either of a **primary** or of a **secondary importance** (Mitchell et al., 1997). Freeman (1984, p. 46) defined a **stakeholder** as ‘any group or individual who can affect or is affected by the achievement of the organization’s objectives’. For the focal firm to deploy an **effective management approach**, with all the relevant stakeholders, the stakeholder’s salience concept needs to be understood, which is defined as ‘the degree to which managers give priority to competing stakeholder claims’ (Mitchell et al., 1997, p.854). The stakeholder’s salience is based on the stakeholders’ classes, consisting from one or more of these attributes: ‘(1) the stakeholder's power to influence the firm, (2) the legitimacy of the stakeholder's relationship with the firm, and (3) the urgency of the stakeholder's claim on the firm’ (Mitchell et al., 1997, p.854).

Such a classification determines the approach to be taken by each stakeholder, which is based on the prioritizing of the social relationship according to the power type, the established requirements and the urgency of the request, to meet both static and dynamic commitments (Mitchell et al., 1997). Such a theory overlaps with French and Raven (1968) referent and legitimate power types, from the five sources of power, as referred above, but the stakeholder theory extends from a dyadic to multiple set of agents such as SC set-ups (i.e. a number of stakeholders).

Co and Barro (2008) builds on Mitchell et al. (1997)’s attributes and typologies of the stakeholder theory and provided a framework for analyzing stakeholder management strategies in supply chain collaboration to establish whether a **cooperative or aggressive collaborative strategy** is to be adopted in the relationship. The collaborative strategy selection depends on the joint function of self-perception (i.e. focal firm perceived relative power to the stakeholder), perception of others (i.e. level of importance) and group perception (i.e. group climate and efficacy) (Ibid). In view of these three perceptions a decision needs to be taken by the focal firm to establish which strategy from the two options (i.e. cooperative or aggressive) lead to the most fruitful outcome and at the same time build or sustain the established relationship by minimising the risk for the focal firm to be closed out from the collaborative arrangement (Ibid). It was established that when the level of trust among stakeholders is low, the focal firm may choose an aggressive strategy to collaborate effectively, whilst when there exist a level of interdependence, a perception of urgency and that benefits will be incurred, may choose a cooperative strategy to collaborate effectively (Ibid).

2.6.3.3.3 SC actors' power based relationships: The power matrix

The strategic relationships continuum vary from an **arm's length** (i.e. transactional based) to **close collaborative relationship** (i.e. partnership based) type (Cox et al., 2003; Chicksand, 2015; Cuevas et al., 2015). The **partnership concept**, between a buyer and a supplier, is defined by: 'an on-going collaborative relationship between two legally separate organisations, based upon a commitment to the equal sharing of the costs, risks and rewards derived from working together', which is normally adopted when both parties have either low or high power attributes vis a vis the power structure (Chicksand, 2015, p.10). In other instances, there may be the need to adopt a lower level of collaboration, referred as an arm's length, when the relationship between the two actors may have either the supplier or the buyer in the dominant relationship, meaning that both have different power attributes, referred as power differentials (Chicksand, 2015), as referred within the context of the buyer and supplier collaborative relationships types perspective in Section 2.6.3.3.4. The benefits incurred under a close collaborative approach or by a partnership include: 'lower transaction costs; improved management of complex purchases; dealing with contractual uncertainty; the acquisition of scarce resources; cost reduction and functional stability; improved business stability; and increased organisational legitimacy' (Chicksand, 2015, p.2).

Such a sense-giving approach for all the possibilities of different **power attributes**, is represented by the buyer and supplier power matrix (Chicksand, 2009), in Figure 2.2. Such a power matrix implies that for supplier dominance and/or independence relationship, the most appropriate sourcing strategy for the buyer is reactive sourcing (supplier selection) (Cox et al., 2004a). Whilst for a buyer dominance and/or interdependence relationship, the most appropriate sourcing strategy for the buyer is a proactive sourcing (supplier development) (Ibid). With an extended dyad relationship, a proactive SCM can be adopted to manage all the relevant SC tiers (Ibid).

As referred in Figure 2.2, the buyer and supplier power resources are defined by three variables: **utility, scarcity of suppliers and information scarcity**. This implies that such power resources determine the buyer power over the supplier power and vice versa, so that the matrix includes all the possible variations and also defines the dominance and type of dependencies (i.e. interdependence or independence). The meaning of the power resources variables, as depicted in Figure 2.2, are that: utility refers to how useful or important each supplier is for each other (e.g. volume of orders whether useful or not); scarcity refers to whether the items provided by each actor are available in the market or restricted (i.e. scarce of suppliers); and information scarcity refers to the availability of the relevant information on each actor to assess each other' performance (i.e. SC visibility) (Chicksand, 2009).

Figure 2.2: The buyer and supplier power matrix (Source: Chicksand, 2009).

2.6.3.3.4 SC actors' collaborative relationships: Buyer-Suppliers relationship type framework

To understand the power dependencies relations, Cox et al.' s (2003) framework in Figure 2.3 outlines the four generic buyer-supplier power structures, namely the: buyer dominance, interdependence, independence and supplier dominance vis a vis the 'way of working' (i.e. arm's-length or collaborative relationship) and 'share of surplus value' (i.e. financial value or its operational centrality). To understand each SC actor power, from a management perspective, it can also be analyzed from the resource dependency theory, since it explains the relationship between entities and how SC actors depend on the **shared resources of each other**, which may be both tangible, such as supplier support, information sharing and shared goals and intangibles, such as investment in equipment to meet buyer's needs (e.g. Ramsay, 1996).

According to Cox et al. (2003), such a framework outlines that there are two variable concepts. One concept defines the '**way of working**' based on two types of relationships, referred as arm's-length and collaborative, which create a continuum of low contact (e.g. contractual information) to close and proactive value-added relationship (e.g. joint commitments, leverage of resources and information sharing) between actors (Ibid). The balanced relationship type explains the ideal level of relationship to meet the two actors' requirements, either through an arm's length or collaborative approach, where both SC actors adopt a non-adversarial relationship, making them interdependent on each other, which further outlines that the non-adversarial collaborative approach is the closest type of relationship between SC actors, referred by the term partnership (Cox et al., 2003; Hingley, 2005; Chicksand, 2015). The other concept is the '**share of surplus value**', referred as buyer skewed or supplier skewed, based on the division of surplus value in buyer-supplier relationships, which also creates a continuum of **adversarial** static value to adversarial growing and dynamic appropriate value, and a balanced position between the two extremes based on a **non-adversarial** arm's length or collaborative effort (Cox et al., 2003).

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Figure 2.3: Buyer–supplier relationship types (Source: Cox et al., 2003, p.138)

2.6.3.3.5 The aims of collaborative relationships

The SC members engage in collaborative relationships for **balancing of power** for the **mutual benefit** (Dyer & Singh, 1998; Leonidou et al., 2008; Hausman & Johnston, 2010) but others disagree with this ideal scenario, stating that the scope is to **gain individual competitive advantage** (Hingley, 2005; Caniels & Gelderman, 2007). Cox (2004c) has taken a more comprehensive perspective by indicating that each firm, within the SC, performs with a level of power asymmetry, so as to gain, from both as an individual entity (e.g. status) and as part of a group, from both commercial and operational benchmarks and also enhances its individual competitive advantage. Such a collaborative relationship decision is a crucial step forward, since every SC member needs to understand its capabilities, depending on its power, to 'appropriate more of the value for themselves if they are able so to do' (Cox, 1999, p.172) to promote business success. The power varies from power symmetry to power asymmetry, as referred in Figure 2.2, which determines the depth of the cooperative relationship, such as an arm's length or in-depth collaborative relationship (Cox et al., 2003; Chicksand, 2015; Cuevas et al., 2015). Trust shifts from a positive to a negative attribute when the relationship between actors shifts from the power symmetry to the power asymmetry continuum (Huxham & Beech, 2008).

The power exerted from the dominant player (e.g. distribution of risks, benefits, etc), as already referred in Section 2.6.3.2.7, may take various forms such as reward power; coercive power; legitimate power; referent power; and expert power (French & Raven, 1968) so that the other parties, through such business relations, either gain or lose benefits. According to Yeung et al. (2009) the two leadership roles, adopted by the dominant firm, are classified as either **non-coercive** or **coercive power** approaches, which depend on the type of relationship (e.g. arm's length or close collaborative) and track record of performance (e.g. more stable orders, financial penalties, revenue sharing). Co and Barro (2008), as already referred above, also provided a framework in line with Yeung et al.'s (2009) theoretical perspective for either adopting a **cooperative** or an **aggressive** collaborative strategy based on different set of criteria.

The ideal collaborative scenario is referred by the situation when the dominant firm builds on trust, commitment and transparency with the weaker (i.e. dependent) firms (Cox, 2004; Ambrose et al., 2010) and applies a non-coercive power approach and/or use a joint combination from the five power forces, as referred by French and Raven (1968), not to produce a counter-productive effect on the performance of any SC member, which may even lead to termination or damage to the relationship (Benton & Maloni, 2005).

Furthermore, situations may exist when the dominant player may tend to exploit the relationship with the dependent SC members through **opportunistic behaviour**, by assigning to such SC actors below average benefits, instead of employing an **equitable stance** (Heide, 1994; Hingley, 2005) and furthermore owns and controls key resources that appropriate value (Cox, 1999). The relationship climate between SC actors is very dynamic, since both the dominant and the dependent players, while being engaged with a current set of SC actors, are also in search for new opportunities, which may seek more rewarding partners or players, with the termination of the contractual obligations (Weitz & Jap, 1995).

2.6.3.3.6 SC actors' value-adding roles

SC actors, such as suppliers, may also seek to **increase the dependence** of the buyers by undertaking **investments initiatives** to enhance interdependence between them (Ramsay, 1996) and at the same time enhance its competences and capabilities to promote **added-value**. Borys and Jemison (1989, p. 241) defined the concept of value as 'the process by which the capabilities of the partners are combined so that the competitive advantage of either the hybrid or one or more of the parties is improved'. The SC is an **extended network of dyadic relationships**, with several stages that add value all across the SC tiers until they reach the end-customer to deliver the final customer perceived value (Cox et al., 2001). In fact, an extended definition on value, outlines that it can take different forms: value to the customer, referred as the customer's value proposition; the value-adding processes across the SC, from one SC entity to the next until the final customer; and the monetary value for the company, referred as the value appropriation (e.g. return for the investment) (Cox et al., 2001). Such a value added perspective vis a vis the value proposition and value-adding processes is in line with Porter's (1985) value-added theoretical perspective. Furthermore, it is to be noted that value consists from both financial and non-financial value (i.e. monetary value and brand name/image value respectively). Such SC thinking, based on Cox et al.'s (2001) three forms of values, enables the focal firm to focus effectively how: to win the market by the right product to meet the customers' best perceived value; to design processes that optimise the activities for best value-added products/services with the contribution of all SC tiers; and to establish the best return on the capital employed (Cox et al., 2001).

The focal firm within the SC context, as the buyer, the underpinning rationale is to establish the most appropriate sourcing strategy to build a robust relationship management approach to promote **best practice** and the **best performance outcome** (Cox et al., 2004a). In such a way, the focal firm, may be subjected to three levels of satisfaction, referred as satisfied, more or less satisfied or dissatisfied (Cox et al., 2004a). Ideally a proactive SCM approach is implemented among all SC actors, but in reality, due to the different contextual conditions of all SC actors determined by their power regimes (Cox et al., 2001; Glyn, 2001) or power circumstances (Cox et al., 2004a), such an ideal approach, in practice, is difficult to achieve.

2.6.3.3.7 SC actors' alignment for performance improvement

Once the sourcing strategy is selected, there is the need for **aligning** it effectively (Cox et al., 2004b). In practice, an ideal alignment is the main objective for **performance improvement** and **leverage of resources** from the dyad relationship and also from all SC actors, but if not achieved, it can take two other forms of alignment (Ibid). One form is when the relationship is misaligned and sub-optimal, with the possibility of remedial action to re-align the relationship in place and the other form is a misaligned and dysfunctional relationship, with no chance to remedy and achieve alignment (Ibid). Such a latter alignment relationship has a no way out to remedy and the buyer is recommended to seek an alternative supplier (Ibid). To remedy problems associated with the sourcing strategies implementation, every SC actor needs to be informed, through training, development and knowledge sharing, to understand the best practices that need to be followed (Meehan & Wright, 2012). It cannot be excluded that the sourcing strategies with their alignment between all SC actors, need also the internal alignment of each individual organisation, within its functional areas, so as to have both external and internal alignment in place (Cox et al., 2004a).

In a nutshell, such a collaborative scenario makes it crucial for all SC members to build on an ideal relationship climate, based on the **right power deployment** to promote a win-win approach with **trust-building** (Hingley, 2005; Terpend & Ashenbaum, 2012), to minimise any actor from seeking other partners or players in other SCs, causing a break-out from the relationship or else a dysfunctional or a misalignment or a sub-optimisation of the SC operations respectively, with the resultant negative consequences on the other SC actor (Cox, 2004a, 2004c). Such a **win-win approach** between SC actors is not the only scenario, since certain asymmetric power circumstances, between SC actors may exist, that requires a dyad relationship to adopt a **win-lose approach**, since it may also be beneficial for both parties (Cox, 2004d).

2.6.3.4 Summary of the leadership concept from both the focal firm and SC perspective

2.6.3.4.1 The leadership traits: transformational, transactional, servant and situational

All the above leadership styles within the focal firm, especially the transformational and transactional leadership styles may be mapped on the two dimensional Managerial/Leadership Grid axes (Blake & Mouton, 1985) where they juxtaposes two leadership approaches, referred as the Task and Relationship/People behaviours. The task attribute refers to the ‘Concern for production’, which emphasizes the leader’s importance given to the accomplishment of the tasks (i.e. transactions) to promote a high level of performance. The relationship/people attribute refers to the ‘Concern for people’, which emphasises the leader’s importance given to the individuals’ needs and expectations. Leaders need to ensure a concern for productivity but at the same time need to build trust among all employees to unleash people’s passion and promote knowledge sharing to foster creativity (Fawcett & Magnan, 2004).

The key leadership theories, from the extant literature, were focussed on the importance of the **transformation, transactional** and **servant leadership** styles, which are vital for leadership practices and its success. The Leadership Grid (Blake & Mouton, 1985) clearly outlines that the leadership styles consist of a continuum between a concern for both the leader's objectives and the employees' needs, where both are mutually inclusive and dynamic since ideally the outcome shall end up to a win-win situation for both actors. Such a continuum of leadership style is in line with the **situational leadership** approach since every situation is contingent and may need to take dedicated measures to achieve effective leadership especially due to the dedicated organisational climate (Hershey & Blanchard, 1969). This means that leadership approach consists from a leader, a follower and the contextual conditions (Tannenbaum & Schmidt, 1973; Tosi, 1991; Osborn et al., 2002; Liden & Antonakis, 2009).

The contextual conditions were further defined, within the leadership practices, and were classified to describe the organisational context to be under one of the referred situations of: stability, crisis, dynamic equilibrium, and edge of chaos (Osborn et al., 2002). The researcher from the literature considers that the attributes of the transformational leadership overlaps with authentic leadership (Avolio & Gardner, 2005) vis a vis the leadership values and ethical concern, where the ethical perspective nowadays is considered key in various literatures fields. In such a case all leaders need to embed in all decisions and practices, both ethical and moral principles which are away from the contemporary corruption cases and hidden agendas (Avolio & Gardner, 2005) which are also pivotal both within and across the SC to win all stakeholders' support, trust and commitment to promote an effective SCI approach.

2.6.3.4.2 The integrated leadership approach

Within a single organisation set-up, the leadership style is ideally based on a **decentralised approach**, where all employees are empowered across all management levels to promote a cross-functional and teamwork environment by adopting a leadership power sharing stance, with an **interdependent and integrated leadership approach** with all functional areas (McCauley-Smith et al., 2013). Within a SC set-up, one needs to consider, that for an effective leadership it must be seen not only from a top-bottom approach but from a 'leading out and leading in' approaches (Useem, 2001), since the employees need to constantly interact with their managers and leaders within and outside the firm with all of its stakeholders. Though, it is assumed in the literature, whichever is the context, such as buyer to supplier or employee to supervisor relationship, the leadership power need to be based on the same foundation principles (Heide & George, 1988). The effective leadership platform is reached through joint initiatives between all involved stakeholders as substantiated by Olivares et al. (2007, p. 79), where they stated that 'Although individual-based leader development is necessary for leadership, it is not sufficient. Leadership requires that individual development is integrated and understood in the context of others, social systems, and organizational strategies, missions, and goals'.

In retrospect, an effective leadership approach needs the right **leadership style with a holistic stance** to ensure that all stakeholders' requirements are considered, to promote synergy of all actions with a teamwork vision (Bass et al., 2003; Schippers et al., 2008). Furthermore, the leader needs to have the right mindset and competence, as advocated by Cheung et al. (2012, p.3923) by stating that: 'having all the data in the world will not help to improve a company's profitability if the data are not correctly interpreted'. This approach reinforces the need of right leadership skills across all management levels, which are achieved through ongoing training and leadership development initiatives (McCauley-Smith et al., 2013), so that all relevant leaders are informed and well versed to promote effective decision making within all the SC dynamic contextual conditions. The quality of the management approach, within the SC context, is also function of the management leadership approach, which together with other seven dimensions, namely training, employee relations, customer focus, quality data and reporting, supplier quality management, product/service design, and process management, all contribute to the SC performance (Kaynak & Hartley, 2008).

2.6.3.4.3 Effective leadership with the right strategic power approach

An effective leadership approach also needs to consider that to reach effectively all SC stakeholders, need to interact according to their salience: which is function of the power of the focal firm vis a vis the SC member; the established practices jointly agreed upon; and the urgency or critical need of the matter (Mitchell et al., 1997). Such a SC context in general is determined by the individual power of all SC members which drives them to pursue different types of influences on other SC actors, but above all they try to extend the internal business processes also across the SC business processes, through either **coercive or non-coercive power strategies** (Yeung et al., 2009). Such a power influence approach is function of three power resources, referred as levels of utility, supplier's scarcity and information scarcity, to meet both commercial and operational benchmarks (Chicksand, 2009). Trust between SC actors builds with more power symmetry (Huxham & Beech, 2008). The deployment of power needs to be managed effectively, through a **cooperative or non-coercive approach** (Co & Barro 2008; Yeung et al., 2009), so as to build a positive climate within all relationships, so that it does not produce counter-productive effects on the overall SC performance, with the ultimate break-out of any of the SC actor from the SC network (Cox, 2004a, 2004c).

2.6.3.4.4 A holistic and integrated management and leadership approach

The effective management and leadership approach within the SC context needs to incorporate a holistic and inclusive understanding of both the financial and the physical properties of the SC (Cox et al., 2001). In such a way the value appropriation is to be mapped with the physical value added processes (Ibid). Furthermore, the focal firm needs to map also the power attributes of all SC actors to manage all the relationships with each other, since there can be more than one SC actor engaged with the focal firm, both as dyad or else as an extended network (Ibid).

Such a theoretical analytical approach to SC thinking, through power regimes or power circumstances of all SC actors, imply that every SC member needs to establish who gets what, how, where and when in the SC (Cox et al., 2001). This shows that SCI is not always possible due to various valid reasons (e.g. due to differing power). **SCI** is likely to occur for **interdependent SC actors** or when the focal firm is the buyer and it is close to the customer and can also apply power dominance (Ibid). It is well established in the literature that SCI increases the focal firm power, apart from other benefits, relative to the other SC actor (Horwitch &Thietart, 1987; D'aveni & Ravenscraft, 1994). Management needs to understand the power of each SC actor, since circumstances may exist where any SC actor may block value to another SC actor (Cox et al., 2001) or else a SC actor may have the power to undermine the overall SC (Glyn, 2001), since the SC is strong as its weakest link. Power regimes outline that there exists a hostile environment with a self-regarding effort by SC actors to appropriate value (e.g. opportunism from an RBV perspective) (Cox et al., 2001). This also implies that the complex network of SC actors needs **dedicated relationship building** with each other to enable business success (Ibid).

2.6.4 Business strategy theme

2.6.4.1 Corporate and business strategies

Johnson and Scholes (1999, p.10) define **strategy** as 'the direction and scope of an organization over the long-term: which achieves advantage for the organisation through its configuration of resources within a changing environment, to meet the needs of the markets and to fulfil stakeholder expectations'. The strategic decisions are of a complex nature due to an uncertainty and a volatile economy and with a competitive and dynamic market.

Due to the nature of the study, mainly focused on the SME sector type of firms, the terms **corporate and business strategies** are assumed by the researcher as common terms, due to the relative small size of the firms' understudy, where the focus is only based on a single business unit and wherever any

SME formed part of a Multinational firm, no consideration has been included on the mother's company Corporate strategy, with its different business portfolio. The term corporate strategy as a result is merged into the business strategy, being a single business company (Thompson et al., 2005). Such a stance is also used to simplify the systematic literature synthesis of all the emerged themes from the data. The business strategy classifies the strategic management approach to consist from three levels which cover the strategic, tactical and operational levels respectively, so as to unify all functional areas together with all SC members with their capabilities and limitations (Skinner, 1969; Stonebraker & Afifi, 2004; Swink et al., 2007).

The overall business strategy is based on the mission of the firm, which outlines the values and expectations of all the stakeholders including the customers. The strategic management approach is based on the inter-relationship between the **strategic analysis, strategic choice and strategy implementation** (Johnson & Scholes, 1999). Such a three step process is used to ensure that the firm understands its environment and its strategic capabilities (i.e. strategic analysis) to take into account all of the relevant information so as to derive the strategic options to decide (i.e. strategic choice) and then proceed with its implementation. Such a strategic approach needs to be established effectively by selecting the best option (i.e. strategic fit) so that the focal firm achieves a competitive advantage (Ibid). The significance of such competitive capabilities is based on the fact that those SCs that lag behind and fail to deliver the value will lose in the competitive market (Cox, 1999).

2.6.4.2 The business operations strategy

The way forward for the firm's business strategy needs to have an operations strategy based on a **holistic integrated SCM approach** in-conjunction with a **continuous improvement mindset** in all operations so as to achieve a **sustainable competitive advantage** (Chen & Paulraj, 2004; Lummus et al., 2008). Slack et al. (2004, p.67) defines the operations strategy by stating that it 'concerns the pattern of strategic decisions and actions which set the role, objectives and activities of operations'. The operations strategy has several performance objectives to achieve and these are being referred as the **competitive capabilities** (Johnson & Scholes, 1999), which are further discussed in Section 2.6.9.

Not all firms can reach all competitive capabilities in the same manner, due to the adopted complexity and different **operations strategic priorities**. Such a complexity is attributed to the performance and decision-making variations that may originate by different stakeholders forming up the SC, which may need to jointly-undertake the necessary strategic trade-offs for a win-win outcome. Such a **strategic trade-off** concept was referred by Skinner (1969) who outlined the importance to establish a clear set of competitive priorities. Similarly Hayes and Wheelwright (1984) in their seminal paper, substantiated the importance of having strategic priorities and also trade-offs and synergies vis a vis competitive performance dimensions. They classified that there also exists four types of **operations strategies** sources that the focal firm may adopt, to achieve a competitive advantage within manufacturing (Ibid). The four operations strategies were divided into two types referred as neutral (i.e. reactive approach) and supportive (i.e. proactive approach), where both are considered from an internal and external perspective to either maintain or improve the competitive performance. Such a competitive advantage perspective is also discussed in Section 2.6.9 from Porter's seminal works, which is dedicated to review the literature related to competitive capabilities as an outcome of the strategic implementation.

2.6.5 Manufacturing strategy theme

2.6.5.1 Manufacturing strategy contribution to competitiveness

From the seminal paper of Skinner (1969), it was claimed as pivotal the direct bi-directional relationship between the **corporate/business strategy** with the **manufacturing strategy** and the importance of the manufacturing strategy contribution to the **firm's competitive edge**. According to Skinner (1969, p.136), the manufacturing function must not become a 'corporate millstone', due to a non-competitive production system, but must become a 'competitive weapon' with a top-down management approach, based on a continuous decision-making commitment to implement the right trade-offs to derive the relevant manufacturing policies, which are to be linked to the competitive and strategic facts. Such a stance needs to ensure that the top management gives due importance to the manufacturing strategy since it adds to the firm's 'arsenal of competitive weapons' (Skinner 1969, p.145). Furthermore, Hayes and Wheelwright (1984) developed a set of six (6) World Class Manufacturing practices, based on empirical research on Japanese, German and US firms, which enables firms to achieve outstanding performance and to build competitive strength. These six best practices are: Workforce skills and capabilities; Management technical competence; Competing through quality; Workforce participation; Rebuilding manufacturing engineering; and Incremental improvement approaches (Hayes & Wheelwright, 1984). Such a best practice approach within the manufacturing practices needs to be extended from an internal productivity perspective to both suppliers and customers' requirements. As defined by Garetti and Taisch (2012, p.84) 'manufacturing includes all industrial activities from the customer to the factory and back to the customer, thus including all the different kinds of services that are connected to the manufacturing chain'. Such an era led to concurrent engineering (Winner, et al., 1988), lean management (Womack et al., 1990), agile manufacturing (Youssef, 1994), JIT (Flynn et al., 1999), mass customisation (Duray et al., 2000) and efficient consumer response (Hoffman & Mehra, 2000).

The manufacturing strategy role in the contribution to **competitive performance** is also function of the product/process matrix position due to the nature of production method used (job, batch, line and continuous) and the nature of the product (i.e. type and volume) (Hayes & Wheelwright, 1979a, 1979b). Such a stance is used since the production method determines the competitive approach due to the lower costs, associated with say continuous production methods. Similarly a higher value-added product manufactured type, when it incorporates increased attractive features (e.g. dedicated product design, higher quality, lower price and high dependability), so as to create a competitive edge over others. Such Skinner's and Hayes and Wheelwright's theories both outline that the manufacturing strategy is a direct antecedent to a competitive strategy.

2.6.5.2 The manufacturing strategy and manufacturing leadership practices

The implementation of the manufacturing strategy is based on the operations strategy key categories classified under the structure and infrastructure decisions (Hayes & Wheelwright, 1984; Hayes et al., 2005), which built on Skinner (1969) work, by giving more importance to the **manufacturing leadership practices** to pursue the operations strategy, through the business's manufacturing policies and people, to promote a competitive edge. Such two decision areas promote an improved leadership approach by configuring and aligning these key operational strategic areas with the relevant priority assigned by the business to promote competitive edge.

Another organisation alignment approach related to the Hayes and Wheelwright (1984) operations strategic stance is the McKinsey 7-S model (Waterman et al., 1980). The 7-S model has seven internal factors that need to be considered for an effective strategic implementation process to achieve a competitive edge. These factors are classified as three hard elements and four soft elements, where strategy is one of the main elements since without a clear strategy, the organisation will lack direction and impetus. The seven elements are strategy, structure and systems which are referred as the hard elements and the **shared values**, skills, style and staff which are referred as the soft elements. The model focuses on the 'shared values' element, since it makes all the other elements aligned together, since the cultural values of all people reinforces unity and teamwork which are two recipes required for effective and efficient performance. Furthermore, such people shared values importance, shows the key role of the human element, within the strategic implementation process, meaning that people are a key and invaluable asset (Rothwell, 2002; Tarique & Schuler, 2010; Xu & Thomas, 2011). Such a shared value can be seen from both manufacturing, by the processes coordination and also from a SCI perspective, by the intra- and inter-organisational practices.

2.6.5.3 The manufacturing strategy and SCI

The **manufacturing strategy** is directly linked to the **SCI strategy**, as advocated by the (Frohlich & Westbrook, 2001) seminal paper, when they asserted that the 'new millennium upstream and downstream integration with suppliers and customers has emerged as an important element of manufacturing strategy'. This perspective was also referred by Flynn et al. (1999), where they extended the work of Hayes and Wheelwright in 1980s, by advocating that SCI within and outside the focal firm is a crucial approach to face all world class manufacturing problems associated with the key operational objectives of cost (i.e. quality and features), dependability (i.e. specifications, time and service), quality (i.e. process quality) and flexibility (i.e. product and volume).

In today's industry, manufacturing is being based on lean manufacturing, as an enhancement of mass production, when it focuses on cost and efficiencies, and deploys agile manufacturing, for a more responsive approach at the downstream side of the SC (Yusuf & Adeleyei, 2002; Gunasekaran et al., 2008; MacBryde et al., 2013). The manufacturing process needs to implement JIT practices and the overall SC is using a pull-based system (Kros et al., 2006), to align the production and business processes throughout the supply chain to meet the changing demands of the chain's ultimate customers (Cox et al., 2003; Green & Inman, 2005). Pull strategies are customer focused and by adopting a JIT-II-selling strategy, employ tactics that **integrates** fully empowered sales representatives within the customer's purchasing process (Green & Inman, 2007). As already referred in the a priori literature review, Section 2.5.1, Yusuf & Adeleyei (2002), based on an academic study focused on lean and agile manufacturing, contended that **integration** can deliver concurrently on multiple competitive capabilities.

Such agile techniques importance focused on the time of SC response to the customers' request has also been substantiated by Cox et al. (2003). Furthermore, **agility** within the manufacturing SC context, is also considered as a pivotal characteristic of **HVM**, since the manufacturing firm needs to build on their capabilities, innovative and environmental sustainability approaches (Martinez et al., 2008) for the success of the SC within the dynamic and competitive environment (Agarwal et al., 2007; Braunscheidel & Suresh, 2009; MacBryde et al., 2013). The new innovative way of manufacturing is to deploy a paradigm shift, for a **service led competitive manufacturing strategy** (Neely, 2009; Baines et al., 2009), which is based on a shift from product selling to an integrated product and service offering (Baines et al., 2007). Such an approach is referred as the **servitization of manufacturing** (Lightfoot et al., 2013) or the integrated solutions of manufacturing (Davies et al., 2006). MacBryde et al. (2013) supports this perspective by asserting that manufacturers are engaging in activities which are complementary to the core production process, by adopting an approach that involve the customers in both the design and service activities to enhance the overall service value proposition through enhanced servitization.

From a SC perspective, the **internal SCI** focuses on the focal firm manufacturing processes and strategies to fulfil the customers' requirements and efficiently interact with all upstream and downstream SC members to achieve **competitive advantage** (Ragatz et al. 1997; Flynn et al., 1999; Frohlich & Westbrook 2001; Paulraj et al., 2008; Flynn et al., 2010). The external linkages with all SC members, are not after a functional organisational structure, as it happens in the internal processes of the focal firm, but needs all the functional areas to work together in a **synchronous and unified process approach** (Flynn et al., 2010; Richey et al., 2010). It cannot be excluded that the manufacturing processes, to be in line with all lean and agile processes need the **enabling processes of IT/IS** (Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014). The IT infrastructure is facilitating and creating more effective IT based **information sharing capabilities** (e.g. sales and purchasing information) and **flexibility within all manufacturing processes**, both within and outside the focal firm, with all of its SC actors, such as in JIT inventory tracking, and in flexibility for product development, production, logistics, suppliers and supply base respectively (Gunasekaran et al., 2008; Jin et al., 2014) and also helps to build competitive performance of the overall manufacturing SC (Gosling et al., 2010).

2.6.5.4 The manufacturing 'make' or 'buy' strategic decision

The manufacturing strategy, as already referred, is interlinked with the SCI strategy, since the manufacturing process may be made inter-dependent on other firms forming up the SC. In fact various scholarly work have focused on the strategic decision whether a manufacturing process is kept in-house or is preferably outsourced (i.e. make or buy) to achieve or sustain its competitive advantage (Harrigan, 1985; Klein, 1988; Bajec & Jakomin, 2010). This strategic decision may either be based on the **core competency of the focal firm** (Cox, 1999), where the core activities are performed in-house and peripheral activities are outsourced, in line with the RBV (Barney, 1991) and extended RBV (Matthews, 2003) respectively. Such an approach exploits the resources of the focal firm and of its suppliers to improve on the overall competitiveness (Cox, 1999; Baloh et al., 2008). The other perspective may be based from a **cost efficient rationale** by the focal firm, in line with the transaction cost analysis (Williamson, 1985), to exploit the cost of operations of the focal firm and of its suppliers to improve on the overall competitiveness (Williams, 1985; McIvor, 2010). In reality the decision is multifaceted since it is function of a complex set of other contextual conditions such as suppliers' availability, focal firm's products portfolio and/or capacity of production, sector type and proximity of suppliers.

2.6.6 Supply Chain (SC) Strategy theme

2.6.6.1 SC strategy and supply chain integration to achieve strategic alignment

The SC strategy is concerned with the **integration and coordination decisions** within the focal firm in conjunction with the set-up to be implemented with all stakeholders (Gunasekaran et al., 2008; Green et al., 2014). The SC strategy is complex concept in the SC literature (Rose et al., 2012) and consists from both a **strategic and operational capabilities** with their **alignment** (Cox, 1999; Kim, 2009) function of the contextual conditions (Cox, 1998). Such SC foundations with its variations imply that a contingent model needs to be adopted to fit each business situation (Stonebraker & Afifi, 2004). The SC strategy also needs to adapt and structure its resources to effectively align to the changing competitive conditions (Thompson, 1967; Hofer, 1975; Kim, 2009). Within such a competitive environment, an **extended integrated collaborative approach** is needed in all the activities, within the focal firm and across the SC, to deploy a time-based SCM approach, so as to achieve time compression, flexibility and agility (Stonebraker & Afifi, 2004; Lin et al., 2006). The organisations also need to fit their **environmental sustainability** requirements within their business strategy and across the whole SC, including suppliers' selection and logistics (Vachon & Klassen, 2006; Hsu et al., 2013; Caniels et al., 2013).

2.6.6.2 SC strategy from a manufacturing and marketing perspective

The SC strategy may be based on the type of product under manufacture, whether it is a **functional or innovative type**, so as to focus effectively, referred as matching, either through **efficiency or responsiveness** respectively (Fisher, 1997), by formulating the ideal SC strategy to promote business success. Fisher's model gives a **manufacturing against a marketing strategic perspective** of doing business to make a profit. The innovative approach is more customer focused, since an effective change management approach is needed to meet the innovative changes the customer wants (i.e. being responsive to all dynamic market, needs agility and flexibility) which in turn generates revenue with improved performance. According to Fisher (1997) the performance improvement with an innovative product is larger than that gained through efficient processes with a functional product (i.e. low cost basic product from a manufacturing perspective).

The SC Strategy is about effective decision making to promote success and to build on the **competitive capabilities** (Bojarski et al., 2009; Kim, 2009). A strategy that leads to performance improvement does not derive competitive capabilities and as a result the strategic approach does not make a firm a winner in the market but only a qualifier on the road to competitiveness. This is the key focus given by the seminal article by Fisher (1997), which postulates that the adopted SC strategic approach is function of the type of product to ensure that the overall SC strategy fits effectively the business objectives, so as to meet what the customers want and to be competitive, even at the expense of less efficient processes, unless they are managed in such a way to minimise such inefficiencies.

2.6.6.3 Strategic supply chain integration with all SC actors

The SC strategy is concerned with all suppliers and upstream SC members' relationships across the SC to give a competitive edge through improved performance (Carter et al., 2000; Scannell et al., 2000; Kim, 2009). Through **strategic supplier integration**, the focal firm acquires and shares both information and knowledge on operational, technical and financial aspects, to improve on the overall capabilities and performance (Swink et al., 2007). Similarly, through downstream strategic SCI, the focal firm builds on all the customers' relationships across the SC, to give a competitive edge through performance improvement (Ellinger et al., 2000; Kim, 2009). Such a **strategic customer integration** approach acquires and assimilates the customers' information and knowledge to establish their preferences and requirements so as to establish the relationships with ongoing customer contacts and interactions (Swink et al., 2007).

The business strategy with the right strategic decision making, needs to establish the effective SC strategy, so as to integrate in some form or in a limited way, all business functions both within and throughout all the SC tiers (e.g. inventory, logistics, purchasing and supplies), backed by an IT infrastructure, to achieve both manufacturing and performance improvements (Carr & Smeltzer, 1999; Wisner, 2003; Gonzalez-Benito, 2007). Such a SCI approach, with **process integration** across the SC, provides the right structure and platform that leads to competitive success (Eisenhardt & Tabrizi, 1994; Birou et al., 1998; Kim, 2009). Such an extended understanding of the focal firm from a **SCI perspective** implies that the focal firm resources are being jointly interfaced and aligned with that of all SC stakeholders, so as to exploit: the synergy of resources, which are embedded in all SC actors; the SC strategic alignment advantages; and a cumulative competitive edge.

2.6.6.4 SC strategic decision based on the manufacturing 'make' or 'buy' strategic decision

The focal firm needs to employ a cost/benefit analysis to establish the feasibility of the way forward, since SCI is risky and may not be appropriate in all situations (Stonebraker & Afifi, 2004). Such a new operational business perspective, from a wider approach to operations, where the focal firm deploys resources outside its boundaries to achieve an overall competitive edge, is supported by the extended RBV of a network of firms (Matthews, 2003) and the RBV of the focal firm (Wernerfelt, 1984, Barney, 1991). Such an operational perspective explains the advantages gained from the synergy effects of all the SC actors with each other and within the focal firm to promote a unified and a distinct competitive SC.

Such a SC strategic decision is referred to as the '**core competence paradigm**', to decide which operations are to be retained and others to outsource, so as to compete effectively (Cox, 1999, p.169). Such a decision is a crucial step forward, since every SC member needs to understand its capabilities, depending on its power, to 'appropriate more of the value for themselves if they are able so to do' (Cox, 1999, p.172) to promote business success. This is the foundation principle within a SC having dominant players, who are able to own and control key SC resources with the appropriation of value, over other SC members (Cox, 1999, 2004a). This is in line with the **manufacturing strategy**, make or buy decision, as referred in Section 2.6.5.4 and the virtual, extended and vertical integration enterprise approaches respectively, as referred in the collaborative theme and a priori literature review, Sections A4.1.8 and 2.5.2 respectively.

Such a SCM approach needs to be seen from the right **strategic and operational perspective**, since an **integrated SC** should be ideally based on power equivalence and 'equity, trust and openness' and not on the power of any SC member to direct others, with a hierarchy of structural dominance and dependency (Cox, 1999, p.171). Though, depending on the **SC type and context**, such as in the automotive manufacturing sector, where there exist a standard and smooth flow of demand, it makes structural dominance feasible for dominant players to impose direction on weaker (i.e. dependent) SC participants within an integrated SC (Cox, 1999). With such an approach each SC member creates value-added operations (e.g. innovation, improved customer service, superior product attributes) and also manages effectively its appropriation of value (e.g. extracts above average profits, build brand name, strengthen competitive position), since both **value creation** and **value appropriation** are strategic objectives required for achieving sustained competitive advantage (Mizik & Jacobson, 2003; Zhang & Chen, 2008).

2.6.6.5 The SC strategy as a function of the dominant players

The SC power structure outlines that the overall SC set-up has a level of competition, which is an **inherent adversarial approach** between SC members (Chicksand, 2015), based on who shall own and control the SC resources. Such a business trend is substantiated by Cox (1999, p.173), by stating that 'Most suppliers are basically **opportunistic** rather than **deferential**, and have little real incentive to tie themselves to one customer unless they are forced to do so'. At the same time such a **dominant player based approach** promotes success as a result of: the innovative approach to promote value-added operations; minimising any threat from other SC members by managing effectively all SC actors; and exploiting the appropriation of value (Cox, 1999). For such an innovative SC climate, ideally there must be a '**benign power structure**' between all SC actors so that the resources ownership and their control are managed effectively across the SC (Cox, 1999, p.173). This means that there is the need to retain power and undertake effective control over all SC members depending on the SC configuration (e.g. how the SC is structured with the margins of allocated profits), which also clearly outlines that a **'one-size-fits-all' model** does not exist, due to the unique characteristics of each SC (Heide, 1994) .

Supply chain theory suggests that the 'supply chain should be managed from end-to-end' but in practice this achievement has several barriers and needs a considerable effort to reach beyond the first tier in both directions (Storey et al., 2006, p.763). Such a **challenging end-to-end approach** was articulated by Storey et al. (2006, p.763) assertion, by stating that: the 'Management of the supply chain was analogous to a relay race, with responsibility being passed from one company of actors to another'. Though, it cannot be excluded that extended dyadic SCs exist, where SCs consists from a focal firm that has the **overall control of various SC actors** (Cox et al., 2001; Frohlich & Westbrook, 2001). The SC strategy is also determined by the knowledge embedded within the firm management to formulate the right strategy, as advocated by Cheung et al. (2012, p.3907) that: 'the knowledge-based system helps to formulate supply chain strategies which are capable of adapting and responding to the supply chain evolution, and helps **to optimize supply chain configuration** leading to the long term success'.

2.6.6.6 The SC strategy through process integration: The SCOR practitioner's model

Practitioners, through the Supply Chain Council, have established the Supply Chain Operations Reference model (SCOR, 2010), to outline the importance of the strategic importance of SCI associated with all SC entities. The SCOR model outlines that for effective SC strategy, the SC set-up needs to implement an integrated approach across the SC, by **linking strategically all processes**, which include planning, sourcing, making, delivering, returning and enabling between all SC actors, namely suppliers, customers and manufacturers, so as establish performance benchmarks and promote best practices (Bolstorff & Rosenbaum, 2007). The SCOR model, as referred by Bolstorff and Rosenbaum (2007), can be used to achieve SCM excellence by deploying a project management approach. The SCOR methodology, to be implemented effectively, needs to identify the scope, by establishing the business context, building SC definition matrix and derive a project charter (Ibid):

(a) The business context is used to determine the context for the SC improvement, by analysing the strategic background (e.g. SWOT and CSF), financial performance (e.g. revenue and income and total

current assets and liabilities), internal (e.g. organisation structure, performance measures and SC span) and external profiles (e.g. PESTEL assessment, 5 Forces Model and stakeholder list) respectively.
(b) The SC definition matrix outlines all the markets, customers and channels against products, locations of firm units and suppliers. A priority ranking may also be done to identify all products contribution to the SC.
(c) The project charter outlines all stakeholders to align all deliverables and define the roles and responsibilities to achieve business objectives by including the risks and dependencies on other SC members and control procedures.

2.6.7 Holistic supply chain integration (SCI) management theme

2.6.7.1 The holistic SCI approach within its contextual conditions

The holistic view of SCM has been considered as an important perspective for the formulation of the SC strategies (Wilding, 1998; Perona & Miragliotta 2004; Power, 2005; Fawcett et al., 2008; Bayraktar et al., 2009; Cheung et al., 2012). The holistic approach, from a theoretical perspective, is considered crucial to set-up a **broad integration of customers and suppliers** with the focal firm (Frohlich & Westbrook, 2002; Power, 2005). The term demand chain management (DCM), is also used to describe such a **holistic view**, since it explains how SC actors shall manage and coordinate all the links from the customer backwards to the suppliers, based on an extensive integrated approach to have an adequate understanding of the demand (Vollmann et al., 2000; Frohlich & Westbrook, 2002; Juttner et al., 2007). Lambert and Cooper (2000), in line with the DCM approach, outlined three marketing-oriented business processes, referred as CRM, customer service management and demand management. It has been clearly outlined that both the demand chain (i.e. customer side) and the supply chain (i.e. supplier side), forming up the two ends to the SC, although their focus differs, in line with Fisher (1997) market and product perspectives, both need to contribute effectively together in the pursuit of all goals (Juttner et al., 2007).

The SC is embedded in a **hostile environment** (i.e. short product lifecycle; competition; small sized orders; speed to deliver and to market) (Cheung et al., 2012). This context is clearly advocated by Cheung et al. (2012) by stating that: ‘Globalization and proliferation of multi-national companies, joint ventures, strategic alliances and business partnerships have changed the business environment. For survival under the pressure of turbulence, it is critical for companies to reorganize and optimize their supply chain effectively, by taking a holistic view of the supply chain’ (Cheung et al., 2012, p.3923). Such a holistic perspective is a need, since after all, although all SC actors deal with different roles (e.g. different material handling and processes), they are fulfilling the same customers’ orders (Jiao et al., 2006). Furthermore, it is to be noted that on the **facilitators or inhibitors** for an effective strategic SCM approach, needs to consider such issues and challenges not individually but from a **holistic perspective** to promote SC success (Fawcett et al., 2008). Typical facilitators are people empowerment and support, collaboration and information integration, whilst inhibitors are resistance to change, misaligned objectives, lack of collaboration, conflicting cultures and lack of trust between SC actors (Ibid). It cannot be excluded the importance to overcome the focal firm internal integration mechanisms challenges, due to the inbuilt barriers subjected to the silos thinking between functional areas and with a lack of cross-functional commitment to operations (Bowersox et al., 2000).

2.6.7.2 Holistic SCI approach: Agile and optimised SC and manufacturing operations

The holistic approach across the SC could be made possible with the advent of the **internet based technologies**, since through the web, one is able to provide an integrated platform for customers and suppliers for all activities across the SC (Frohlich & Westbrook, 2002). In fact DCM (Section 2.6.7.1) has been referred as the most powerful web-based manufacturing strategy (Frohlich & Westbrook, 2002). To achieve such a holistic process, there is also the need to have **productive based processes** across the SC, which need the **swift movement** of materials throughout the whole SC process, based on value-added processes, a high speed of flow without bottlenecks (i.e. competitive throughput time) and to narrow the process manufacturing variations for a more even flow (Schmenner & Swink, 1998). Such a stance is in line with the **theory of swift, even flow** (Ibid). Nowadays, a common saying used is: 'time is money'. As a result, organizations today, need to complete their tasks quickly to reap a greater profit based on a triple-A SC which needs to be **aligned, adaptable** and **agile** (Lee, 2004; Ishaq et al., 2012).

The **SC agility** needs to take a holistic approach to the SC based on a proactive strategic stance, to be more responsive to the customer demand (Power, 2005). Gunasekaran et al. (2008, p.550) support both the **holistic** and **agile approach**, since they advocate that **agile manufacturing** 'should not only be based on responsiveness and flexibility, but also on the cost and quality of goods and services'. The principle behind the pull strategy is sustained by Lambert (2008, p.32), where he declared that the 'supply chain starts with your customer network and flows back through to your supplier network, and all the functions of the business need to be involved in managing the combined network'. He further added that the way forward is 'the move to a more **holistic view** and finding a way to make decisions that are **optimal** for the whole of the business'. Such a holistic significance has also been advocated by Bayraktar et al. (2009, p.137) by stating that there is the need to get all the relevant information from all IT systems from SC actors in a 'DSS for **holistic decision making**', so as 'to consolidate the information from various systems together, in order to make the most suitable decision considering all constraints. This will assist forecasting; optimize resource planning and operational efficiency; and ultimately provide a more accurate costing'.

Cohen and Lee (1988) have also referred the crucial role for the **optimisation of all processes**, such as material supply, production and distribution. This is in line with the principle that the new SCI paradigm is designated to **consolidate all the SC members' resources and capabilities**, for the benefit of the whole SC to achieve performance improvement, since the performance of all SC actors influence each other's performance (Huo, 2012). Furthermore, Fawcett et al. (2008, p.36) added that all potential SC 'barriers' need to be seen in 'combination or holistically', so as 'to separate the trees from the forest'.

In general, process management refers to a set of interlinked processes within the organisation in a concerted effort to improve organisational processes (Benner & Tushman, 2003). Within the context of manufacturing, a process approach improves manufacturing efficiencies, cost reductions, customer service and profitability (Hammer & Stanton, 1999). Such a process approach was also substantiated by Lambert and Cooper, (2000) where they declared that for the competitiveness of the whole SC to act as a **single enterprise**, there is the need to shift from managing individual functions across the SC, to **integrating activities into key SC processes**. Over the last years process management practices were applied in both manufacturing and in upstream/downstream SC activities. Quality-related initiatives, such as TQM, excellence models, ISO certification procedures and Six Sigma programmes, have become the norm in such processes (Benner & Tushman, 2003).

2.6.8 Technology deployment (in information systems and automation) theme

2.6.8.1 Information Technology (IT) as an enabler of SC and manufacturing processes

The IT strategy is ideally aligned to the business strategy to undertake the necessary investments. In practice, within the SMEs scenario, the IT strategy is reactive and implemented when there is the need to gain from IT investment or else it is an outcome from the bottom line to be able to perform works effectively (Ciborra, 1997).

Being in this information age, SC actors are highly dependent on an **effective information processing** approach, to develop and manage knowledge across the SC through IT applications (Dyer & Singh, 1998; Ofek & Sarvary, 2001; Schoenherr & Swink, 2012). The deployment of technology also has the capabilities to eliminate waste in several processes by making them **more efficient** (Cox, 1999; Gunasekaran, 2004; Sanders, 2008). IT is **enabling all collaborative processes**: through connectivity of all SC actors; to capture all real time information; to implement the necessary information management techniques to promote SC visibility; to enable value added services; and to achieve a holistic management approach across the SC (McAfee, 2002; Chesbrough & Teece, 2002; Koudal & Wellener, 2003; Fawcett et al., 2007; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014). Furthermore, 'seamless, real-time processes are already the status quo in both individual plants and entire companies. The next wave of business process redesign addresses interplant and inter-enterprise processes, known as collaborative processes' (Kagermann et al., 2011, p. xiii). This collaborative process scenario is compliant with the needs of SCI within the SC context based on the **process approach** (Lambert & Cooper, 2000; Benner & Tushman, 2003).

The importance of IT adoption is without doubt very beneficial for SMEs survival (Gagnon & Toulouse, 1996), since it is well cited that IT capability leads to superior performance (Determirhan et al., 2007). Though, one cannot exclude the fact, that practitioners within SMEs, are facing a challenging investment scenario, from a technology perspective, due to lack of capital (Bayraktar et al., 2009), even in view of all Governments initiatives and support for investment in technological solutions (e.g. provision of funds, incentives and capital guarantees schemes).

2.6.8.2 IT promotes SCI

With the advent of new technology applications (e.g. content management solutions, data warehouses, search engines and social networks), such an environment is solving a lot of demanding **information management** issues and challenges, which is leading to a paradigm shift from a platform of 'information overload' to an effective 'knowledge management' platform (Kagermann et al., 2011, p.27). Furthermore, in certain processes, the human element interplay is changing since the 'role of people in the fulfilment process is changing progressively from processor to process monitor and enhancer' (Kagermann et al., 2011, p.104). The human approach role is further elaborated by the fact that there is a growing consensus for IS implementation success (e.g. ERPs), by adopting a teamwork approach so as to **integrate, collaborate** and **share their expertise on technology based platforms** to capture information so as transform and exploit knowledge (Sarker & Lee, 2003; Faraj & Sambamurthy, 2006; Fawcett et al., 2007; Schoenherr & Swink, 2012). Though, it cannot be excluded the **key role of the human element** in all problem solving and critical thinking abilities, since humans are able to process information with an amazing efficiency and often perform better than the most highly sophisticated machines (Halpern, 2003; Kuhn, 1999).

In view of the above the IT scenario, with an environment based on the internet (referred by the cliché term as the '**Internet of Things**' (IoT)), with various interconnected systems (e.g. mobile phones, tablets, laptops, computers, etc), IT is **enabling and integrating all processes** across the SC, together with the customers' engagement, to promote enhanced products and processes, such as fast 'flow of information', 'automation' based activities and 'postponement' activities (Bowersox et al., 2000; Frohlich & Westbrook, 2002; Parker & Anderson, 2002; Kagermann et al., 2011). Such a stance, with the advent of new technologies Kagermann et al. (2011, p. xiii) advocates that: 'From management's perspective, this emerging capability will necessitate **dismantling and rebuilding value chains**'. That is, the process which was used yesterday may be different from that of today, due to the advent innovative technology based solutions leading to new competitive strategies, which if deployed effectively, will add value to the overall process and also achieve a competitive edge, such as within the ERP II scenario (Clegg & Wan 2013), such as innovative trends through e-business; contracting out of operations; efficiencies through networking across the SC; and globalised services/manufacturing such as 3PL and 4PL). Such a transformation environment brought about by technological changes is also substantiated by Germain & Droge (1998), since they advocated that technology is creating the need to change the organisation structure.

2.6.8.3 IT creates a competitive edge: A RBV and Learning Theory perspective

From the RBV of the firm (Wernerfelt, 1984; Barney, 1991) and the extended RBV beyond the focal firm (Matthews, 2003), it is being outlined that the SC flexibility as a competitive edge is being created not from the investment in technology, but how the technology is being used, through its dedicated information sharing mechanisms (e.g. ERP customisation of the integrated processes to improve on the supplies, production, logistics and product flexibility), both within and across the SC, which are treating both the **information management** and the **IT infrastructure capabilities as resources**, which may be distinct from other SCs (Prajogo & Olhager, 2012; Schoenherr & Swink, 2012). From the learning theory perspective, IT investment provides the capabilities to **exploit the organisation current performance** (e.g. improves the efficiencies of information managed processes) and/or **explore new innovative processes** (e.g. undertaking new technological based investments) (March, 1991). Such two organisational actions to achieve competitiveness are referred as the exploitation and exploration initiatives respectively (Ibid).

IT has been recognised in the last two decades as a source of competitive advantage due to provision of systems that **assist organisational processes** for developing and deploying relational capabilities (Bharadwaj, 2000; Hult et al., 2002; Paulraj et al., 2008; Sanders, 2008; Gunasekaran et al., 2008). At the same time, with integrated information systems deployment between SC actors, they are enabling the focal firm to be informed from a seamless approach on suppliers' poor performance, unpredictable customers' demands and uncertain business environment (Bayraktar et al., 2009). Though, it cannot be excluded that IT is not only an **enabler role** but may be an **inhibitor**, due to outdated legacy systems, inadequate information systems and security risks due to hackers, and where IT is treated as solution rather than as an enabler (Fawcett et al., 2007, 2008). Other inhibitors are resistance to change from employees, lack of IT vendor support, lack of integration commitment between SC actors, incompatible and disparate systems and shortage of skills (Bayraktar et al., 2009). Attention shall also be given on all IT investments since it does not mean that there will be a correct approach in IT usage (Sanders, 2008).

2.6.9 Competitive capabilities theme

2.6.9.1 Sustainable competitive capabilities within the focal firm and across the SC from a RBV perspective

Porter's seminal work in strategy literature, the **competitive forces model** (Porter, 1980), outlines how a firm, through its activities, can achieve a competitive strategy within the industry by analysing all the forces associated with the market sector and the environment to achieve a **strategic fit**. Porter's **value chain model** is another model that explains how a firm needs to think strategically about the activities involved in the business to assess their costs and their differentiation to promote value-added at a premium price and create a competitive advantage (Porter, 1985). The value is defined as 'the amount the buyers are willing to pay', where the firm to make a profit needs that the 'value-activities' are greater than the overall cost of production (Porter, 1985, p.38). Such sources of competitive advantage can be attributed to various activities, where with a **holistic view of the firm**, the set of activities will sum-up to an overall **competitive advantage**, by creating a differentiated value proposition such as pricing, branding, communication and promotion (Porter, 1996; Juttner et al., 2007). From a manufacturing perspective, such competitive approach leads to a competitive strength relative to its primary competitors in the market (Ward et al., 1994).

The sustainable competitive advantage or the above-average performance, within the industry can be created by adopting the strategic choice from the **three generic strategies**, as referred by Porter's Generic Competitive Strategies matrix (Porter, 1985), as either cost leadership or differentiation or focused strategy respectively. The competitive advantage assesses the competitive strategy (Porter, 1985). Porter further argues that 'the enduring competitive advantages in a global economy lie increasingly in local things - knowledge, relationships, motivations - that distant rivals cannot match' (Porter 1998, p.78). Nowadays, from the extant literature, sustainable performance or **sustainable competitive advantage** not only refers to an economical perspective but also from a social and environmental perspective (i.e. triple bottom line) (Elkington, 2002; Luken & Stares, 2005; Lee, 2008; Lee & Klassen, 2008; Glover et al., 2014; Hsueh, 2015). The environmental perspective alone has become a source of competitive advantage (Vachon & Klassen, 2006; Ketchen & Hult, 2007; Hsu et al., 2013; Caniels et al., 2013), as referred in Section A4.1.2, since the sustainable SC is able to differentiate itself from other SCs through more social responsible practices in both resources usage to protect the environment and also in the treatment of employees (Buyukozkan & Berkol, 2011). The sustainable value-added approach that leads to a competitive edge within the focal firm is substantiated by the **RBV of the firm**, where such distinct resources cannot be matched or replicated by competitors due to the four criteria: value, rareness, imperfect imitability and non-substitutability (Wernerfelt, 1984; Barney, 1991). Similarly, within the SC context, the added value by all SC actors in all sustainable measures is also in line with the **extended RBV of the overall SC** (Matthews, 2003) which also leads to the overall SC competitive edge.

2.6.9.2 SCM competitive capabilities from the value-chain model perspective: Vertical integration or outsourcing (virtual integration)

The **value chain concept** is considered the root of the **supply chain management** theory within the extant literature (Mascarenhas et al., 2004; Ramsay, 2005). The activities within the value-chain are inter-related to assess their value and costs to promote **value-added operations** in all the processes (Fawcett & Magnan, 2004) (e.g. expensive raw material needs to adopt lean manufacturing throughout the process to safeguard efficiencies). The investment in technology within the organisation functional areas and outside the organisational boundaries to provide relevant, timely and accurate information is a source of competitive capabilities (Fawcett et al., 2007; Bayraktar et al., 2009). This scenario is also substantiated by Porter & Heppelmann's (2014) study on the use of smart technology within both manufacturing processes and products, where the competitive strategy results in a set of competitive advantages attributed to the IT-driven transformation through smart connected devices providing three perspectives: physical, smart and connectivity with the provision of IoT. The four areas of advantages are: monitoring, control, optimization and autonomy. Such value-activities are referred as the 'linkages within the value-chain' which promote competitive advantage through **optimization and coordination** (Porter, 1985, p.48). Within the SC context, the SC consists from various stakeholders who need to link all activities in line with the value-chain approach, to promote effectiveness and efficiencies and to promote a value-added approach in all chain of activities, referred by Porter (1985, p.55) as the 'vertical scope'. The competitive advantage attributed to the competitive capability, through a vertical scope (Porter, 1985), complements the well established term in SCM literature, referred as **vertical integration** or vertical linkages (Swink et al., 2007; Guan & Rehme, 2012). Furthermore, such a vertical integration approach may be one of the options that to manage effectively the firm, needs to **increase ownership** across the SC, so as to achieve growth and efficient SC operations (Guan & Rehme, 2012) whilst for others there may be the need to **outsource** to achieve the same objectives (Frohlich & Westbrook, 2001; Kroes & Ghosh, 2010) and deploy virtual integration.

The **horizontal linkages** of the value-chain activities are attributed to the internal integrated activities performed by the organisation to promote a competitive advantage (Porter, 1985). These integrated activities also constitutes the principle of SCI across the SC, with the difference that the activities' values and costs need to consider all the **SC members' activities** that contribute to the overall SC process to promote a win-win mindset leading to competitiveness and profitability (Dyer, 1994; Lambert et al., 1998; Ketchen & Hult, 2007; Swafford et al., 2008; Flynn et al., 2010; Zhao et al., 2013). The competitive advantage is achieved by the **integration** of the internal core competencies of the focal firm with those of the supplier, customers and other stakeholders' resources appropriately (Costantino & Pellegrino, 2010).

2.6.9.3 Competitive capabilities through quality management: A RBV perspective

Furthermore, the **quality based established procedures**, such as ISO 9001 standard, has become a prerequisite and in-built within the internal management processes to interact effectively with all stakeholders from a holistic approach (Singh et al., 2011). As a result going beyond 'basic' implementation quality standard to the **'advanced'** and **'supportive' implementation stages** (Prajogo et al., 2012; Huo et al., 2014) creates a **competitive advantage over other SCs**, through both **implicit** (e.g. effective information management capabilities) and **explicit** (e.g. state-of-the-art automated equipment) resources. Such a competitive advantage is achieved by the firm-specific and difficult-to-imitate resources, such as physical assets (e.g. dedicated equipment), financial (e.g. improved cash flow), intangible (e.g. brand name) and human resources (e.g. distinct people skills), as outlined by the **RBV of the firm** (Wernerfelt, 1984; Barney, 1991; Teece et al., 1997; Green & Inman, 2005; Kim, 2009). Furthermore, Teece et al. (1997, p. 516) outlined the importance that the competitive advantage needs to result in dynamic capabilities to meet the flexibility needed in the marketplace, by stating that: 'The firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments'. Such a dynamic capabilities are needed in today's changing, innovative and competitive environment. The external stance, from a SC perspective, was also reinforced by (Porter, 1987) as the **cross-business collaboration**, which is also in line with the **extended RBV** of the **overall SC** (Matthews, 2003).

Such an advanced and management support in **quality implementation** stages are a step forward to ensure that all SC stakeholders' interacting processes with the focal firm, at both upstream and downstream, go **beyond** the established ISO based quality practices, to promote proactive and innovative actions for **improved operational performance**. SCM is considered as a crucial operations strategy for organizational competitiveness in the twenty-first century, with the direct involvement of people (Gunasekaran et al., 2008). The new context associated with SCM, is that today competition is not focused between firm to firm competitiveness, but on entire supply chains (Dyer, 2000; Christopher & Holweg, 2011).

2.6.9.4 Competitive capabilities from an individual assigned priority or from a cumulative approach

Initially **competitive capabilities** were considered as mutually exclusive and still a manufacturer needs to be selective on conflicting priorities such as flexibility and delivery (Skinner, 1985) but afterwards he re-stated his position that such competitive capabilities are based on a **dynamic trade-off** (Skinner, 1996). There are other sources in the literature that substantiate that competitive capabilities may be achieved by a firm in order of an **assigned priority** (e.g. Noble, 1995) and others who declare that firms can achieve very well in a multiple set of competitive capabilities (Flynn & Flynn, 2004) and furthermore that they are **mutually reinforcing or cumulative** (Swink et al., 2005). In fact, it is also well cited in the literature that operational or manufacturing capabilities lead to business performance either in **individually** or **in concert** (Vickery et al., 1997; Flynn et al., 1999; Rosenzweig et al., 2003; Swink et al., 2007).

The current frequently cited SC key **operational competitive capabilities** for the focal firm, which are also applied at both the upstream and downstream sides of the SC are: **cost, flexibility, speed/delivery and quality** (Hayes & Wheelwright, 1979b; Frohlich & Westbrook's 2001; Chen & Paulraj, 2004; Swink, et al., 2007; Ketchen & Hult, 2007; Ketchen, et al., 2008; Kim, 2009; Richey et al., 2010; White et al., 2010). Similarly, the financial or **business competitive capabilities** are **sales, market share and growth** (Johnson, 1999; Flynn et al., 2010) and **return on assets, return on sales and return on investments** (Vickery et al., 2003; Rosenzweig et al., 2003; Flynn et al., 2010).

2.6.9.5 Competitive capabilities direct/indirect relationship to SCI operational performance outcomes

From the literature, the evidence of the effects of the mediating variables of SCI within the internal focal firm are conflicting and other times differ. For example, innovation and operational performance directly promotes business performance improvements (Vickery et al., 2003; Koufteros et al., 2005). Other scholars' evidence supports also a direct relationship of internal SCI to business performance improvements (Frohlich & Westbrook, 2001; Swink et al., 2007; Bayraktar et al., 2009; Zhang & Huo, 2013). Similarly, internal integration evidence also differs on the effect on the operational performance since it can have both direct effect (Saeed et al., 2005) or an indirect effect (Koufteros et al., 2005; Gimenez et al., 2012). Furthermore, Schoenherr & Swink (2012) inferred, by distinguishing between the four operational capabilities and stating that internal integration has no moderating effect on quality and cost dimensions, but it is affirmative on delivery and flexibility dimensions. Such a difference in the research results may be attributed to the fact that SCI has three dimensions (i.e. supplier, customer and intra focal firm), which all need to be aggregated together to have consistent outcomes (Swink et al., 2007) or else it could be attributed to the different dimensions and variables used to measure the SCI construct (Alfalla-Luque et al., 2012).

Though, it cannot be excluded from the literature, that internal integration is the foundation of **SCI initiatives** across the SC and that it also provides the bridge between the supplier and the customer integration initiatives to promote **performance improvement** and/or **operational capabilities** which in turn leads to improved business performance (Frohlich & Westbrook, 2001; Koufteros et al., 2005; Swink et al., 2007; Bayraktar et al., 2009; Flynn et al., 2010; Schoenherr & Swink, 2012) to achieve competitive capabilities (Rosenzweig et al., 2003; Bayraktar et al., 2009).

2.6.10 Literature gaps from the post literature review

2.6.10.1 Leadership literature gaps

The established leadership studies have significant relevance to each SC actor, from a leader-follower approach, applicable for each SC tier micro organisational set-up (i.e. from an internal organisational perspective). But there are few scholarly works which explicitly considers network based leadership in the macro context of inter-organisational networks (Sydow et al., 2011), such as supply chain set-ups (i.e. leadership approach adopted by SC members across the SC). The leadership domain within the 'management of integrated supply chain' is a 'largely ignored area' (Defee at al., 2010, p.764). They additionally declared that:

> 'This perspective suggests that supply chain integration may be partly due to the active leadership and influence of one organization within the supply chain. Interestingly, however, no theory currently exists that explains how a firm becomes the supply chain leader and maintains that role over time. Moreover, the role and impact of the other "follower" organizations within the supply chain has been virtually ignored in the context of their alignment and support of the supply chain leader' (Defee at al., 2010, p.764).

Also, Lambert et al. (1998, p.12) assert that 'The managerial and behavioural components were, in general, less well understood and more difficulties were encountered in their implementation', relative to the physical and technical management components (e.g. organisation structure, communication and information flow structure, etc). Stonebraker & Afifi (2004, p.1142) also contend that there is the need to investigate the 'leadership proactiveness' within the SC context. Furthermore, such a challenging SC management approach has also been queried by Storey et al. (2006, p.769), by questioning who shall manage the SC from all the SC actors, by stating that: 'Who could and should have this responsibility?'

The role of people is pivotal in all SC management and leadership implementation initiatives, in fact the literature indicates that the role of people is often not explicitly addressed within SCM (McCarter et al., 2005) and furthermore there is lack of research on the integration between the HRM and SCM disciplines (Lengnick-Hall et al., 2013). Such lack of significance given to the human element, within the SCM literature, can also be relatively seen when compared with the literature dedicated to the 'green' dimension within the sustainable SCM perspective, since the latter takes a pivotal role in various scholarly works (Ashby et al., 2012). But with respect to the human element, there exist 'no equivalent use of the social element' despite the key role the people have in all needed skills and in the formation of all relationships across the SC (Ashby et al., 2012, p.506). Finally, Shub and Stonebraker (2009, p.32) declared that 'There is little in the literature that describes the relationship between human resource activities or organization variables and supply chain success'.

2.6.10.2 Supply chain integration literature gaps

SCI from an external perspective is lacking, since Swink et al. (2007, p.153) identified that 'past research provides little information regarding the relative and respective contributions of strategic customer integration and strategic supplier integration activities' (Swink et al., 2007, p.153). Furthermore, Guan and Rehme (2012, p.188) from a study focused on the customer integration gaps, emphasized that 'Downstream integration has received little attention in supply chain research'. SCI studies within manufacturing are also limited since Swink et al. (2007, p.153) added that 'Little attention has been given to the impacts of integration on manufacturing plant competitive capabilities'. Schoenherr & Swink (2012, p.110) also contend that 'theory surrounding supply chain integration is still underdeveloped', and as a result they recommended that 'Further studies should also aim to collect dyadic or even triadic integration measures', so that research studies cover a more holistic SCI approach. Such SCI holistic gaps was also supported by another study which outlined the need that future research has to consider multiple levels of firms relationships (Pero et al., 2010). Most of the SCI scholarly work are focused only on the dyadic level (Kang & Kim, 2010; Xiao et al., 2010; Dass & Fox, 2011), which as a result are causing lack of literature associated with the multiple direct and indirect relationship with all SC members (Holweg & Bicheno, 2002; McFarland et al., 2008; Dass & Fox, 2011). Finally, Cheung et al. (2012, p.3907) emphasize on the importance of deploying knowledge and not only information to improve on SC performance, by stating that 'Most of the previous research work for supply chain integration is information driven instead of knowledge driven'. Bessant et al. (2003) also inferred such a lack of knowledge management within SCM literature.

2.6.10.3 Sustainability literature gaps

Most of this research within the SCM literature with respect to sustainable practices has been fragmented and considered single activities in isolation (Svensson, 2007; Gold et al., 2010; Glover et al., 2014), and as a result scholarly studies need to consider the triple bottom line measures from a holistic perspective. SC actors, such as suppliers, need to be engaged in such a green SC initiatives in-conjunction with the focal firm, which has also received little attention by scholars (Caniels et al., 2013). It is considered pivotal that SC related scholarly work need to engage Green Supply Chain Management (GrSCM), in fact it was stated that: 'further research in the integration of environmental management with ongoing SC operations' is being recommended in recent works associated with environmental performance (Bojarski et al., 2009, p.1747).

2.6.10.4 Manufacturing literature gaps

The manufacturing sector needs further research in the area of 'holistic research approach integrating technological, managerial and business-model solutions together with a change in the customer behaviour, with the perspective of a more sustainable manufacturing for the production of more sustainable products and services' (Garetti & Taisch, 2012, p.88).

The outcome attributed to SCI within manufacturing is lacking, since as referred in Section 2.6.10.2, it was stated that: 'Little attention has been given to the impacts of integration on manufacturing plant competitive capabilities' (Swink et al., 2007, p.153). In view of the dynamic changes within manufacturing from an operations management perspective, there is lack of literature to empirically establish the foundations of the paradigm shift on how the service provision is being put into practice within the HVM context (Wilkinson et al., 2009). Such a perspective, was substantiated by Macbryde et al. (2013, p.1594) by stating that 'there is little empirical evidence indicating whether firms in developed countries are indeed changing their mode of operation and moving into HVM' and they also added that 'These gaps in knowledge are particularly important in relation to smaller firms which are largely ignored in the existing literature, and yet form a significant part of so many developed economies'. They finally added that manufacturing success needs a strategic approach over the traditional efficiency focus, by declaring that a 'more holistic approach is required bridging the gap between higher level strategic work and the detail of operational activity'.

2.6.11 Summary of the a priori and post literature reviews

The a priori literature review (Section 2.2) is mainly focused on SCI and IT within the manufacturing SMEs. Such an a priori literature review is carried out before the initiation of the data collection and analysis process, so as to inform the researcher on the tentative research objectives, by taking a broad perspective on the theory underpinning SCI. Such a step situated the researcher with a good understanding of the key SCI issues and challenges from the extant literature, as referred in Section 2.5, supported by its summary in Section 2.5.12. Such a literature review also enabled the researcher to filter out the literature gaps (Section 2.5.9 & 2.5.10) so as to formulate the tentative research question (Section 2.5.11). The literature review with its established significant concepts (Appendix 2) also assisted the researcher to design the open-ended interview guide, to kick-off the research initial data collection and analysis (Appendix 3).

The post literature review (Section 2.6) is carried out with the completion of the data collection and analysis and after establishing the emerged theory, as referred in Chapters 5 and 6. Such a literature review objective is to establish the contemporary theory on all the emerged themes and the contemporary literature gaps respectively, so that the researcher is in a position to establish the commonalities and the differences between the emerged theory and literature, so as to derive the research contribution, as referred in Chapter 7.

The post literature review, as guided by the emerged theory, outlines that the business strategy needs to set-up a manufacturing strategy in-conjunction with the SC strategy, by involving the right SC actors and employ an integrated approach to develop all operations into a competitive weapon across various elements of performance (e.g. innovation through improved products and processes; low cost of operations through efficient processes; and low purchasing costs of all raw materials). The business strategy places demands on the manufacturing strategy to implement the necessary production plans, with all sustainable measures, from the triple bottom line perspective and quality standards, to meet the competitive capabilities (e.g. products low costs, operational cost cutting measures, high quality levels, sustainability and R & D initiatives, in both processes and products).

The focal firm cannot operate in a vacuum and needs to set-up an effective SC strategy, in-conjunction with relevant SC actors, to achieve a holistic SCI management approach to achieve competitive capabilities. Such a holistic process approach is enabled by technology deployment, in both manufacturing automation and information systems. The manufacturing technology is deployed to improve the efficiencies of all processes within the focal firm through automation. The information systems provide an information sharing platform to exploit all resources, such as information and knowledge, both within the focal firm and across the SC, through improved synergies, so as to improve in both manufacturing (e.g. lean and agile manufacturing) and SC operations (e.g. real-time information sharing) to promote SC flexibility, responsiveness and visibility.

The SCI approach needs to ensure an internal integrated approach in all its strategies and tactics to be in a position to replicate such an integrated approach beyond the focal firm with all SC actors, to achieve an overall SC competitive performance. The holistic process approach, also needs a innovative SC strategic approach, to build on the manufacturing strategy innovative initiatives, to promote a continuous improvement approach in all processes, both within the focal firm and across the SC, by the involvement all SC actors. The holistic process approach needs to employ several measures and initiatives which involves all SC actors to unify together all SC stakeholders, which are to be based on a set of inter-related concepts since SCI is a multi-dimensional and cross-disciplinary concept, where one concept influences another and vice versa. Such a complex set of concepts are in line with the emerged theory themes under the holistic SCI management approach, as referred in Table 5.1, but there exists limited details on what constitutes such a holistic process approach, as already referred in Sections 2.6.7 and literature gaps in Sections 2.5.9 and 2.6.10.2.

The next chapter outlines the methodology, where it explains the role of both literature reviews and also the overall research process based on Straussian GTM, with its procedures and techniques in the data collection and analysis design and implementation together with the researcher's philosophical research paradigm to generate a valid and reliable substantive theory.

3.0 Chapter 3: Research Methodology

3.1 Introduction

This chapter provides the research methodological outline of the overall research process, by including the Straussian methodology Grounded Theory Method (GTM) (Strauss & Corbin, 1998) selection as the preferred option over the Glaserian GTM (Glaser, 1998), and also an overview of all the procedures and techniques within the GTM, with a representation of all the steps in a visual display. Justification to use the GTM within the supply chain management (SCM) discipline is also referred. The GTM seminal works are outlined together with the researcher's philosophical paradigm vis a vis the epistemological and ontological aspects for generating valid knowledge. The research quality criteria is referred to promote valid and reliable research and with all the ethical safeguards in line with the ESRC guidelines. The roles of the a priori and post literature reviews are referred within the research process. Finally, the research process itself is outlined, by explaining all the implementation measures taken in all sampling and data collection and analysis processes to promote scientific research rigour in line with the GTM research quality criteria.

3.2 Research methodology justification

Operations Management (OM) is an applied, problem-oriented and cross-disciplinary field (Amundson, 1998). OM based academic research needs to contribute to theory development from a multi-discipline perspective to produce relevant research within the relevant academic fields and which must also be accessible and understood from the practitioners' perspectives. The purpose of theory is to define, establish and explain relationships between concepts or constructs which forms up one element of scientific knowledge (Amundson, 1998). OM borrows from other fields for understanding the nature and purpose of theory such as sociology, economics, information and organisational theories among others, which makes the discipline as cross-disciplinary (Croom & Romano, 2000; Parente et al., 2008).

SCM falls within the OM discipline which lacks theory construction (Frohlich, & Westbrook, 2001; Pilkington & Fitzgerald, 2006) and is looking for less hypothesis testing (i.e. statistical methods) and more systematic observation through qualitative research approaches, due to the SCM innovative nature of all processes, both within and outside the focal firm (Fisher, 1997; Hayes, 2000). The researcher's cognitive lens adopted is based on Supply Chain Integration (SCI) with a multidisciplinary approach, mainly based on SCM and Information Technology (IT).

The research objective is to determine and explore how the focal firm, in-conjunction with all the stakeholders, within a SC set-up, is managing a holistic integrated approach between all players. The aim of the research is to derive a grounded theory based on a set of interviews, as the main source of the data collection approach, so as to establish inductively how the focal firm is achieving an integrated approach, within the focal firm and across the SC. The research question is to establish all the key factors and a theoretical framework that constitutes SCI within manufacturing SMEs to promote competitive performance.

The aim of the research is to select the most adaptable method to answer the research question, as referred by Bouchard (1976, p.402) who states that good research needs 'picking the most powerful method for answering that particular question'. Furthermore, the research methodology also needs to consider the epistemology and ontology, to establish the researcher's philosophical paradigm, since one cannot interpret research and generate knowledge from different paradigms within the same research method, due to different worldviews, not to risk research inconsistency as a result of the paradigmatic incommensurability (Lee & Lings, 2008).

Taking the two extreme ends of social science epistemologies, namely positivism and social constructionism, the research methodology has a set of determined characterisitcs depending on the philosophical approach of the researcher, with respect to the: research aim type (i.e. discovery or construction of reality); research techniques (i.e. measure or conversation); research analysis (verification/falsification or sense-making); and research outcome (i.e. casuality or understanding) (Easterby-Smith et al., 2008). The researcher's approach has adopted a research aim that constructs theory, as referred in Section 3.6.1. The research technique is conversation with the participants to generate data that outlines the theory under the practitioners' actions. The research design is sense-making by the on-going memos with constant comparison of data, during the data collection and analysis process, as referred in the three coding stages, within Section 3.10. The outcome is about the understanding what the data are saying, throughout the data collection and analysis process, to derive the substantive theory to promote understanding, to both the academics' and practitioners' communities, as referred in Section 3.9.

The decision to approach a study quantitatively or qualitatively depends on the research questions driving the study, prior work, the planned research design and the desired contributions the researchers wish to make (Edmondson & McManus, 2007). The suitability of the qualitative research strategy chosen by the researcher, over the quantitative counterpart approach, is valid since the research objective is exploratory with the objective to establish the characteristics that constitute the SCI phenomenon within the manufacturing sector. Such a qualitative research approach needs to understand the meaning and knowledge from the data given by practitioners. The research boundary conditions are targeted to manufacturing SC, to ensure that the research is manageable and to engage in more focused research. SCI is based on the interactions between various SC members, which are all characterized by constant and dynamic technological changes and innovations, in both the manufacturing and SC processes and the manufactured products. The SCM discipline is still a developing management approach, especially in integration initiatives with the current developments, which is causing SCI to take an emerging paradigm shift (Pagell, 2004; Storey et al., 2006; Zhao et al., 2008; Schoenherr & Swink, 2012). With such literature gaps, a qualitative research approach is well suited due to the richness of quality data needed within the data collection process (Stern, 2007).

The research question and objective is to establish a broad perspective of the SCI and is therefore more practically reached by a qualitative methodology, to capture such a holistic phenomenon, where: emphasis is on exploration; it is naturally occurring and contextual; it is inductive; it is subjective; data is expressed in words; the researcher participates and collaborates with the participants; and it undergoes text analysis (Rudestam & Newton, 2007). It was further claimed that 'the frankness of the conversational responses reveal some of the depth that would be unlikely to be gained through a survey instrument' (Harland et al., 2007, p.1249). It is to be outlined that the GTM goes a step further than text analysis, since it is a method that digs deep within the text to undergo theoretical abstraction in an iterative process, with an 'interplay between induction and deduction' through constant comparison of the data to arrive at the emerged theory (Strauss & Corbin, 1998, p.137).

Qualitative theory building approaches, 'such as grounded theory method (GTM), are still not very widespread and rigorously applied in operations management (OM) research' (Binder & Edwards, 2010, p.232). Though, the GTM is well mentioned in information systems to discover process oriented descriptions and explanations within a context (Myers, 1997; Bryant, 2002; Urquhart et al., 2010). Such GTM applications substantiate the researcher's selected choice, since the research focus is mainly based on both the SCM and IT disciplines.

The researcher has used the GTM to focus on qualitative data but it is normally associated with both qualitative and quantitative data (Glaser, 1998). The researcher's statement that he is using a GTM based on a qualitative research method is a valid declaration, since such an option was taken because of the 'ease of highly meaningful data collection' (Glaser, 1998, p.29). The researcher also understands that no method can deliver the ultimate truth, although some methods are more suited than others for conducting research, no one can argue that a 'single method -- or a collection of methods -- is the royal road to ultimate knowledge' (Guba & Lincoln, 2005, p.205). The grounded theory approach, with such a research question, demonstrates consistency between the research questions and the methods used to answer these questions (Suddaby, 2006; Binder & Edwards, 2010).

3.3 Methodology selection

The research objectives' requirements led to the selection of a qualitative research method with a constructivist epistemology, based on the Grounded Theory Method (GTM) (Strauss & Corbin, 1998). The researcher's approach to the GTM is mainly governed by both the Glaserian (Classical) (Glaser & Strauss, 1967; Glaser, 1998) and the Straussian (Strauss & Corbin, 1998) grounded theory seminal works. Though, the researcher had to choose one from the two options and as a result preferred the Straussian GTM for its systematic process (Strauss & Corbin, 1998). This selection did not exclude the researcher from including any key reference to the Glaserian GTM within the research work, since both methodologies constitute some common roots but have some pivotal in-built differences.

The main differences are that the Glaserian methodology (Glaser,1992) outlines that: first, the research focus shall not be established prior to the research data collection and analysis, but needs to emerge from the analysis itself; second, that there is no need to review the extant literature before the research commencement, to ensure no preconceived ideas to influence the research process; and third, the approach of emergence shall be left open, with no systematic procedures, not to force the emerged theory out of the data. Whilst the Straussian methodology (Corbin & Strauss, 2008) outline that: first, an initial broad focus research question is required to guide the research process; second, undertaking an a priori literature review enhances the researcher's theoretical sensitivity and can be used to establish the research question/s; and third, the researcher can use analytic tools and techniques, such as the coding paradigm and CAQDAS, to assist the systematic theoretical conceptual process to inductively derive the emerged theory.

3.4 The Grounded Theory approach: Straussian methodology overview

The Straussian GTM research design is being outlined to demonstrate the systematic research approach adopted to promote research rigour. The researcher deploys the three Straussian GTM coding techniques, referred as Open, Axial and Selective Coding respectively. The data collection is based on two sampling techniques to generate the data. The GTM data management tools are based on both the CAQDAS (Computer-Assisted Qualitative Data Analysis Software) and the storyline techniques, supported by memos and visual aids all along the research process, in particular, logic diagrams as tables, code matrices as tree diagrams and conceptual frameworks as mind maps, to promote the research audit trail of all the data analysis. The researcher's constructivist philosophical stance is used, since it accepts the researcher's active engagement in the research data collection and analysis process, to generate valid knowledge. The research quality criteria is considered to promote validity and reliability in the generated substantive theory and in all the research process.

The research methodology process consists from the following steps, which although are depicted as a sequential process, the three coding stages within step 6 were of an iterative nature, which drives the researcher to move back and forth during the research process to build on theoretical sensitivity in the data, so as to promote research rigour. The key steps within the research methodology are referred in Table 3.1:

Step	Research methodology strategic steps	Research methodology description and scope
1	A priori literature review	Established gaps and research questions; enhanced the researcher's theoretical sensitivity; and designed the initial open-ended interview guide.
2	Research strategy	Qualitative approach to meet the inductive and exploratory nature of the research question.
3	Research method	Grounded Theory Method (GTM) to generate grounded theory based on the Straussian GTM.
4	Data collection	Mainly based on interviews; and supported by direct observation notes by the researcher and documents provided by participants and other accessed data sources (i.e. triangulation of data sources).
5	Sampling techniques	Open sampling (i.e. based on the first interview guide derived from the literature) and theoretical sampling (i.e. based on second interview guide as emerged from the data).
6	Data analysis	Open, Axial and Selective Coding stages with dual data analytic approaches based on CAQDAS and Storyline techniques supported by memos, logic diagrams (i.e. tabulations); conceptual frameworks (i.e. mind maps) and code matrices (i.e. tree diagrams). Such triangulation of analysis techniques assisted the theorising process through constant comparison so as to achieve theoretical saturation.
7	Research philosophy	Constructivist paradigm.
8	Research quality criteria	Fit (Credibility), Generality (transferability), Understandability (dependability) and Control (confirmability) (Glaser and Strauss, 1967).
9	Ethics	Ethical considerations in line with ESRC framework.
10	Theoretical account of the emerged theory and the conceptual framework with a set of theoretical propositions	Generated grounded theory with a set of key categories (i.e. one core; a set of 5 main categories with 16 sub-categories) and a conceptual framework.
11	Theoretical integration	Situated the generated substantive theory within the extant literature to derive the commonalities and the differences and the contribution.

Table 3.1: Research Methodology Outline (Author)

3.5 Seminal works associated with the Grounded Theory Method (GTM)

The GTM was initially articulated in Glaser and Strauss's (1967) book 'The Discovery of Grounded Theory', after deriving a systematic analysis of terminal ill patients, with the objective to be used by social scientists in other topics to generate theory (Eisenhardt, 1989; Urquhart, 2001; Suddaby, 2006), without the need to have an a priori hypothesis (Glaser & Strauss, 1967). Over the years, the GTM developed into two distinct variants, one favoured by Glaser, referred as the classical GTM and the other by Strauss, referred as the Straussian GTM. A disagreement between the two sociologists, as referred in the Strauss and Corbin's book in 1990, caused the GTM to take two different approaches.

In the opinion of the researcher, although the Straussian GTM is being used in this research, both Glaser and Strauss seminal works, dated back in the Glaser and Strauss (1967) book, still represents the solid foundations of the GTM, although other books that followed, by both authors and even others, refined and clarified the principles, through their different approaches, associated with the research process to promote research rigour (e.g. Strauss, 1987; Glaser, 2002; Charmaz, 2006; Bryant & Charmaz, 2007). Such key common foundational concepts are: Theoretical Sensitivity; Constant Comparison; and Theoretical Sampling. In retrospect, the researcher wish to make it clear that primary attention during the research process is given to the Straussian GTM, but it is not being excluded that some concepts or techniques will be used from the Classical GTM and even other scholars, backed with the relevant reference to the sources.

A key issue that underpins the two GTM approaches is the philosophical paradigm that constitutes the theory generation. There was a movement away from the objectivist stance used in Classic grounded theory (Glaser & Strauss, 1967) to a position, where the role of the researcher was accepted to contribute to the sense-making process and that a multiple interpretation of human experience also contributes to derive the reality (Strauss & Corbin, 1994; Charmaz, 2000, 2006). In fact, the researcher's philosophical paradigm, as referred in Section 3.6.1, takes the constructivist GTM, which is still consistent with the Straussian GTM and in line with Charmaz (2006, p.130), where it is argued that researchers may come up with similar ideas but the theory construction may vary and hence she stated that the 'theory is dependent on the researcher's view; it does not and cannot stand outside of it', as it is treated by objectivists.

From the 'The SAGE Handbook of Grounded Theory', by Bryant and Charmaz (2007), the researcher's preoccupation on the different approaches adopted in GTM by Glaserian, Straussian and Charmaz, among others, has been completely eliminated, since it has been clearly outlined, that the GTM is a family of methods, where the researcher needs to make informed choices and needs to articulate the rationale to support the choice (Bryant & Charmaz, 2007). This means that the researcher is allowed to adopt the key GTM foundations, referred by both Glaser and Strauss, as the main scholars who contributed to the seminal works on the GTM. As a result once any approach taken is defined and cited accordingly, then the methodology is considered to have a valid research design strategy. The main reason for the researcher to mainly deploy the Straussian GTM, is the fact that such a methodology employed a systematic approach and accepts an a priori literature review (Strauss & Corbin, 1990; Corbin & Strauss, 2008), whilst the Classical grounded theory methodology is open, flexible and parsimonious, where it focuses on latent structural patterns that constitute the emerged theory (Glaser, 1998).

3.6 Research philosophical approach and research quality

3.6.1 Epistemology

Epistemology defines the validity of the generated knowledge. The participants' statements (e.g. description of their actions) are analysed to construct out of such data the key themes. The term construction comes from a constructivist epistemology. The theory generation process is not only emerging and being discovered (Glaser & Strauss, 1967) but is being constructed from the emerged data, with the active engagement of the researcher's interpretation from the views of the participants through the transcribed data. This constructivist approach has been emphasized by the statement that the: 'mutual creation of knowledge by the viewer and viewed aims towards interpretive understanding of subject's meaning' (Charmaz, 2000, p.510). The data through the transcripts represents an account of the way reality was at the time of the interview, where participants creates their own meaning on the SC phenomenon based on their experience and knowledge (Corbin & Strauss, 2008). The researcher is engaged in a number of processes, under the GTM, such as constant comparison, Open Coding, storyline memo writing, Axial Coding and Selective Coding, which are all function of the researcher's reflexivity, which means that the analysis may also be coloured by the researcher (Strauss & Corbin, 1998; Charmaz, 2006). The researcher's reflexivity plays a key role in the way the analysis is undertaken, since it determines the researcher's abilities of creativity and discovery to construct theory from the data, referred as theoretical sensitivity (Strauss & Corbin, 1998; Corbin & Strauss, 2008).

The researcher cannot imagine to use the Classical GTM, since he cannot understand how it is possible to set aside all his previous knowledge during the research process to begin the research with a 'tableau rose' (Glaser, 1998, p.70) (i.e. tabula rasa or clean slate). Such a theoretical sensitivity is also highly influenced by the researcher's work experience, of around fifteen years in the industry and with his professional knowledge on the subject matter and also as an academic for the last nine years). Though, the researcher considers that objectivity can be achieved through rigour, impartiality and consistency (Patton, 2002).

3.6.2 Ontology

The ontology of the research stance adopted is based on the condition that the physical and social reality is subjective with a multiple reality and context dependent. This means that reality is constructed by the science itself within a reality which is 'unstable, constantly changing and unavoidably subjectivity' exists (Lee & Lings, 2008, p.60). The researcher, being a human, during such an activity, cannot stand apart from the experience (i.e. be impartial). The human element cannot separate the self from the social context, leading to the researcher experience to be unavoidably influenced by such a context (Lee, 1999).

The scientist is no longer value free and objective in the data collection and analysis process, but reflects the personal values or beliefs, such as preferences, experiences and academic background. 'A God's eye frame of reference' is not fully possible (Van De Ven, 2007, p.45). Furthermore, particular attention should be given to objectivity (impartiality) of the information obtained during the qualitative research methodology, since as Lee and Lings (2008, p.120) refer, 'humans have a tendency to place more importance on information that supports their existing views than information which challenges those views'. Such an approach needs to be avoided, so as to maintain the rigour and validity of the findings by undergoing the constant comparison method on various participants' accounts, to derive the similarities and differences in the emerged theory with an audit trail of all the emerged theory. Furthermore, the CAQDAS and storyline techniques are used for data analysis, to promote a dual data analytic method triangulation, during the data collection and analysis processes to achieve trustworthy research by studying the same phenomenon through a different technique. Such research validity is further enhanced by including slices of data from polar or extreme (deviant) cases, which sustain cases that go against the norm, which further amplifies the variation in the emerged theory (Yin, 2009). With the implementation of such measures within the methodology introduced a level of robustness to make up for the researcher's influence on the interpretation of the data (Glaser & Strauss, 1967, Strauss & Corbin, 1998).

3.6.3 Research quality

The qualitative research approach has the researcher himself as the measuring instrument (Creswell, 2007). The qualitative research over the quantitative research approach can 'follow up ideas, probe responses and investigate motives and feelings, which the questionnaire can never do' (Bell, 2009, p.157). The aim is to develop, capture or uncover substantive knowledge from the different processes and elements in the SC relationships, which can 'yield rich material and can often put flesh on the bones of questionnaire responses' (Bell, 2009, p.157), with theory building and refinement. The data is explanatory (i.e. reported in words rather than measurements or ratings) and special attention is given in the data analysis to promote rigour and to employ an engaged scholarly work and not to limit research outcomes validity and reliability. Though, the findings transferability (generalizability) properties, due to small the sample of the population under study, are characterised by 'contextual uniqueness and significance' Bryman (2008, p.378), which means that the findings are context specific and dependent and cannot be generalised to other situations due to contextual differences. The generalizability property is concerned to the theory generated grounded in data or to the 'quality of the theoretical inferences rather than to populations' (Bryman, 2008, p.392). The issue of transferability and contextual differences is further explored by Wasserman et al. (2009, p.371), where it was argued that 'Grounded theory attempts not only to build conceptual models specific to particular pieces of data, but for broader contexts'.

With such a perspective, the research outcome is being considered as more solid, since various countries across the globe, especially Small Island States, have similar contextual characteristics, such as competiveness and cultural values, but with different orientations, which may not affect the conceptual framework substantive key theory but may only influence the variations of the conceptual elements and their interactions within the overall process. Such a transferability property with its emerged hypothesis/propositions preferably needs to be substantiated through replication of the study in other countries to promote the validity of such generalisation across different geographical settings. It is to be noted that the research sample frame includes a mix of SMEs with all the concerned stakeholders across the SC, which are both locally and internationally engaged (e.g. Italy, USA, Germany and UK), which makes the conceptual substantive theory to cover a broader context with a richer generalizability.

Glaser and Strauss (1967) criteria for assessing the credibility, plausibility and trustworthiness of the grounded theory include: (a) fit; (b) understandable (i.e. understandability; (c) generality (i.e. generalizability); and (d) control. Thus the emerged theory should **fit** the substantive area (i.e. the generated propositions of the theory, fit the reality of the discipline), with the provision of being **understandable** to the people who apply the theory (i.e. the theory clearly promotes practical usage), include the **generality** principle to be applicable and flexible enough to guide problem-solving and processes implementation to a wide range of contextual situations and finally allow for **control**, by being able to undergo the necessary changes and refinements to make the theory relevant and useful over time. Corbin and Strauss (2008, p.302) declare that the two research quality criteria are ‘trustworthy’ and ‘plausible’. Such a quality criteria approach is needed to ensure that the claims (propositions) made from the research are credible, valid, meets high standards of rigour and will advance the SCI theory in a scholarly way. The canons of good science were always a debatable subject by the research community to ensure that qualitative research maintain the standards of scientific research as quantitative research. Such a consensus has always been focused to derive the criteria needed to judge the merit of qualitative research and its generated theory.

The researcher, in view of such a multiple perspectives on the research quality criteria, also refers to Denzin and Lincoln (2005, p.24) who assert, in line with Glaser and Strauss (1967) scientific rigour, with particular reference to the constructivist paradigm, that ‘**credibility, transferability, dependability** and **confirmability**, replace the usual positivist criteria of internal and external validity, reliability and objectivity’. Such an approach is also substantiated by Miles and Huberman (1994, p.277), where they established a practical list which need to be posed to promote trustworthy and authentic research, which are referred by: ‘objectivity/**confirmability** of qualitative work; reliability/**dependability**/auditability; internal validity/**credibility**/authenticity; external validity/**transferability**/fittingness; and utilization/**application**/action oriented’. Henceforth, the researcher adopts the research quality criteria based on Glaser and Strauss (1967), as referred above, since they are in line with both Denzin and Lincoln (2005) and Miles and Huberman (1994), namely: fit matches credibility; generality matches transferability; understandability matches dependability; and control matches confirmability. All practical implications taken by the researcher for each research quality criteria are referred below:

I. The constant comparison process applied in the data (i.e. slices of data) from both the same or different twenty-two transcribed interviews, across all the three coding stages, within all memos through the CAQDAS and the storyline approaches (Chapters 4 & 5), with narratives substantiated by *in vivo* excerpts (i.e. participants’ meanings), kept the analysis grounded in the data and makes the substantive theory in line with the **confirmability** criteria by eliminating bias and preconceived concepts on the data and promotes transparency in the research analytic process, which makes the theory to take foothold in diverse situations to be **controllable** to meet the user differing requirements and to meet the dependability or fit criteria;
II. A systematic approach is used through the CAQDAS and storyline approaches in all analytic coding stages (Chapters 4 & 5), as triangulation tools, which makes the substantive theory in line with the **dependability** criteria through an established consistent and rigorous audit trail, which promotes informed **understanding** of the substantive theory processes to be applicable by the user of the theory; and

III. The final theory generated a substantive theory, which is specific (i.e. **fit**) to the discipline (Glaser & Strauss, 1967). The substantive theory is mainly focussed on the SCM and IT disciplines by building a SCI conceptual theoretical framework, with a set of theoretical hypotheses/propositions, which makes the substantive theory in line with the **credibility** criteria. Such a stance is achieved by ensuring that all analytic processes are grounded within the data, with the inclusion of variation within the key categories and sub-categories, as emerged from different views of all the participants through the constant comparison process, as outlined in the final conceptual storyline with its theoretical model (Chapter 6);

IV. The emerged theory is open to development, since the iterative constant comparison process, was applied to various participants' data within different firms, which involved comparing the emerged theory with new data with every new participant. Such a stance makes the final theory tendency to adapt, or takes into account, to what the new data are saying, which makes the substantive theory in line with the **transferability** criteria, since it makes the theory to be **generalizable** to other contexts, once they fit or have a degree of similarity to each other.

It is to be noted that the inductive generated conceptual framework represents the theory as applied to the real world, but Lee and Lings (2008, p.123) refer to it, a 'model is a representation of the real world; but it is not the real world'. This accounts for the knowledge transfer problem (Van De Ven, 2007; Lee & Lings, 2008), which still needs to be challenged, due to the difference in the real world from the representation of the theoretical model.

As a result of the researcher's constructivist philosophical approach, in this Grounded Theory research methodology, is based on the researcher's engagement with the participants and various other sources of data, to promote data sources triangulation (e.g. interviews, documents and direct observation field notes) and also uses diverse analytic tools, to promote data analytic triangulation (e.g. CAQDAS and storyline with a set of memos), with the generation of knowledge. Such knowledge generation is a function of the researcher's theoretical sensitivity and hence his reflexivity, to have all the necessary insights to construct the theory from the interpretation of the data with a richer and a higher quality research approach. The generated theory is specifically valid to the sample under study and not generalizable to the whole population, due to unique contextual conditions, unless the contextual differences are well established to promote a wider contextual coverage. The reality is considered as subjective (multiple perspective) and socially constructed depending on all the actors (i.e. participants and researcher) and their context.

3.7 Research Temporal Design, Sampling Strategies, Sample Size and Unit of Analysis

3.7.1 Research temporal design

The research design is based on a cross-sectional type of design (Bryman, 2008), where the objective is to capture a snapshot of what is happening in the field. It is not the scope of the research to undergo a temporal assessment, as covered by longitudinal research. The constant comparison process under the GTM is used to capture in-depth data, so as to uncover all the processes and actions within the field understudy but not to include the changes in time from repeated visits to the participants.

3.7.2 Sampling strategies

The data is generated from two sampling stages, mainly based on the interviewing technique, being the primary mechanism used in various grounded theory studies (Birks & Mills, 2011), as referred in Section 3.9. The researcher had to play the role of the facilitator during the interviewing process, especially in the second sampling stage, by employing 'sensitizing', 'theoretical', 'practical' and 'guiding questions', to generate rich data, but at the same time had to watch out for any bias imposition both on the participant, during the interview or on the data, during the analysis (Corbin & Strauss, 2008, p.72).

All the participants, under both targeted samples, are focused on different types of manufacturing sectors to promote variation and richness in the data. Reference was made to the Malta Enterprise Directory 2012 (Malta Enterprise, 2012), for the list of the Maltese manufacturing firms, to be informed on the various sectors within manufacturing, to establish the right selection. Though, it is to be noted that to get access to the research respondents required more efforts than just by sending an e-mail or establishing a phone call. In fact all the respondents' selection, in the two sampling stages, was based on established contacts within the industry, through colleagues Engineers and Lecturers and other relatives and friends.

Every interview with the participants, in both sampling strategies, was digitally recorded and took around one to two hour time-span. The transcription time for each interview, together with the field notes taken from direct observation, took an average time of 20 hours to compile. The duration of the research data collection and analysis process took almost two years to complete, with several gaps dedicated to the analysis processes in between interviews to deploy the constant comparison process through various memos and summary memos both within the CAQDAS and storyline techniques.

3.7.2.1 First stage sampling strategy

The first stage of the sampling strategy combined the approaches of open sampling (Strauss & Corbin, 1998) and convenient sampling (Bryman, 2008). The reason for the selection of such a dual sampling stance is attributed to:

- Open sampling was used since the first participants selected in the research data collection were highly knowledgeable of their respective businesses and well versed with the supply chain responsibilities and in the role of IT at the workplace, to be in a position to detail out an in-depth account on the phenomenon in a broad and more flexible way from a practitioner's perspective, in line with the research criteria to generate rich data, considering that the researcher had no concepts in mind to probe upon; and
- Convenient sampling was used because the participants were readily accessible through established contacts, who also acted as gatekeepers. These were mostly Engineers or Managers, who were in the same class or in a different year, in my Graduate or Post Graduate education level training or else were referred by colleagues who worked in the manufacturing sector. It is to be noted that whenever no previous contacts to gatekeepers were available, the request to gain access to the firms to undertake the research interviews was always turned down.

Appendix 5 provides the list of these eight (8) participants with an anonymous coding label for ethical reasons. The sample matched the requirements of the study, to generate rich data, since it covered different types of firms' ownership and sector type, with different roles across the supply chain (e.g. suppliers, manufacturers, contractors and freight forwarders), which included both locally or internationally owned firms from various countries' subsidiaries and manufacturing sectors respectively. Such a sampling strategy was adopted for the first phase of the research method, to ensure that a good rapport exists with the participants and with such a level of trust, positioned the participants to generate rich and in-depth data for all the open-ended questions, as referred in the interview guide in Appendix 3. Almost all the interviews included a factory tour to enable the researcher to undergo direct observation of the whole manufacturing process.

Initially a pilot study was carried out to test the content validity of the interview guide and to undergo the relevant refinements with the support of my research supervisors. Such a sampling approach, included instances where participants adopted a very flexible approach and explained in detail all their views on the phenomenon, independent of the interview guide sequence of questions. There were some cases where participants also incorporated a critical perspective of some of their statements, on both current and retrospective data, such as by outlining incidents and examples from experience, to enrich the account of the information and how to sustain such SC practices. The researcher's priority was always focused to capture current experiences, over retrospective data, since living forward ideas that are being implemented leads to emerging explanations that are more interesting and innovative, than past actions. This **first stage** of the sampling strategy obtained data that was used in the first two phases of this research data collection and analysis, as referred in Tables 3.1 and 3.2.

3.7.2.2. Second stage sampling strategy

The **second stage** of the sampling strategy was based on theoretical sampling, with the scope of 'filling in' the gaps in the emerged theory (Corbin & Strauss, 2008, p.272). Theoretical sampling was left to last phase of the research process, to avoid varies pitfalls, such as 'premature closure' and 'redundant categories' (Charmaz, 2006, p.107). Such a sampling approach was focused on the emerged concepts, so as to be further explored, by a new interview guide, as referred in Appendix 6, containing a set of semi-structured questions, based on the emerged theory, represented by the set of emerged tentative categories from the Axial Coding stage in Chapter 5. The process of data collection and analysis was controlled by the emerging theory, whether substantive or formal (Glaser & Strauss, 1967). Such a new interview guide was backed with a probe list, to ensure that all participants remain in-line with the focused questions, by setting a set of prompts, so as to sample for concepts (Strauss & Corbin, 1990), as referred in Appendix 7.

The targeted sample was based on a sample of fourteen (14) relevant participants, in line with the research criteria of the study, to generate rich data, where some of them offered a follow-up visit, from the previous interview within the first sampling stage and others were new ones, who were ready to participate. The list of fourteen (14) participants that were included under this stage, are referred in Appendix 5, with an anonymous coding label for ethical reasons. The scope of this sampling stage was to: pursue intentionally and probe beneath the emerging theory; to enrich the research data collection and analysis process; to achieve theoretical saturation; and for 'generating theory' (Glaser & Strauss, 1967, p.45). The researcher during the theoretical sampling, needed to ask participants to outline their account on each emerging category and its properties in question, so that the researcher, through the data analytic approach, could establish the main concern within the data, identify relationships between concepts and to build-up further the variation in the categories' properties and dimensions, so as to reach theoretical saturation (Corbin & Strauss, 2008). Theoretical saturation refers to the data analysis process, where the emerged theory would have been developed, since it ceases to generate new conceptual properties with further additional data (Glaser & Strauss, 1967; Strauss & Corbin, 1990).

The data from this sampling stage was primarily used in the Selective Coding stage (Chapter 5), to establish the research core substantive theory, but was also used in the Axial Coding stage (Chapter 4) to intensify the already emerged tentative categories, with respect to their properties and dimensions. The breakdown of all the research method phases, with their sampling strategies and coding stages, are referred in Table 3.2.

Research Method Phase	Coding Stage	Sampling Strategy Stage (Total of 22 interviews based on 17 firms)
1	Open Coding	Open Sampling based on 8 interviews on 6 firms (i.e. 2 of the firms offered to interview 2 participants)
2	Axial Coding	Open Sampling based on the previous data set
3	Selective Coding	Theoretical sampling based on 14 interviews based on 14 firms (i.e. 11 new firms and 3 firms with the 2nd visit)

Table 3.2: Research Methodology Phases, Coding Stages & Sampling Strategies (Author)

3.7.3 Sample size

The sample size dimension could not be determined before the data collection and analysis was started, since the GTM is an inductive process with evolving theory as new data is collected and analysed. The sample size was a function of the richness of the data collected, so that with the continuous data collection and analysis, this led to theoretical relevance and theoretical saturation. This means that the emerging concepts formed tentative categories, which were well developed and validated with the completion of the set of eight interviews within the open sampling stage. Such a number of participants' data were incorporated in the sample to saturate the key concepts, referred to as tentative categories and sub-categories. Further other two participants with other firms, were initially included in the sample after the first eight interviews data collection and analysis phase. Though, after listening to the digital recording and taking notes of the initial key *in vivo* quotes led to redundant results. These participants were excluded from the sample, since the respondents at this stage, had nothing new to contribute to the emerging theory. At the completion of the analysis of the first eight interviews, this phase was considered the key determinant of the first stage sample size. This initial stage sample size of eight (8) interviews enabled the completion of the first two key coding stages of the research, namely the Open Coding and Axial Coding, since the Selective Coding was assigned to the theoretical sampling stage, to avoid premature close-out of the emerged theory (Charmaz, 2006). The next data collection and analysis step, as already referred in Table 3.2, consisted from the theoretical sampling stage, which included another set of fourteen (14) interviews, to reach theoretical saturation, where the sample size followed the same principle implemented in the open sampling stage. This sampling stage was focused on the emerged theory, so as to elaborate and refine the conceptual and theoretical developments (Charmaz, 2006).

Stern (2007) advocated that 20 to 30 interviews are adequate to reach saturation. The overall number of interviews of this research amounted to twenty-two (22) which is in line with Stern's (2007) estimated number of interviews to reach theoretical saturation. The sampling approach, within the GTM, differs from statistical random sampling to select the right sample to represent the general population, since the overall population consists from quite a substantial number of SMEs within the manufacturing sector (Appendix 1). The sampling approach used was only focused on a relatively small number of SMEs, which were used to generate data that was required to reach theoretical saturation and emergence of the theory (Glaser & Strauss, 1967).

3.7.4 Unit of analysis

The **unit of analysis** of the research was the organisation, which consisted from any SC member or SC stakeholder. The **unit of observation** was the participant, who represented the role of the organisation or the stakeholder with his/her experiential expertise in all processes and functions. The GTM analysis needed to aggregate the participants' meanings and interpretation to understand the organisation strategies or actions, outcomes and contextual conditions. This theorising process had to respect rigour, by undergoing the constant comparison on the data with all participants, which is referred to as triangulation of data by using multiple participants. Such a triangulation may have introduced a level of ecological fallacy (Van de Ven, 2007), since inferences were being drawn from the individual/s to the group/s (i.e. from the participant to the organisation). Though, the nature of the iterative constant comparison process, was used as a tool, to ensure that the emerged theory is grounded in data, where in some cases even multiple participants were also interviewed within the same firm, as referred in Appendix 5, to have more in-depth comparative data, so as to focus on the key emerged general theory, by including its variations in all tentative categories.

3.8 Research ethics

The interview covering letter and consent form, together with the Interview guide, for the phase one of the research data collection process, are referred in Appendix 3. Such documents were submitted to all participants by e-mail to obtain a signed consent agreement before every interview. Such a consent form formally stated the researcher's ethical responsibility and the research data collection process, for the interview proposed session, to promote freedom of participation, confidentiality, anonymity in any future published work and trust respectively. The participant was always asked verbally in an ethical way whether s/he accepts that the interview will be recorded, to promote a sense of ethical respect by explaining the reason for the usefulness of recorded data, although it was one of the clauses included in the consent form. This is in-line with the ESRC requirements which state that 'Research staff and participants must normally be informed fully about the purpose, methods and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved'

(ESRC, FRE, 2010, p.3). The two interview guides were approved by the ethics committee and by academics, to be in-line with the ESRC requirements which state that the ‘Research should be designed, reviewed and undertaken to ensure integrity, quality and transparency’ (ESRC, FRE, 2010, p.3). Other ethical considerations, in line with the ESRC, FRE (2010), to ensure that all participants do not suffer any negative consequences from the research outcome, were that: all the digital recordings and transcribed data were held on a non-portable computer and protected by password and held in a secure place, together with the single back-up held, which was also held in a separate and secure place, where both provisions should minimise any leakage of data as a result of theft/loss; all the participants original data will be safely deleted/disposed from both sources, once the research is over; and that the transcribed data from the interviews was camouflaged from all sensitive information, by using coded labels, such as names of interviews, persons and companies, to ensure anonymity in all research published data.

3.9 Grounding the emerged theory in the data and the role of the a priori and post Literature reviews

The grounded theory methodology is classified as an inductive method, where theoretical sampling, is used as a deductive activity grounded in inductive derived categories (Glaser & Strauss, 1967; Glaser, 1978; Strauss & Corbin, 1998). The research process acts as a virtuous circle, where ‘deductions for theoretical sampling fosters better sources of data, therefore better grounded inductions’ (Glaser, 1998, p.43). The difference between an inductive and a deductive method relates to ‘pacing’; if the researcher looks at data first and then forms the hypotheses, this is an inductive mode, or if the researcher forms the hypotheses first by conjecture and then seeks research data to verify the deduction, this is a deductive mode (Glaser, 1998). As a result the research has no need to establish an initial hypothesis from the literature, but this is derived in the course of the research once the core emerged theory is established (Glaser & Strauss, 1967).

The research methodology design is adapted from Lehmann’s (2001) model, as depicted in Figure 3.1. The diagram shows that the GTM consists of multiple stages of data collection and analysis, referred as ‘slices of data’ (Glaser & Strauss, 1967, p.69), which are repeated until reaching theoretical saturation. The slices of data consist of multiple sources of data which are mainly generated from interviews and supported by observations field notes and documents from various sources, where the data is mainly of a qualitative nature. Data determines the theory generated since the more rich the data, the more theory emerges. The successive interviews throughout the data collection and analysis are not considered as case studies but slices of data (Glaser & Strauss, 1967), where all participants gives different data based on their knowledge which are collected and analysed by the researcher to verify and validate the emerging theory through the constant comparison process, with the objective to reach theoretical saturation of the emerged theory. The theorising process is based on an inductive approach in the data, by comparing 'data to data, concept to data, concept to concept, and linking concepts back to the data' (Glaser, 1996, p.98), either from the same interview or other interviews, performed both in a successive and also in an iterative process in line with the constant comparison process.

The analysis consists of three coding techniques (Open, Axial and Selective Coding) in an iterative process to achieve an interconnection between emerged categories and to reach theoretical saturation with generation of the substantive theory. Memos are used as a sense-making process by enabling an audit trail to keep track of all the constant comparisons of all the theorising process, so as to flesh out the emergent concepts through theoretical abstraction.

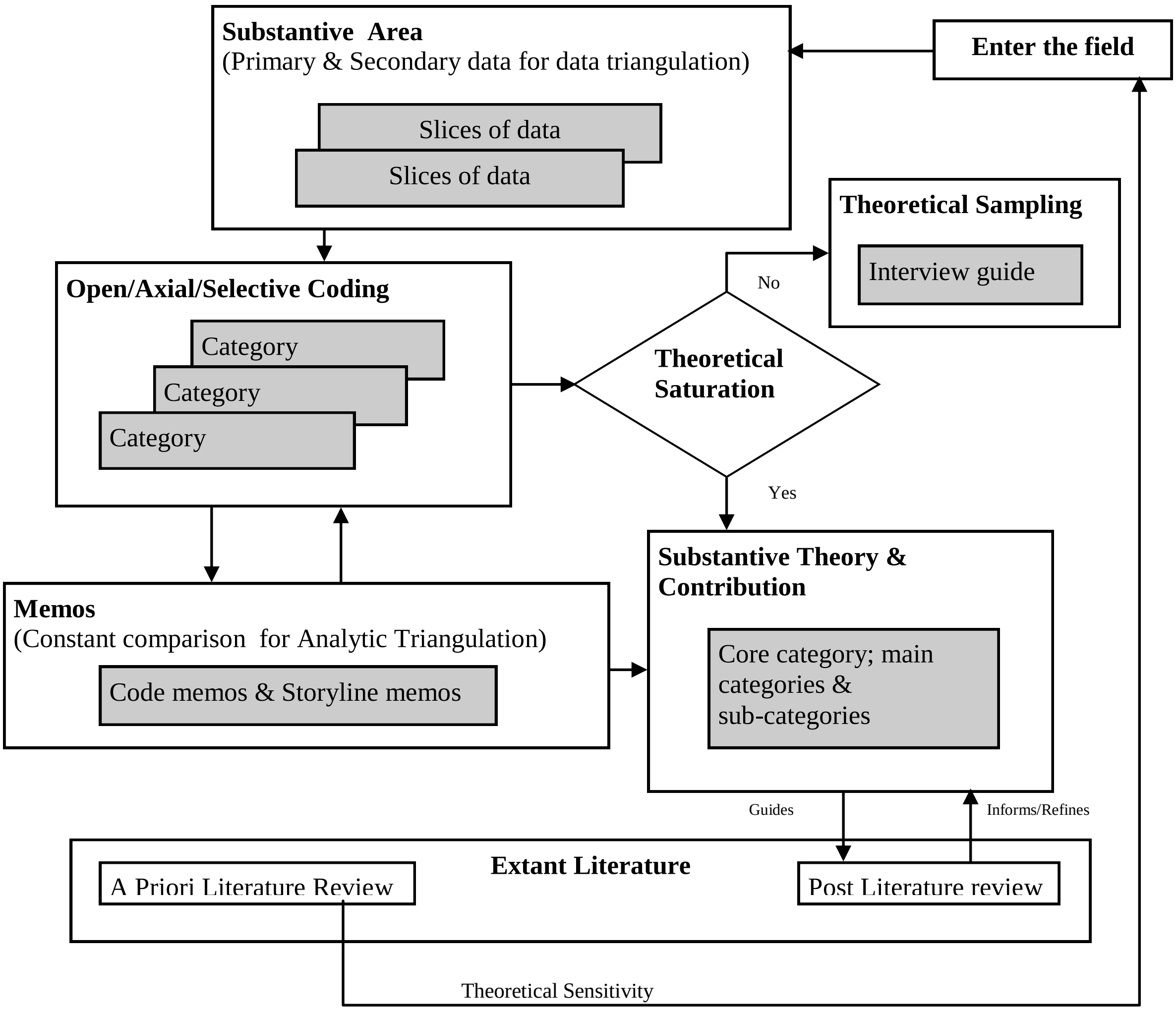

Figure 3.1: The grounded theory research strategy (adapted from Lehmann, 2001)

At the open sampling stage of the research, the first set of interviews is based on an interview guide derived from the **a priori literature review**. Such a literature review is initially undertaken to guide the researcher, by establishing a tentative research question, based on the current discipline literature gaps and at the same time to promote research significance, by focussing on the current discipline emerging changes and dynamic challenges. Such an a priori literature review is also used to establish the current theories that builds up the research phenomenon, through the provision of significant concepts, with their dimensions, but which are kept 'provisional and conditional' (Strauss, 1987, p.12). Finally, it also assists the researcher to enhance his theoretical sensitivity, during the data collection and analysis process, to interact with the informants and also to grasp better the meaning of their statements within the interviews. In fact Creswell (2007) advocated that, the preparation for research in qualitative studies is essential, and some pre-research literature is necessary to frame the problem and provide a rationale for the study.

Theoretical sampling is used to capture refined data, once the theory starts to emerge, through further data collection and analysis based on a new interview guide. Such an approach is used to densify the emerged concepts variation in their properties and dimensions and also to achieve theoretical saturation. All the process leads to the generation of theory, within the empirical area, referred as substantive theory (Glaser & Strauss, 1967). At the theoretical sampling stage, the theory becomes dense with concepts and is also enriched and may be finally refined by relevant extant literature, by integrating the emerged theory with the literature, referred as theoretical integration (Strauss, 1987; Glaser, 1998; Strauss & Corbin, 1998). As a result, at this stage, the researcher is said to have 'discovered' a substantive theory (Glaser & Strauss, 1967). Substantive theories are applicable to the particular area of empirical enquiry from which they emerged (Ibid).

The generated substantive theory is related with the relevant literature so as to establish the contribution to the extant literature (Chapter 7). Such a contribution is determined by identifying the commonalities, the differences and the new, between the current literature and the generated substantive grounded theory (Glaser, 1998). Furthermore, the role of the extant literature should become very important at this stage, because the researcher needs to acquire sensitivity and knowledge on grounded concepts (Glaser, 1998). The **post literature review** is hence delayed to this final stage until the emerged theory is building up, to avoid any forcing on the emerged theory and is therefore read as a source of more data to be compared with existing grounded theory but not to control or derail it (Strauss, 1987; Glaser, 1998). Henceforth, the literature is used as a 'secondary source of data' (Strauss & Corbin, 1998, p.51). The literature review is directly related to the major subject areas based on the emerged concepts (i.e. emerged themes). Such an approach ensures and minimise the effect of preconceived concepts and properties from the literature on the generated theory. It is then, and not before, that data from the extant literature contributes to the study (Eisenhardt, 1989; Urquhart, 2001).

3.10 The GTM research design three coding techniques

The aim of the research design is how one can generate empirical evidence to examine the research question (Lee & Lings, 2008). The analytic techniques are used as a tool to generate such evidence by establishing ways of probing in the data and thinking comparatively to generate ideas about what the data are saying and to establish the properties and dimensions of categories (Strauss & Corbin, 1998). To achieve such a systematic and transparent analytic process, the research methodology is based on three GTM key coding analytic stages:

3.10.1 Open Coding stage

The first stage of the analysis is Open Coding. Open Coding is the process to open the statements (as text or voice) outlined by the participants, to expose the meaning contained therein, in terms of actions, context/conditions and consequences categories respectively, referred to as the **Coding Paradigm**, within the micro and macro conditions in line with the **Conditional/Consequential Matrix** (Strauss & Corbin, 1998). *In vivo* Coding or Open Coding is an analytic process, performed on either single words, or phrases or sentences, which leads to an emerging concept or idea from the data. The Coding Paradigm is used as a framework to explicate clearly all the connections of the conditions, actions and consequences related to the phenomenon under investigation, to promote empirical grounding (Strauss & Corbin, 1990). Such a **Coding Paradigm** includes: the context/conditions which give rise to it, where it answers the 'why, where, how come and when' questions (e.g. the situations of the Maltese Industry and the international links for negotiation); the actions/interactions by which it is expressed, where it answers the 'by whom' and 'why' questions (e.g. strategic responses to issues/events/problems, such as collaboration and contractual agreements); and the consequences it produces, where it answers the 'what happens as the result of the actions/interactions' questions (e.g. effectiveness, efficiency and competitiveness) (Strauss & Corbin, 1990, 1998). The researcher coding approach in terms of the Coding Paradigm is used to promote a structured approach to facilitate the conceptual insight, but the main objective is to achieve explanations and to gain understanding of the phenomenon, within the micro and macro contextual conditions, as outlined in the conditional/consequential matrix (Strauss & Corbin, 1998). The process of Open Coding is to capture all potentially and provisional concepts in terms of the **emerged codes** grounded in the data through a set of **provisional categories** (Corbin & Strauss, 2008).

Such a theorising process is mainly initiated on the computer software application MAXQDA 2007, with the relevant code memos for each open code and resumes through the storyline approach with the relevant memos and overall memos, in the next Axial Coding stage, as the first two key two data analytic approaches to data analysis, as referred to in Sections 3.11.1 and 3.11.2 respectively. The scope of using the storyline, as a follow-up of the CAQDAS approach, is to promote better freedom and creativity in-built in the GTM, since qualitative research software may 'numb', 'stultifies', and 'abort intuitive skill development', required in the 'grounded theory package' and to shift from the fragmented approach to a more holistic theorising process approach, since it may also 'hinders and cops out on the skill of doing grounded theory' (Glaser, 1998, p.185,186).

3.10.2 Axial coding stage

The second stage of the analysis is the Axial Coding analytic approach. There is no demarcation line between the Open Coding and Axial Coding, but it is a continuous and iterative process between the two coding stages, since emergence starts from the initial steps of the data analysis process (Strauss, 1987). In the Axial Coding, the discrete parts of data, within the Open Coding stage, as the open codes are re-assembled through theoretical abstract statements, to explain what is happening in the data and by deriving the relationships between the emerged tentative categories, by 'crosscutting or relating concepts to each other', in line with the Coding Paradigm (Corbin & Strauss, 2008, p.195). The coding paradigm is only used as a means and not the end in itself and as a result is used by the researcher to arrive at theory building.

The objective of this stage, as clearly advocated by Strauss and Corbin (1998, p.132), is not based on:

> 'identifying whether the conditions are causal, intervening, or contextual. Rather, what the analyst should focus on the complex interweaving of events (conditions) leading to a problem, an issue or a happening to which persons are responding through some form of action/interaction, with some sort of consequence'.

As a result the linking between concepts enables the theorising process to elevate significant concepts into a set of related tentative categories. Such an approach is needed to theorise from the data around the axis of one category at a time (Strauss, 1987). This theorising process, with reference to all concepts' relationships, is referred in Chapter 4, where the **tentative categories**, with all their interweaving connections with one another are generated. Such an analytic theorising process approach is mainly based on the storyline method with the support of: (a) narrative based memos, for each tentative category, with the selection of key *in vivo* quotes from the data; (b) logic diagrams for each tentative category, with the relevant properties and their dimensional variations and their conditions; and (c) conceptual frameworks, for each tentative category, with the related conditions and the consequences, in line with the Coding Paradigm, as referred in Section 3.10.1.

The role of the **tentative categories** is to capture more abstract concepts (i.e. concepts at broader levels of scale) to explain what the data are saying through their analytic power and 'potential to explain and predict' the phenomenon under study (Strauss & Corbin, 1998, p.113). The sequence of theorising starts from open codes (i.e. conceptual reference to represent the *in vivo* data) in Phase 1, where codes are then grouped to derive concepts, themes and categories, in such an orderly sequence in Phase 2, which all lead to the foundations of the emerged theory. The tentative categories are used as an abstract representation of either the actions, or conditions or consequences, to represent the data, which finally lead to the establishment of the core theme in next Selective Coding stage, in Phase 3, that links all the final tentative categories together.

3.10.3 Selective Coding stage

The third stage is the Selective Coding. In this stage the categories are integrated and refined, with the selection of a core category, together with other key categories and sub-categories, to represent the substantive theory. Such an integration process of main themes through the storyline technique gives the emerged theory greater explanatory power (Strauss & Corbin, 1998). Furthermore, the conceptual framework, as referred in Figure 6.1 represents the substantive theory, where such a framework approach is also used 'to organize their data, keep a record of their concepts and the relationships between them, and to integrate ideas' (Corbin & Strauss, 2008, p.125).

This integration process is referred to as the 'delimiting of the theory' to 'one or two core variable(s)', which should act as a guide for further data collection and analysis (Glaser, 1978, p.61, 72). The core category is said to cut across all other categories, in line with the Selective Coding process (Strauss & Corbin, 1998). By doing so, the research need to focus on one of the several basic social processes or conditions that would be present in the data, to serve as a basis for a generalised theory with a set of theoretical propositions (Strauss & Corbin, 1998; Binder & Edwards, 2010). Glaser (1998, p.190) outlines that the theory needs to have ideally 'the smaller the amount of concepts that account for the greatest variation in substantive behaviour', so as to resolve the main concern of the theory. Such a stance links all the categories around 'a core category to refining and trimming the resulting theoretical construction' (Corbin & Strauss, 2008, p.263). The refining and trimming is referred to the delimitation of the analysis to those significant variables affecting the core variable to contribute to parsimonious theory (Glaser & Strauss, 1967) which represents the final emerged pattern of social behaviour (Glaser, 2002).

3.11 Data collection and analysis data management tools and techniques

The Open Coding stage initiated the research analysis and is performed on all the eight interviews, in a systematic way by a qualitative data management tool, based on a computer software application. All the interviews are digitally recorded and transcribed to ensure that all the meaning and statements are all captured by the text, which are analysed in line with the Open Coding technique, referred in Section 3.10.1. The Open Coding stage, based on the CAQDAS, together with the Axial Coding stage based on the storyline approach, are the two data analytic processes. Both stages took almost three years to finalise, due to the in depth analysis and iterative nature of the research process having to organise interviews in a sequential order in time, with the necessary gaps to allow time for data analysis. As a result, such a data collection and analysis approach consists of a cumulative process of theorising sessions, from one interview to another in a sequence and also through cross-referencing and recursive mode, from one interview to another with no sequence whatsoever, due to the nature of the GTM analysis constant comparison process, to promote sense-making on the emerged theory.

3.11.1 Computer-assisted qualitative data analysis software (CAQDAS)

The CAQDAS used is the MAXQDA 2007 application (Kuchkartz et al., 2008), and is the same application used by Corbin and Strauss's (2008) book. Although the researcher had a choice between NVivo and MAXQDA, the latter application software is selected after reading the recommended positive comments on the ease of use by Flick (2006) and Corbin and Strauss (2008). The Open Coding stage is organised by the CAQDAS, where all emerged open codes are supported by descriptive and theorising memos to build and understand what the data are saying. The CAQDAS is used as a data management tool, to classify all the emerged codes in line with the coding paradigm (actions, context/conditions and consequences classification) and to promote an audit trail, along the research process, to promote research rigour. The MAXQDA application also provides a time saver in storing and coding, especially in the first phase of the research process, referred as the Open Coding stage, so as to minimise the effect of information overload. One needs to understand, based on the researcher's experience on this research work, that this software application is a tool for content analysis, by deriving frequency counts and also provides the facility to retrieve segments, in particular to see all *in vivo* quotes from the data associated with each code. Such information management provision facilitates the researcher's analytic process during the theorising process within all memos dedicated to each code. Though, it is to be noted, that the real grounded theory process, still remains in the researcher's mind and that these code memos within the CAQDAS served as a supporting tool in the grouping of the open codes to higher level codes, referred as tentative categories. This thinking process is the main reason to use the storyline approach in the Axial Coding stage, to serve as a follow-up analytic method of this CAQDAS stage based on the same data sample.

3.11.2 Qualitative storyline technique supported by displays

3.11.2.1 Qualitative storyline technique

The storyline analysis technique followed the CAQDAS analysis approach on the same data set. In practice, it cannot be excluded, that both the storyline and the CAQDAS approaches interweaved in an iterative process, to complete effectively such an analytic research process for all the eight interviews, but are outlined as sequential steps, so as to organise the research methodology presentation in a scholarly way. The storyline technique is used to understand the content and to uncover what the data are saying within the context of the sources (Patton, 2002) and in a systematic and prescriptive approach (Strauss & Corbin, 1998).

The storyline makes use of a narrative approach theorising process with *in vivo* references to the data, by maintaining an audit trail to ensure that all the emerged theory is grounded in data through the relevant evidence and by bringing the participants back to life. Such a data analytic approach needs to be applied throughout the research process, by moving between raw data (i.e. interview by interview *in vivo* quotes for each emerged theme), memos and the storyline itself, in line with both the constant comparison and the theoretical abstraction processes to discover the theoretical emerging patterns (Strauss & Corbin, 1998). It cannot be excluded that the storyline remains the conceptual interpretation by the researcher of all the data which is still a recommended analytic acceptable approach (Strauss & Corbin, 1998), but is dismissed by the classical grounded theory approach (Glaser, 1992). Though, one needs to put the right perspective on the storyline approach, since within the research community, the storyline, as a research strategy, is an underutilised approach within the GTM (Birks et al., 2009).

The storyline initially is used to compare data with data from the same or different interviews, so as to develop the tentative categories (Glaser, 1978). The approach included memos and overall memos (i.e. a summary memo is a memo based on one or more memos) from the transcripts (raw data) to summarise what the data are saying (Birks et al., 2007). Along this analytic approach, the researcher is immersed in the data and tries to understand and reflects upon, even at times by stepping back from the data, so as to establish what the data are saying, to grasp the key concerns of the emerging theory. The storyline approach, with the support of the storyline memos, is a process which includes the codes (i.e. concepts) identification, explanation and substantiation by quotes which are a construction and interpretation of the data (Strauss & Corbin, 1998). Hypothetical statements can then be used to identify relationships in line with the Axial Coding technique (Strauss & Corbin, 1990, 1998). As a result the final storyline needs to outline the theoretical constructs made up from the categories and their relationships (Strauss, 1987; Charmaz, 2006). The variation within the data also builds the dimensional variations within the emerging concepts, both in the storyline and in the final theory, to increase the theory explanatory power (Strauss & Corbin, 1998). Furthermore, the storyline approach assists in the identification of gaps in the emerging theory, which is in line with the grounded theory discovery process (Charmaz, 2006). Such gaps need to be fulfilled by undergoing theoretical sampling (Strauss & Corbin, 1998), as referred in the next Selective Coding stage.

3.11.2.2 Displays or mind maps technique

Logic diagrams (i.e. tabulation) and conceptual frameworks (i.e. mind-maps) are also used throughout the data analysis to visually observe the relationships between themes/concepts and to outline all dimensional variations of all tentative categories, so as to assist the analytic and theoretical abstraction process, which are important visual elements of the integrative process in grounded theory (Miles & Huberman, 1994; Strauss & Corbin, 1998). Such diagrams helps to clarify and facilitates the analysis and evaluation of the theorising process of all the emerged categories, within the Axial Coding stage to derive the relationships between all emerged categories and their variations in a transparent process, as referred in the data analysis Chapter 4. The Code Matrix (i.e. Tree diagram) approach (Miles & Huberman, 1994) is used to demonstrate an audit trail and visual representation of all the emerged categories from the Open, Axial and Selective Coding stages respectively in the research analytic process (Table 5.1). The use of manual derived displays or mind maps, enable the researcher to focus, since they produce a condensed and comprehensive format of all the data as text, since text is 'weak and cumbersome form of display' but on the other hand displays are 'helpful for understanding the flow, location and connection of events' (Miles & Huberman, 1994, p.91, 93). Such a theorising process through the use of diagrams is supported in grounded theory work (Glaser & Strauss, 1967; Strauss & Corbin, 1998). In fact, Strauss and Corbin (1998, p.153) asserted that: 'diagrams are more useful than storytelling for sorting relationships between concepts'; 'valuable tools for integration'; enable the researcher to 'work with concepts rather than with details of data'; and diagrams are 'abstract representations of data'.

3.11.2.3 Triangulation of data analysis techniques and data sources

All the analysis from the data, with both the CAQDAS (e.g. through open codes and code memos) and the storyline techniques (e.g. through memos and overall memos), are all used in an iterative platform, based on constant comparison, to assist the theorising process so as to derive the key themes, capture the theory and the relationship/s between codes or categories. These two different techniques promote **triangulation of data analytic methods** to address the research validity (Miles & Huberman, 1994;

Strauss & Corbin, 1998; Denzin & Lincoln, 2005; Bryman, 2008; Corbin & Strauss, 2008). Such a stance does not refer to a mixed method research methodology but a dual approach to data analysis.

Multiple data sources are also used to promote trustworthy and authentic research through **data triangulation** (Miles & Huberman, 1994) (e.g. interviews, direct observation fields notes from factory tours and grey literature based documents, which includes both qualitative data, such as procedures manuals, information on each company on the web and Government portal and also quantitative data, such as annual financial accounts of each firm from MFSA and international mother companies). Such multiple sources of data are needed, since in grounded theory it is rarely to use interviews as the 'sole form of data collection' (Suddaby, 2006, p.635). Such triangulation of data, by using such different sources, is performed so that the secondary data could enrich and be compared to the emerging theory from the primary data in line with the notion as 'all is data' (Glaser, 1998, p.142). In general, qualitative studies should also triangulate their findings through multiple methods for their work to have greater impact (Binder & Edwards, 2010; Bluhm et al., 2010), but it is to be noted that this research is focussed on a single research methodology based on a GTM, with both multiple data sources and multiple data analytic techniques.

3.12 Implementation outline of the overall research data collection and analysis phases

3.12.1 Research method phase 1: Open sampling with Open Coding analysis technique assisted by CAQDAS

In this Open Coding stage, the analysis was performed on a set of eight transcribed interviews, denoted by interview one (1/INT1) to interview eight (6/INT8), as referred in Appendix 5. The interviews were guided by the first interview guide, as referred in Appendix 3, and in Section 3.7.2.1. The analysis was performed with the support of the CAQDAS, which was organised in line with the Coding Paradigm (Strauss & Corbin, 1998) as the analytic stance to establish systematically and to gain understanding of the phenomena, of the 'how' (i.e. the process) and of the 'why' (i.e. the structure or conditions) to capture the dynamic and evolving nature of events with their consequences (i.e. the outcomes) (Strauss & Corbin, 1998). Hence all the **open codes** were classified into: 'actions and reactions'; 'consequences and outcomes'; and context and conditions', as referred in Appendix 8. All interviews' transcription, together with field notes and secondary documentary data, were uploaded in sequence with every interview carried out. The analysis of each interview was undertaken at the earliest, possibly on the same day, with every interview transcription completion, to enrich the code memos with all the necessary theorising notes, included within each code, since the researcher would still have a clear picture of the participant explicit and implicit messages in the data.

Such a CAQDAS facilitated in a systematic way, the extraction of all *in vivo* segments of texts, by breaking the data, either in line-by-line or sentence or paragraph of *in vivo* text, from all the transcribed interviews, to be attached to each emerged code or open code (concept). Figure 3.2 depicts the MAXQDA four segments, namely the Document System, Text Browser, Code System and Retrieved Segment. In Figure 3.2, an example of an open code can be observed, which is labelled as 'communication' and which has a frequency count thirty-one (31) within the code system segment. Open Coding refers to the process of thinking outside the box, where it is well established that thinking is the heart and soul of the analytic process under qualitative research, so as to represent the data with an abstract term or word referred as a concept. Such an approach gave a set of fragmented codes from the data. The number of emerged codes was one hundred and thirty-two (132) codes from a 1472 selected *in vivo* quotes from the transcribed data, which amounted to around 30,000 words of transcriptions, as referred by a screenshot of all such open codes in Appendix 8. To achieve a more reader friendly approach, the data file from the MAXQDA with 132 codes was exported on a spreadsheet to represent all the emerged tentative codes on a single sheet, as referred in Appendix 9. Furthermore, the spreadsheet mathematical provision was used to enable sorting and filtering of all the codes function of the frequency count of less than 10 (i.e. < 10) for the data as derived from the CAQDAS, to capture the first set of forty-six (46) tentative open codes, as referred in Appendix 10.

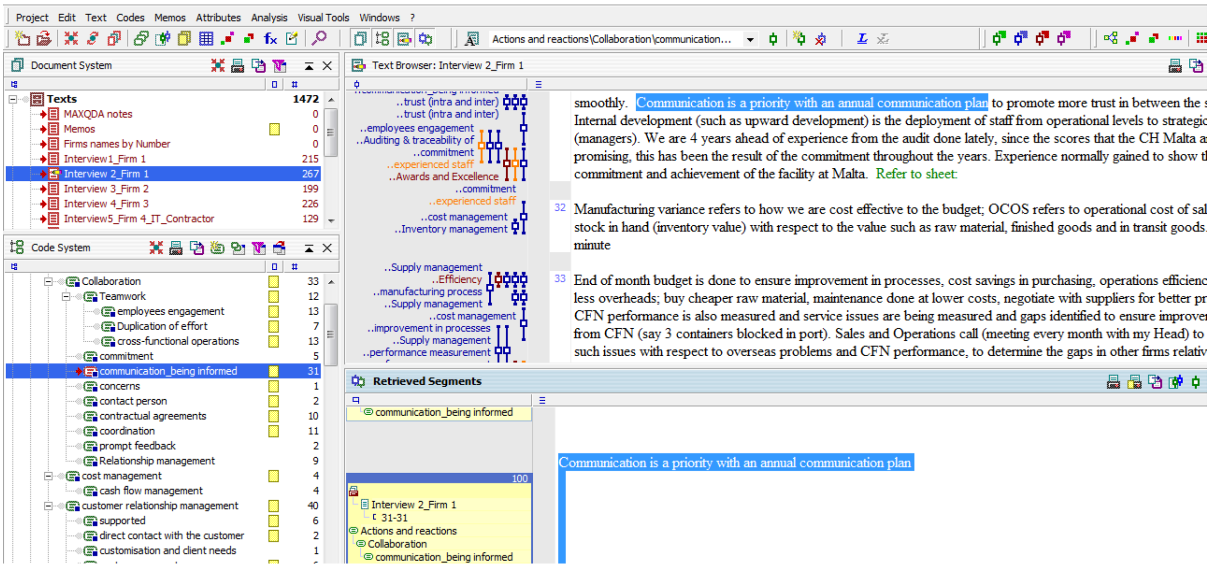

Figure: 3.2 Screenshot of MAXQDA 2007 used for the Open Coding stage data collection and analysis (Author)

Such a data management tool enabled the researcher to compare interview by interview and also different parts within the same interview, which were considered similar and relevant, by extracting *in* *vivo* texts from the transcribed interviews and grouping them under the same concept (i.e. open code) to promote a systematic and organised approach of theorising and sense-making on a concept by concept basis. The CAQDAS supported this theorising process by providing all the *in vivo* quotes in one document and in an orderly sequence for each open code (i.e. using the retrieval segment facility). At the same time such a compiled document for each code enabled the researcher to go through all the *in vivo* quotes one by one, which served as a validation process to confirm that each *in vivo* quote fits the emerged code. Such an analytic process also enabled the researcher to understand and theorise on what the data were saying and also whether such data could be included in other emerged codes. Such a constant comparison iterative process of various data from different participants enabled the researcher to derive each concept properties with its dimensional variation and at the same time initiated the approach towards theoretical saturation of each concept with all the eight interviews analysis. The concept's property is the characteristics (components) that define/explain an action (or group of actions) or a condition or an outcome of the concept, where the property can have dimensions. Such a theorising process was represented in a memo for each code within the CAQDAS, referred as the code memo, as illustrated in Figure 3.3. This systematic approach enabled the researcher to understand what the data were saying and at the same assisted in the theory generation iterative process. With such a systematic approach also promoted trustworthy research with the acceptable research validity and repeatability.

Open Coding refers to break the data to examine the meaning, to get in depth in the data and to think outside the box to get to the details to all emerging concepts in the initial phase of the research data collection and analysis. Such a stance built a solid foundation for the subsequent analysis stages having considered all possible interpretation from the data before deciding on the key issues covering the researched phenomenon.

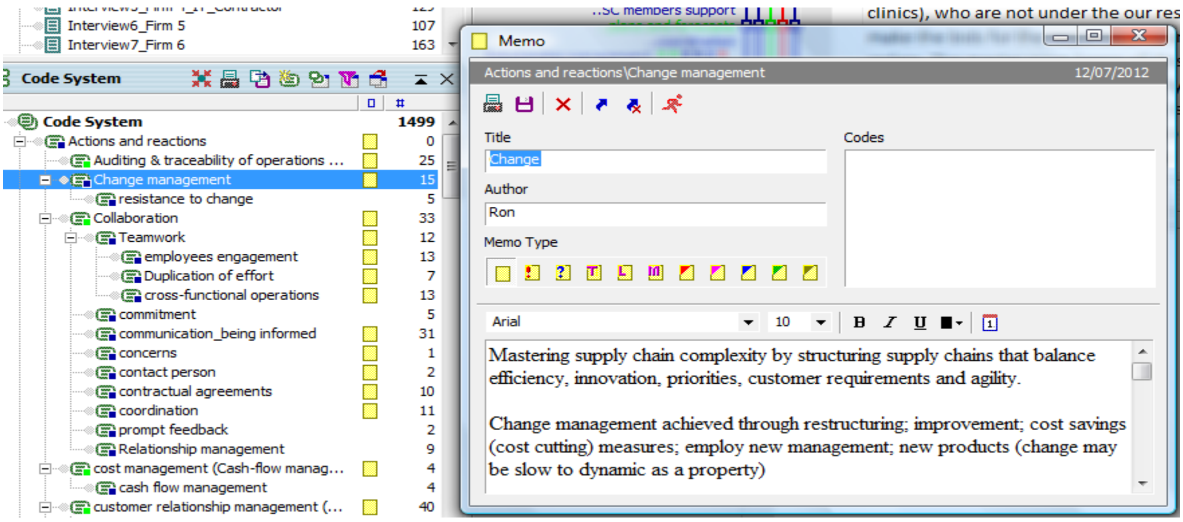

Figure 3.3: Code memo sample from MAXQDA 2007 (Author)

Such an approach assisted the researcher to immerse himself in the data and try to conceptualise from the data what does the open code represents, by inserting all the theorising account made by the researcher, at any moment in time, in code memos attached to all open codes or sub-codes, as already referred in Appendix 9. An extract of these five open codes, from the overall forty-six (46) open codes, as extracted from Appendix 10, are being referred in Table 3.3 below, to demonstrate the audit trail of all open codes sources vis a vis the eight participants (i.e. Interview 1 to 8) and the frequency count values attributed to each open code by each participant.

	Interview numbers								
Filtered Emerged Categories (Based on frequency > 10)	1	2	3	4	5	6	7	8	Total Sum
Actions and reactions\Auditing & traceability of operations	5	4	0	3	2	4	3	4	25
Actions and reactions\Change management	2	7	1	1	1	2	0	1	15
Actions and reactions\Collaboration	4	2	10	8	2	1	4	2	33
Actions and reactions\Collaboration\Teamwork	4	2	0	2	0	0	0	4	12
Actions and reactions\Collaboration\Teamwork\employees engagement	0	8	1	1	0	0	1	2	13

Table 3.3: A demo showing the audit trail of five open codes (Author)

There were some open codes that were assigned *in vivo* labels and others were named with established names in the literature. Assurance was made to promote research rigour that every name assigned from the literature, really represents what the data were saying within the segment selected from the transcription linked to each open code, otherwise a more appropriate name that fits the data had to be assigned, to promote research rigour and avoid any forced concepts based on preconceived literature. For example, collaboration is a concept name found in the extant literature and the assigned properties were: teamwork; employees' engagement; duplication of effort; cross-functional operations; commitment; etc, as referred in Figure 3.4 and Appendix 9. Such a stance showed how the concepts earned their way throughput this phase and also their relationship with each other, in line with the GTM iterative process.

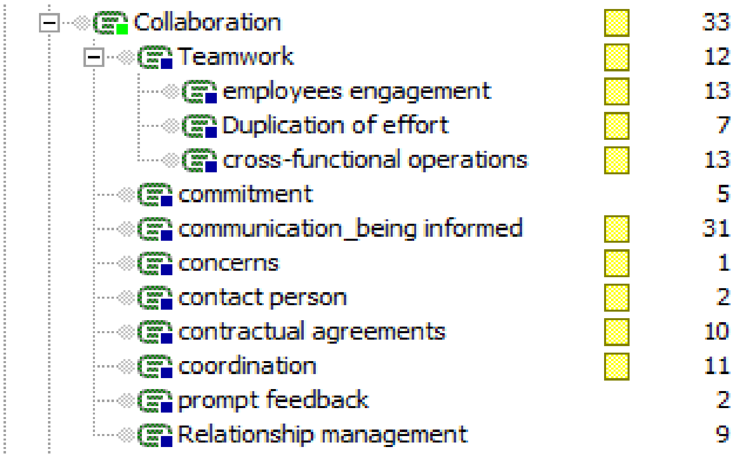

Figure 3.4: Snapshot of collaboration open code from MAXQDA 2007 (Author)

3.12.2 Research method phase 2: Open sampling with Axial Coding analysis technique based on the storyline analysis approach

In the storyline analysis stage, the same set of eight interviews was used and the analysis included a theorising process based on memos for each interview and overall memos to cover the either part of the set or the whole set of interviews in an iterative approach. Memos were based on a narrative approach to represent the theorising process based on a selection of key vivo quotes from the data, which represented exactly the common thread what the participants were saying. This stage began with the process of reassembling the same data set, which was fractured during the previous Open Coding stage through the key 46 open codes, so as to construct the relationship of the emerged tentative categories with their sub-categories, together with their properties and dimensions. The use of visual aids, in particular, logic diagrams as tables, code matrices as tree diagrams and conceptual frameworks as mind maps, were also used as indicated in Section 3.11.2.2. Such visual aids were used to build on the memos, so as to represent the relationship between the emerged concepts in line with the Axial Coding technique and at the same time assisted the sense-making and theorising process of the analysis.

Such a narrative approach, with the support of *in vivo* quotes, brought back to life, what the participants were saying. Furthermore, such an approach created an audit trail, for each emerged tentative category, by including only the key *in vivo* quotes from the data of all interviews. The researcher's decision to adopt such a limitation measure in the inclusion of only the key *in vivo* quotes from the data, was attributed to the voluminous amount of *in vivo* quotes derived from the constant comparison process from all interviews, so as to produce a concise and more manageable account of the data, which were of key relevance to the theorising process. The analytic approach was mainly based on the researcher's skills to immerse himself in the data, where at times there was the need to dig deep in data and in other times to step back from the data, to establish what the data were saying and grasp the key concerns by compiling memos and overall memos. Such an analysis approach was very intensive and time consuming, since it was based on the researcher's thinking process and theoretical sensitivity to interpret what the data were saying, either line-by-line or sentence or paragraph of *in vivo* text.

The research method is an iterative and evolving process that leads to the emerged theory, which is not only based on the storyline approach of what the data are saying, but also on the construction and interpretation what the participant want to mean and disclose. There is the need of a sound theoretical sensitivity of the researcher to capture what the data are saying and how it fits in the research objective. It is to be noted that the GTM is an intuitive process of data collection and analysis, with a substantial level of creativity and theoretical abstraction from the data and hence the theorising and sense making process is not always logically demonstrated within the research document. The major part of the analysis work, especially as the research data collection and analysis progressed, was in the researcher's mind, which was based on the way the interpretation process of the data was used to capture and construct the necessary sense-making process. Initially such a sense-making process was demonstrated through descriptive memos, which was then followed by conceptualising memos with the research iterative process analysis approach. Theory emerged from the data but was being interpreted and constructed through the memoing process.

The emerged theory from this storyline approach, with its memos and overall memos, was also supported by the previous Open Coding stage, by an iterative constant comparison process approach, by using the list of forty six (46) key emerged open codes with their respective code memos. Such a process consisted from the comparison of the two stages, which enabled the researcher to build and/or refine on the emerged theory **to approach theoretical saturation** of all the emerged key codes. With such a storyline approach it enabled to densify the Open Coding stage and led to the successive Axial Coding stage to capture the relationship between codes in a more coherent approach to the emerged theory with the result of several key concepts or higher level categories which amounted to twenty-two (22) tentative categories. This is the conceptualising and sense-making process to represent the theory with a set of concepts, which are then grouped to form a few set of categories as potential indicators, referred as **tentative categories** (i.e. axial codes), which are related and interweaved with each other, to represent the emerging phenomenon (i.e. theory generation).

Furthermore, the storyline approach included logic diagrams and conceptual frameworks for each tentative category, so as to build on the memos and to represent visually the relationship between the emerged concepts in line with the Axial Coding technique, which assisted the sense-making and theorising process of the analysis. All the twenty-two (22) emerged key concepts were represented in a storyline approach through a set of memos on a concept by concept basis, to define and explain the key concepts, with all its relationships to other key concepts or sub-concepts, which were all supported by the key in-vivo quotes from the data. The intention of the data analysis was that key concepts were going to be referred as categories and the sub-concepts as sub-categories respectively. The conceptual labels were to be used to represent the researcher interpretation on the data which were initially tentative open codes in the Open Coding stage, with all the relevant theorising process within the codes memos. Such an analytic process in this subsequent data collection and analysis phase was tracked through memos, all along the research process, to theorise on the emerged theory in an iterative process. Such an analytic approach cannot be attributed to a smooth analytic sequential process, since it needed a cyclical analytic stance from one interview to another, without any sequence whatsoever. In fact the memos became more accurate and complex as the analysis progresses throughout the eight interviews, by deriving summary memos to represent all concepts as categories after the overall constant comparison process of the whole set of eight interviews.

3.12.3 Research method phase 3: Theoretical sampling with Selective Coding based on the storyline analysis approach under the GTM

This stage is referred to as the final data collection and analysis phase, which was focused on refining the theory of all emerged categories through the theoretical sampling technique to collect further data **to achieve theoretical saturation** of all categories. Such a stage included a newly designed interview guide, which was semi-structured, where all tentative emerged categories from the previous Axial Coding phase were included within the questions, to provide the possibility to generate data from the participants through direct questions, as referred in Section 3.7.2.2 and Appendix 6.

The sample included fourteen participants, which consisted from various stakeholders, which were selected to fit the sampling strategy to match the research criteria to generate rich data, by densifying the emerged theory with all the properties and dimensions, so as to promote theoretical saturation of all the emerged theory. The set of fourteen (14) transcribed interviews, amounted to a word count of around 35,000 words and were denoted by interview one (7TS/INT1) to interview fourteen (17TS/INT14), where the first digit refer to the firm identity code, as referred in Appendix 5 and the 'TS' refers the theoretical sampling phase. The objective of this theoretical sampling was to select the right audience and questioning the participants on the emerged theory to refine and build on the current analysis to reach theoretical saturation of the twenty-two (22) tentative emerged categories in the previous stage.

This stage interview guide, with questions focused on the emerged key categories, enabled the informants to intensify their account to more in depth explanations than the previous set of open ended interviews. Space was left for the participant to outline his/her views on each emerged concept, by guiding them by an open ended question on each category but at the same time probes were used, whenever necessary, to guide the participant to keep on track with the focused questions (Appendix 7). The aim of using probes was to lead all participants to disclose rich data (i.e. data with all the necessary details but with a high level of objectivity). Such a stance needed that the researcher had to keep an open mind but focus on the participant account for each question, to dig deep during the interview session, through an effective and active listening approach in an interactive way. Special attention had to be given so that the researcher did not introduce any bias, or not to force or lead the participant to answer what the researcher needed to hear and neither to force him/her to shift away from telling the real account from a practitioner's perspective. Such interviews were also accompanied by follow-up mails and phone calls to clarify any issue with the participants and to generate rich data and furthermore to fill any gaps in the emerged theory. Such a stance enabled to refine the theorising process and to densify the emerged tentative categories by digging deep in the data. Additionally, apart from the primary data, from all the interviews, the data collection included secondary data from various sources available to the researcher, such as documents handed by participants, on-line information from firms' web portals and field notes from the factory tours.

The theorising process was based on the Selective Coding analytic approach using the storyline technique, which consisted from the sense-making in line with the GTM, by undergoing an iterative constant comparison process of all the interviews' data, through theoretical abstraction, by stepping back from the data and asking: 'What is happening here?' and 'What is the core theme behind all this?' This is the conceptualising and sense-making process to generate the theory with a set of categories. Such an approach enabled the researcher to select the action based core category, which cuts across all the other five (5) main action categories with their sixteen (16) action sub-categories. Such a core category needed to explain holistically the research SCI phenomenon. Furthermore, it cannot be excluded the importance for the researcher to remain immersed in the data, by including the key *in vivo* quotes from the data, that were seen as most relevant to the theorising process transition to construct and discover the core theory through such an inductive approach from the data (Chapter 5). Furthermore, such an analytic process included a theoretical account of the emerged theory to promote understanding, by an in depth outline of the substantive theory behind the theoretical model derived from the data, as referred in Chapter 6.

The data was analysed in line with the Straussian Coding Paradigm model, to classify all emerged theory in terms of the actions, contextual data and consequences, which served as a robust platform for the final theoretical framework. The audit trail of all the theorising process, that led to the emergence of the substantive theory from all the three stages, which included all the forty-six (46) open codes, twenty-two (22) tentative categories and finally the action core category, five (5) action main categories and sixteen (16) action sub-categories, together with the nine (9) contextual conditions and one (1) consequence sub-divided into eight (8) dimensions, is represented by the Code Matrix in Table 5.1. The final theoretical conceptual framework, which represents the final emerged theory, in line with the Coding Paradigm, is referred in Figure 6.1.

3.13 Chapter summary

This chapter has outlined that research methodology did not have an a priori hypothesis but an open ended research question to guide the research process and an open ended initial interview guide to take-off the research first data collection and analysis phase. It is clearly justified why the GTM is well suited as one of the most suitable research method for this research, since it has the capability to understand the conceptual relationships and to generate a substantive theory on the phenomenon understudy, which is exploratory and undergoing a dynamic paradigm shift (Glaser & Strauss, 1967).

The a priori literature review was performed to: set-up the initial open-ended interview guide and establish a tentative research question, which were used to take-off the research effectively; establish the literature gaps within the current literature to serve as a guide to the approach and perspective for the research purpose and to increase its significance; and enhance theoretical sensitivity of the researcher on *in vivo* data within the overall data collection and analysis process. Due attention was also given during the data analysis process, not to import any preconceived theories from the a priori literature on the data. Such an approach is in line with the Straussian GTM but goes against Glaserian GTM since the latter GTM declares a key 'concern that literature might contaminate, stifle or contaminate or otherwise impede the researchers' effort to generate categories' (Glaser, 1992, p.31) and furthermore that the emerged theory from the data through its 'interpretations become coloured by the preconceptions' (Glaser, 1998, p.71). The researcher's intended purpose is to achieve theory building through the constant comparison iterative process, which is to be a closely tied process, to generate theory with the right evidence from the data (Eisenhardt, 1989).

The research method with its data collection process, with the two sampling techniques and with its analysis three coding phases, looked at the data in line with the Coding Paradigm (Corbin & Strauss, 2008) (i.e. context, outcome and actions), so that there was an ongoing build-up of theory from the data under the constant comparison process within all the three coding phases until theoretical saturation of all categories had been reached. The principal data analytic approach used within the research, apart from the CAQDAS technique, was the storyline technique, with narratives substantiated by key *in vivo* excerpts from the data, but both tools served as data analysis triangulation techniques to promote research rigour. Glaser (1992) had criticised the use of the storyline approach to generate the theory, since the researcher needs to use the correct analytic processes and procedures, where data needs to generate the theory. On the other hand, the researcher adopted the descriptive narrative, based on a grounded storyline approach, as a conceptualization tool, so as to aid theoretical development and integration (Strauss & Corbin, 1990). Hence, the researcher has used the storyline grounded in data, to arrive at the theory in line with the Straussian GTM, where the theory is generated from the data and not from the storyline. It cannot be excluded that the data that had to be analysed and coded was voluminous, which included an average of one-hour to two-hours duration of each interview, with a total of twenty two (22) interviews covering all the primary data, under both the open and theoretical sampling stages, which amounted to around 65,000 of words within all the data.

There was also the analysis of the secondary data sources which were excluded from the above word count reference and where they served as a triangulation of data sources (e.g. procedure manuals; firms' annual reports and other ancillary reports; content on the firms' website, field notes from interviews and factory tours and the general media). In every data analysis step, the interpretive and constructive approach was used to dig deep what the data were saying, by theorising and deriving the sense-making behind every statement or explanation or theme (e.g. 'KPIs are used to monitor the progress regarding material (raw components) and efficiencies of work carried out per station' (2/INT3) i.e. performance measurements serve as a reference to material usage and work efficiencies to promote lean management). To promote scientific research all the necessary research quality measures were taken to promote a trustworthy and a plausible research methodology and a valid generated substantive theory, in line with key grounded theory key scholars. Whenever possible, extreme cases within the data, where coded to derive the variation within the generated theory.

The emerged theory was kept as provisional in all the first two initial coding stages until the Selective Coding stage was reached and as a result all the emerged theoretical concepts were no longer then referred as tentative categories but as categories. The categories are assumed to be the 'cornerstones of developing a theory' (Strauss & Corbin, 1990, p.7), which leads to the generation of the substantive theory on the phenomenon. The final emerged theory objective, as outlined by Strauss and Corbin (1998, p.25), is to construct an 'explanatory scheme that systematically integrates various concepts through statement of relationships' so as to 'explain and predict events, thereby providing guides to action'. Such an objective has been met by the emerged substantive theory, as outlined in Chapter 6, which was represented by a conceptual account of all the categories with their properties and dimensions' variations (Section 6.3.6), together with the theoretical framework in Figure 6.1.

The post literature review, was carried out in the research final phase, in line with both Straussian and Glaserian GTMs (Strauss, 1987; Glaser, 1998), since this systematic literature review was used to integrate the emerged theory within the extant literature and also used the literature to refine the emerged theory (Section 7.4.7 & Figure 7.2), by treating the literature as the final set of data (Strauss & Corbin, 1998). The areas within the extant literature of this systematic post literature review were driven by the emerged themes from the data. This approach was based on the principle that the literature review acts on the generated substantive theory as a source of validation and to establish whether it fits, extends and refines the current knowledge in the field and also fills any literature gaps, so that the researcher can derive the similarities and differences and determines the research contribution (Strauss & Corbin, 1998).

Furthermore, both Grounded Theory approaches agree that the GTM establishes the emerged theory which is a 'de facto conclusive analysis', namely as the end product 'rather than a preliminary theory' and there is no need to be tested by quantitative methods (Glaser & Strauss, 1967, p.235). The researcher considers that the substantive theory has 'contextual uniqueness and significance' Bryman (2008, p.378) to the Maltese SMEs and cannot be generalised to other situations due to contextual differences. Hence, the transferability property needs to be substantiated through replication of the study in other countries to promote the validity of such generalisation across different geographical settings, unless such contextual differences are evaluated and applied to the current research to justify or not the validity of the substantive theory in other contextual conditions scenarios.

The following three chapters detail out the theorising and analytic processes carried out to generate the substantive theory on the SCI phenomenon, in line with the referred research methodology to meet the research quality criteria and scientific rigour.

Chapter 4: Data Collection and Analysis based on the Open and Axial Coding Techniques

4.1 Introduction to the overall data collection and analysis three phases

The following next two chapters are dedicated to examine the data of all twenty-two (22) interviews, based on seventeen (17) different firms from the two primary data collection sampling phases, referred as open sampling (i.e. 8 interviews) and theoretical sampling (i.e. 14 interviews) respectively. Secondary data was also used to capture other relevant and supporting data sources to promote data sources triangulation. The secondary data included both paper and electronic documents (Section 5.3.4). The data analysis approaches, consisted from three main phases, based on the three systematic coding stages, referred as Open, Axial and Selective Coding (Section 3.10), and as depicted in Table 4.1 below.

Phase Number	Coding type	Sampling Type	Quantity of Emerged codes or categories	Data Analysis Approach
1 (Chapter 4)	Open Coding	Open Sampling based on 6 firms with 8 interviews (i.e. two of the firms offered two participants)	46 tentative open codes set (Appendix 9 & 10)	CAQDAS with code memos
2 (Chapter 4)	Axial Coding	Open Sampling based on the previous data set	22 tentative categories (i.e. 7 key & 15 non-key tentative catergories, as as shown Table 4.10)	Storyline, mind maps, memos, and a code matrix. The theorising process shifted from description to conceptual memos (i.e. categories memos and summary memos to encapsulate a set of categories)
3 (Chapter 5)	Final Selective Coding	Theoretical sampling based on 11 new firms with 14 interviews (i.e. 3 of the firms offered a 2nd visit)	1 core category, 5 main categories with 16 sub-categories as shown in Table 5.1 (Total of 22 categories)	Storyline, mind map and with summary memos to derive the final emerged theory which is represented by the final code matrix

Table 4.1: Breakdown list of all the data collection and analysis phases (Author)

4.2 Phase 1: Data collection and analysis based on the Open Coding technique

The number of emerged open codes from such an analytic process amounted to 132 codes, with varies frequency counts for each open code, which amounted in total to 1472 counts (Appendix 9). Such **132 open codes** were filtered to generate **46 open codes**, based on a frequency count greater than ten, to serve as the **initial tentative set of categories**, as referred in Section 3.12.1. The audit trail of such analytic results is referred in Appendices 9 and 10. The completion of this analytic approach with a set of 46 open codes (Table 4.1) put a start to the next Axial Coding stage, as described in Section 4.3.

4.3 Phase 2: Data collection and analysis based on the Axial Coding technique

4.3.1 Introduction to the Axial Coding stage

This second phase, referred as phase 2 (Table 4.1), outlines the Axial Coding analytic theorising process based on the storyline method. The purpose of the first phase was to generate open codes, whilst this second phase builds and refines the emerging theory by establishing the relationship between various concepts or tentative categories with their respective properties and dimensional variations. All emerged tentative categories, through the storyline approach, are mapped on a logic diagram and a conceptual framework, on a one by one category basis, to construct the overarching tentative categories to serve as the initial phase of theory building with potential and substantive ideas on the SCI phenomenon.

The forty-six (46) open codes from phase 1 are again compared with this phase data analysis emerged concepts. The same data set from phase 1 is used for this phase and the analytic storyline approach consists from a set of narratives based memos on the emerged key themes, supported by the selection of key *in vivo* extracts from the transcripts, to bring the participants back to life. The use of several theoretical memos serve as a source of validation of the theorising process, to ensure that the data analysis process follows a scientific and a rigorous methodical approach to produce a set of abstract codes, referred as axial codes (Strauss and Corbin, 1998). Such a phase focuses on the emerged theory, which transforms the previous phase set of forty-six (46) concepts to a new set of twenty-two (22) tentative categories, which are listed in Table 4.2 and also represented by the code matrix in Table 4.10.

Tentative Categories	
1	Auditing Operations
2	Managing Cash flow
3	Managing Collaboration (relationship management)
4	Managing Change
5	Managing Information sharing/Communication
6	Managing Customer Service
7	Managing Technology deployment
8	Managing Knowledge
9	Leading Effectively
10	Lean Management and Quality Standards Compliance
11	Managing Logistics
12	Managing Performance measurements
13	Planning & Forecasting
14	Managing Process within the SC and Manufacturing
15	Managing Risks
16	Managing Supply Chain Integration (SCI)
17	Managing the SC strategy
18	Managing the Manufacturing Strategy
19	Managing the Business Strategy
20	Supply management
21	Managing Trust
22	Managing Culture

7 Key Tentative Categories

Table 4.2: List of tentative categories from the Axial Coding stage (Author)

4.3.2 Findings from the open sampling data collection under the Axial Coding analytic approach

In this Axial Coding stage, it is to be noted that fifteen (15) out of the twenty-two (22) tentative categories are being referred in the Appendix 11. Such an approach has been taken through a retrospective stance, since initially the actual research data analysis consisted of rich and in-depth theorising, through a storyline approach, of all the emerged theory, with no distinction of any tentative category whatsoever. The researcher had such an indication after the completion of the Selective Coding stage (Chapter 5), since at this Axial Coding stage he had no indication which were going to be the **seven (7) key tentative categories**, as marked in Table 4.2 above and Table 5.1 respectively.

This decision is attributed to the fact that this chapter only focuses on the most significant seven (7) axial codes, in line with the GTM key foundations, where such main themes form the core theorising process to be adopted in the next Selective Coding stage (Chapter 5). Such a stance is also adopted to make the research more manageable and focused on the salient part of the voluminous amount of data with its analysis which are most relevant to the emerged theory. Though, it is to be noted that due importance is also given to such **fifteen (15) non-key tentative categories**, since they still form part of the research conceptual framework foundations, as referred in both Chapters 5 and 6 respectively.

Within Appendix 11, the fifteen (15) non-key tentative categories theorising process includes the same analytic approach as adopted within the other 7 key tentative categories hereby.

4.3.2.1 Managing technology deployment tentative category

The managing technology deployment theme is about the use of technology to facilitate, drive and improve all SC operations and production processes, with higher productivity, through integrated information systems and automation. Furthermore, technology promotes **visibility and transparency across the SC** and **efficiencies** in all operations for the focal firm to be competitive.

To achieve SCI, technology deployment, through the use of **ICT** applications, may either consist from a **common platform** solution (e.g. EDI, ERP and database) and/or **disparate legacy systems** (e.g. workstations) which need to be interconnected with each other so that all these applications need to adapt to the SC and its manufacturing processes requirements. Two participants explained in detail the deployment of technology, by stating that:

> *'... [another system is used to] monitor the progress regarding material and efficiencies of work carried out per station not from ERP but from other application'; 'In-house systems are used to integrate with the ERP'* (2/INT3); *'The ERP system does not cater for all needs being a standard system'; 'The scope is to adapt the product (software and hardware) to the manufacturing processes; 'For the SC to be fully automated, it is not that easy, since organisations ... have various systems in all areas ...'* (4/INT5).

An **ERP** is a **proactive and powerful** tool for **integration** and **information management** that enables and drives the process of the focal firm with its SC members more competitively, especially with shared information facilities over the internet. Such a process approach was described by three participants, by stating that:

> '*The IT integrates and checks the MRP material and other application software, with all the prompts to manage effectively'; 'The role of IT assures the stock levels in a very efficient way'; 'The ERP is shared'* (3/INT4); *'The IT is also driving the process of the SC, since suppliers and clients ... use their software ... to place the order or to see the orders'* (5/INT6); and 'IT is an enabler of all processes … to trigger the process' (14TS/INT11).

With an ERP system approach, it is not always possible to meet all the processes minor requirements and hence legacy systems, with a reactive approach, may still be used to meet such needs, as referred by one participant, by stating that:

> '*The software need to cater for such changes and some end up uses an excel as a time sheet, since to set and tweak the ERP, it is very expensive';* and *'This is a reactive and not real time approach'* (4/INT5).

ICT **enables SCI** by providing a real-time **information sharing** platform from all systems used at the workplace or remotely through the web, with all other SC members (e.g. firms web portals and networks). Such tools enable an effective **information management** approach that promotes **SC visibility** across the SC for better **responsiveness and efficiencies** but the **human element** remains key in the relationship management with all SC members, as clearly explained by three participants, by stating that:

> *'IT systems are used real time to be updated with all information and changes'* (2/INT3); and *'The order trend, with suppliers is integrated over internet (IT)'; 'Sales office through technology can manage the selling or buying, have a birds' eye view at one point'; 'Technology is a big enabler … contributed to large increase in efficiencies'; and 'The on-line is effective and efficient, but the human element remains key to establish a long term relationship. The web portal is an asset but the human element is still needed'* (17TS/INT 14).

The aim of the focal firm is to form a **holistic solution** to meet all SC members' **information management** needs and create a **flexible** approach in all SC processes, by **managing change and risks** effectively and to promote **business continuity** (e.g. identification of bottlenecks and delays in deliveries). Such a **flexible** provision by ICT applications needs a minimal effort from the user, since its information management capabilities are based on in-built formulas, which are flexible to calculate all the changes needed to adapt to any new requirements. Such technology enabling and holistic approach, was described by three participants, by stating that:

> *'..using IT to develop solutions from the data available and support the employees in all daily repetitive work, so that the effort is dedicated to analyse the data effectively and efficiently but generate reports automatically with a click of a button. The above is a business continuity measure against risk of failure not to lose the sale'* (2/INT3)*; 'This helps collaboration between us all as a key issue'* (5/INT 6); and *'IT helps out to flag out the issues and mitigate your risks'* (11TS/INT8).

ICT facilitates the keep-up of an **audit** trail of all works, such as with the use of bar-coding, to improve on the overall efficiencies, historical records, inventory management, information updates and products follow-up across the SC, as referred by two participants, by stating that:

> *'IT systems are used to monitor the board per board basis, which stage it is, who was the person who did it'* (2/INT3); *'Software is being used that manages information per component'; '… bar coding systems, to minimise and eliminate the stock inaccuracies, [are] used for issue of material'* (4/INT5).

ICT enables the collection and monitoring of all activities to support **performance measurements**, through dashboard reporting and business intelligence applications to promote effective **decision making** and **competitive performance**. Such a measuring approach was emphasised by one participant, by stating that: *'KPIs are used to monitor the progress regarding material and efficiencies of work carried out per station'* (2/INT3).

ICT does not always eliminate all **duplication of tasks**, due to disparate applications, of an ERP and various legacy systems. With such a duplication of operations, SCI is still in place, but is against the lean management approach. Such a duplication was referred by one participant, by stating that:

> '*If SAP is used at both ends, then the data can be shared'; 'These are then keyed in the ERP. This is a double transaction due to the two systems, hence duplication'. 'The pdf need to be keyed, a level of duplication [exists]'* (3/INT4).

Technology is also used in **production process technology** applications, such as in automation with advanced manufacturing techniques, to promote better quality, higher productivity and lean management, to achieve **high value manufacturing**, which employs less running costs and improved reliability. Though, it cannot be excluded, that the **human element** intervention is still needed within the process, as referred by two participants, by stating that:

> *'The technology investment in robotics etc, then the cheap labour is challenged'; 'The IT facilitated the processes; 'With full or semi automation machines (robotics arms etc) the cheap labour is won over, since one has 24/7 shifts and high quality, since human introduce errors'; 'Automation enables detection of efficiencies'; 'There exist processes and products that still need humans' intervention. Machines do not cater for all activities'* (4/INT5). *'The production efficiency is higher, around 3 times or less, due to automation …'; '.. [automation] promotes better/higher reliability from a quality perspective'* (6/INT8).

Logic diagram of managing technology deployment tentative category

Table 4.3 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Technology deployment tentative category properties	**Positive extreme dimensional variation**	**Negative extreme dimensional variation**
Technology approach	Proactive	Reactive
Technology based system	ERP or common integrated database with minor use of legacy systems applications	Disparate legacy systems
Technology usage	Facilitate, drive proactively and improve operations and enable informed decision-making	Management of basic information needs with a reactive approach
Technology objective	Adapt technology to all requirements	Adapt the processes to the technology

Automated process	Full automation through technology with high efficiency reliability and lean	Manual approach based on the use of the human element with less efficiency
Information management	Manage effectively all information to promote SC visibility and flexibility to be more responsive to changes and risks	Employ disparate information sources with difficulties to meet changes and responsiveness
Information sharing	Shared information systems with the involvement of the human element to have a more effective relationship	Isolated information systems
Duplication of tasks	Fully integrated ICT based solutions with no duplicated tasks (i.e. lean operations)	Disparate ICT based solutions which needs duplication of efforts through multiple data entries between systems
Tracking of works	Audit trail of all products	No audit trail at all
Performance measurements	Measuring all operations	No measuring at all
Conditions	Technology investment in ERP or common databases or disparate legacy systems; and type of product determines the use of automation and/or manual operations in manufacturing.	

Table 4.3: Managing technology deployment tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the technology deployment tentative category, since it establishes an environment where all SC members together with the focal firm, can be interconnected with each other to share a common platform of information through the use of the right set of technological based software tools, either at the workplace or remotely through the web, to promote SC visibility. The technology used to manage all information needs of the overall SC, may consist from a **common information system**, such as an ERP or else a disparate based approach, based on fragmented ICT based legacy applications or else a mix of both. ICT facilitates the keep-up of an audit trail of all works to improve on the overall efficiencies, by measuring performance, to produce all information updates and product follow-up across the SC to assist decision-making. Technology is also used in **production process technology** applications, such as in automation with advanced manufacturing techniques, to promote better quality and higher productivity. The use of technology enables, drives and improves all SC and manufacturing operations. With the deployment of technology, the focal firm is able to adopt all the necessary flexible and proactive measures with minimal duplication of tasks and with the necessary change management and risk management approaches to promote improved effectiveness and efficiencies and business continuity.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing technology deployment conceptual element is considered as part of the SCI phenomenon since it is an action category, where it promotes several consequences, as a result of technology investment in both automation and ICT applications. Automated technology consequences are reduction in human workforce, advanced manufacturing, high quality and reliability, higher productivity and lean operations. ICT applications consequences are SC flexibility, responsiveness and visibility, competitive performance, lean operations, holistic approach, manage change and risks, performance measurement and information management. The relationship of the managing **Technology deployment** tentative category with all other categories is represented by the conceptual framework in Figure 4.1.

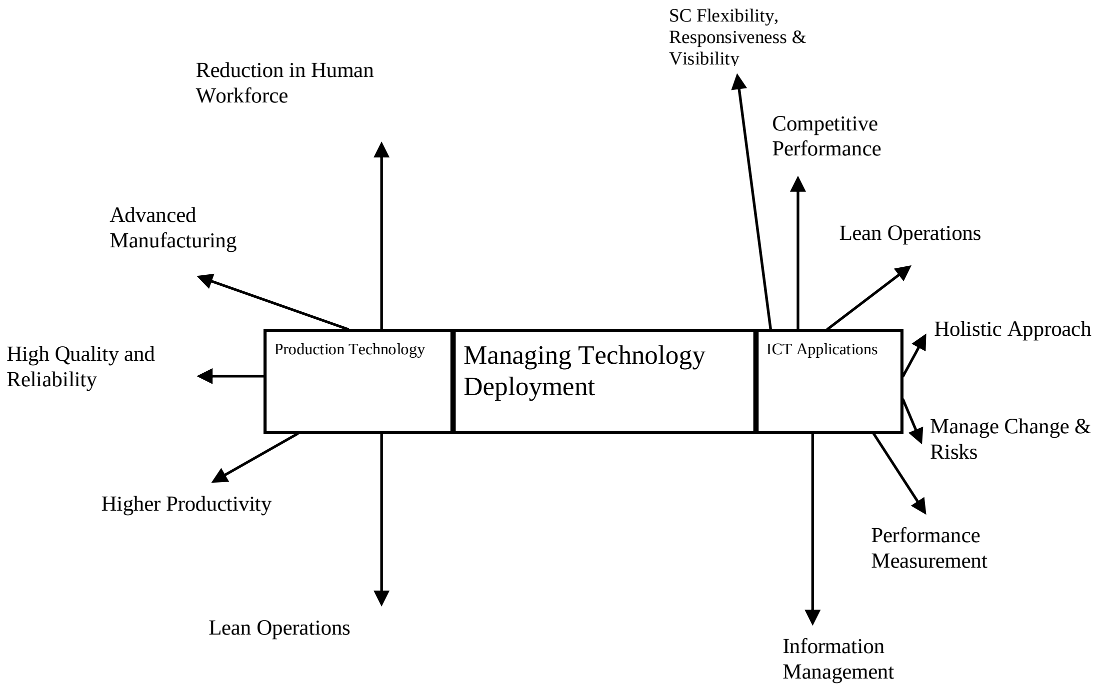

Figure 4.1: Managing technology deployment category tentative category (Author)

4.3.2.2 Leading effectively tentative category

The leading effectively theme is about people who need to promote self-direction and commitment, by developing managerial development skills that promote an effective leadership approach at all management levels, to meet all innovative challenges and the established levels of performance and to have more power to control all operations, both within and outside the focal firm, to promote effective and efficient performance.

To achieve SCI, the focal firm needs an effective **leadership approach**, based on the **leadership style** and on the individual leaders' **cultural values**, as outlined by four participants, by stating that:

> *'Leadership and the team approach is promoting the SCI'* (3/INT 4); *'Other firms have the same product but use different management styles and culture'* (4/INT 5); and *'Leadership style is like the glue to match all management levels together'* (5TS/INT2).

An effective leadership approach promotes staff to be **empowered** and **motivated** at all management levels, to **perform** effectively, in line with the performance benchmarks, as emphasised by four participants, by stating that:

> *'Teamwork and leadership is very effective at all levels such as strategic, tactical and operational'* (3/INT 4); '*…. HR incentives exist through performance measurement since one has more direction, benefits and motivation* (5/INT6); and '… *we use empowerment to take decisions'* (6/INT 7); and *'The leadership style is more of cooperation type, 'people type of style', with me roaming around people'* (2TS/INT3).

A transformational leadership style is an important type of leadership approach and is used by staff to apply an **innovative** and **proactive** approach to work. Such a transformational leadership approach was referred by three participants, by stating that:

> *'… [we] share the project works and innovative ideas …'* (1/INT1)*; 'Projects change to meet other customers' requirements so as to innovate'* (1/INT2); and *'Innovation in the process, say the transition from the manual to automation process. The management tools being used are also innovative ….'* (6/INT8).

The **transactional leadership style** is used by staff within the focal firm, to perform through a **cross-functional approach** so as to manage all processes effectively in a collaborative environment in line with **lean management**, to reach all targeted **performance benchmarks**. Such a transactional leadership approach was explained by three participants, by stating that:

> *'[Focal firm] 'focus[es] on cross-functional operations, open style policy, teamwork, performance measurements'* (1/INT 2); and '*Lean applies to all departments'* (6/INT8); and *'The departments need to have managers that interact effectively together'* (5TS/INT2).

Though, it cannot be excluded that such a teamwork approach, within the focal firm, is function of staff cultural values, due to their silo thinking, which sometimes makes it challenging to achieve the necessary improvements, since:

> *'There is always room for improvement and there is always rivalry at work between departments'* (6/INT 7); and *'The management need to remove all silos, especially from staff operating on the same management level'* (5TS/INT2).

Such a transactional leadership approach, in certain cases needs to adopt a situational leadership approach, to effectively manage all SC members, by implementing the right negotiating skills and implementing the right contingent situations, as clearly referred by one participant, by stating that:

> *'[The focal firm] needs negotiating skills, and you need not be weak with your customers ..... Similarly, [with] the suppliers you need to be strong ...'* (5/INT6); '*Such a stance need special measures which are different from other well established sources of suppliers'* (5TS/INT2).

Furthermore, for the focal firm to lead effectively, it needs to deeply engage with all SC members with an **integrated management approach** to build on the **power of control** across the SC, as outlined by one participant, by stating that: *'.... the more attachment you have with all SC members (in depth), the more is the better since you will have more control'* (5/INT 6).

The **performance measurements** create a rewarding environment to facilitate an effective leadership approach, since staff are involved and become more committed to meet such targets, which in turn also promotes **continuous improvement**. Such a leadership style measurement culture has been outlined by a participant, by stating that:

> *'We measure and discuss everyday all operations. Workers are involved in all decisions'; '[Firm] performance is also measured and service issues are being measured and gaps identified to ensure improvement'* (1/INT2).

The charismatic and humanistic quality of a leader promotes better engagement by all employees at all management levels, which shows the effectiveness of a human friendly leadership style (i.e. a mix of transformational and servant leadership styles). The leadership style need to be sensitive to the employees' needs, as referred by two participants, by stating that: *'.... corporate surveys ... rate the management to employees' effectiveness'* (1/INT1); and *'We work as a family'* (TS/INT4).

Leading effectively needs the commitment of the focal firm **human element** with the right **leadership** approach and with the support of **technology**, to align all **processes,** both within manufacturing and across the SC, and to promote a **lean management** approach so as to achieve **competitive performance**. The role of technology to achieve an effective leadership approach has been clearly outlined by four participants, by stating that:

> *'... using IT to ... support the employees in all daily repetitive work'* (2/INT 3)*; 'The IT integrates ... [and generates] all the prompts to manage effectively'* (3/INT4*); 'The IT facilitated the processes'; 'The IT is also driving the process of the SC....'; 'This helps collaboration between us all as a key issue'* (5/INT6).

Logic diagram of leading effectively tentative category

Table 4.4 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Leading Effectively tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
People cultural values to work in a team	Teamwork employed across all management levels with a cross-functional approach and with a charismatic leadership style	Silo thinking with lack of teamwork with an ineffective leadership approach
Innovative approach	Continuous improvement with a transformational leadership-approach	Status quo approach to innovation
Commitment by all people	Proactive approach	Reactive approach
Technology based processes in SC and manufacturing	Technology based information management systems and automated processes	Manual processes both in information and production
Performance measuring	Excellence in performance benchmarks and with a transactional leadership approach	Meeting average performance
Conditions	Investment in ICT and automation technology; staff cultural values on teamwork deployment against silo thinking; transactional, charismatic and transformational leadership styles to fit every situation; and SC members' commitment to interact and work together with the focal firm.	

Table 4.4: Leading effectively tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the leading effectively tentative category, as it promotes an empowered and motivated workforce to perform effectively and efficiently. Leading effectively depends on the leadership style and cultural values retained by the leaders at all management levels. Leading effectively mainly needs a mix of both transformational and transactional leadership approaches to promote innovation and a cross-functional approach, both within and across the SC. An integrated approach across the SC assigns more leadership power of control to the focal firm. Performance measurements facilitate an effective leadership approach since measuring drives motivation and commitment to meet and/or exceed all targets. It cannot be underestimated that the leader's humanistic approach (i.e. servant leadership style) has to be considered a key foundation principle behind leading effectively, since all leaders need to be sensitive to all employees' humane based requirements to promote an empowered and motivated workforce. Circumstances may exist when a leader needs to adopt a situational leadership approach to meet contingent situations. Technology deployment facilitates the decision-making process in all operations by providing an effective information management approach with real-time information provision to promote an effective leadership approach in both SC and manufacturing operations.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The leading effectively conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as effective and efficient performance, lean operations, performance improvement, innovation and continuous improvement. The moderating variables are technology deployment, leader's leadership style and culture and staff culture. The relationship of the managing **leading effectively** tentative category with all other categories is represented by the conceptual framework in Figure 4.2.

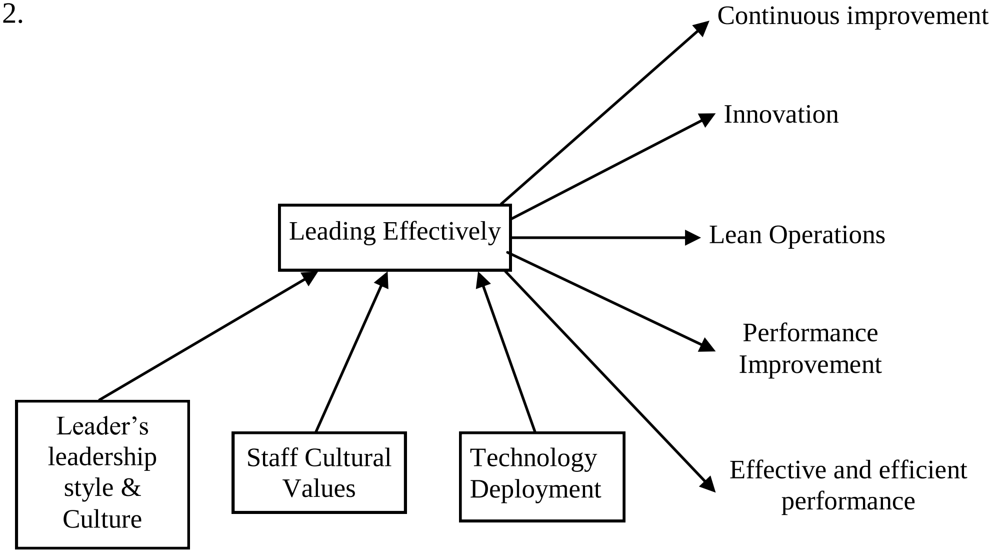

Figure 4.2: Leading effectively tentative category (Author)

4.3.2.3 Managing process within the SC and manufacturing tentative category

The managing process within the SC and manufacturing theme is about establishing all the requirements needed by the focal firm to achieve an integrated SC with all its SC members, by deriving a **holistic process approach** to achieve effective and efficient performance.

To achieve SCI, the SC and manufacturing processes of the focal firm must employ **lean management** to **optimise all processes,** both within and across the SC, in **one holistic process** from both a **technical** and **logistics** perspective to improve on the overall **customer service**. A more in-depth integrated process approach with SC members exists, when the outsourced activities form an integral part of the focal firm manufacturing operations. Such a process approach requirements, were clearly explained by seven participants, by stating that:

> *'Internally needs the right structure … with a holistic responsibility … have separate entities integrated under the Operations management'* (1/INT 1)*; '[Focal firm] focus[es] on cross-functional operations'* (1/INT 2)*; 'SCI is in depth since the outsourced activities involves part of the core processes'* (3/INT 4); *'Lean removed the waste in the processes, to be more responsive to the customer requirements'* (6/INT8); *'… quality concept is a continuous process approach across all functional areas to make the SC holistic'* (5TS/INT2); *'SCI is the integration of processes and assets both internal and external'* (13TS/INT10); and *'… the manufacturing of today is a process approach based on both the manufacturing and services'* (15TS/INT 12).

All manufacturing processes differ from each other much more than the SC processes, but the overall process needs to be lean, streamlined and to adopt a level of **collaboration** with the right allocation of **priorities**, so as to be **flexible** enough to meet all commitments effectively and efficiently and with right **customer service**. The **management leadership style** may also influence the manufacturing process approach to differ even for firms within the same manufacturing sector. The SC and manufacturing process was described by four participants, by stating that:

> *'Restructure was made and the SC needs to be lean'* (1/INT1)*; 'End of month budget is done to ensure improvement in processes'* (1/INT2); *'Priority is carefully monitored … not to escalate the problems with the customers'; 'Integration and collaboration is needed to promote flexibility to build the relationship'* (3/INT4); and *'One full standard system does not exist to work throughout. The peripheral systems yes are standard … [but] manufacturing still vary'*; *'Other firms have the same product but use different processes due to different management styles and culture'* (4/INT5).

All operations within and across the SC needs to be **measured** and **audited** to promote an **audit trail** of all activities and to undertake **performance measurement** to serve as reference to establish **performance improvements** of the overall process in line with established **KPIs**. Such an approach is easier to achieve for the focal firm since it is more challenging to implement for SC members outside the focal firm, due to the **different cultures** and objectives. Such a measurement and auditing perspective, was referred by four participants, by stating that:

> *'For inter-company the performance is more easy to be dealt with due to same values, culture and language with same MBOs. But with local suppliers and others external European suppliers to firm, requires the validation and audit parameters/criteria as established with the corporate KPIs and its suppliers'* (1/INT1); '… *gaps [are] identified to ensure improvement'* (1/INT2); *'We can establish hence through the audit trail, such as the process, the date of production and the people who worked on it'* (5/INT6); and *'The holistic approach is governed by the focal firm KPIs'* (5TS/INT2).

The overall SC and manufacturing process needs to comply with all **quality standards and sustainable and legal requirements**, to provide a product, with all of its components, with the right quality and in line with the customers' specified requirements. As a result all SC and manufacturing processes, with all human interventions, need to adapt to all specifications and procedures stipulated by such standards and requirements to eliminate any risk of failure. The quality of processes refer to all **logistics** and **production** activities that range from all human activities and interactions, down to every component that makes up the product. The sustainable measures refer to the impacts on the waste management and products movements, cost and cash flow management and employee well-being respectively. The sustainability perspective of the overall SC and manufacturing process approach was highlighted by four participants, by stating that:

> *'[We] implemented such EHS programme … system sustainability OK'; 'Manufacturing variance refers to how we are cost effective to the budget'; 'The stock needs to be made available without ending up into cash flow problems'* (1/INT2); *'Environment and CSR,… needs traceability on client and supplier waste management processes'* (5/INT 6); *'… to comply to the respective country standards and audits for certification purposes e.g. ISO and TUV within the global SC'* (6/INT7); *H & S we use OHSAS 18,001'; 'Operational excellence value is key here, because managers are expected to improve processes, people and systems'; 'Quality is an integral part of the model'* (6/INT 8).

Risk management is to be employed in all activities to ensure that at all stages in the process, within and across the SC, meet the expected scheduled performance and are not subjected to any bottlenecks. Furthermore, ICT applications need to be used by all employees as a supporting tool in all their operations, to identify any shortcomings and to remedy at the earliest. Such a risk management approach, was explained by three participants, by stating that:

> *'...using IT to develop solutions… and support the employees'* (2/INT3)*; 'Though, an infallible SC model does not exist. One needs to reduce the chance to end up in these conditions and not be prepared. This is risk assessment, which needs to be shared across the SC with all members .....'* (5/INT6); and *'The products and/or customers are being tracked and identified that have the possibility to fall behind'* (6/INT8).

The focal firm and all SC members need to employ a **cross-cultural based knowledge** mindset, which rests on common values and beliefs, by **sharing information** to **collaborate effectively**. The focal firm, with all SC members, needs to negotiate and establish attractive **contractual agreements**, to meet all the process requirements competitively. Such an environment promotes all members **human element** to be **empowered** and to take **informed and effective decisions**, with a level of flexibility, for a **win-win outcome** and with a **continuous improvement** approach. Such a process approach based on knowledge transfer and collaborative environment was referred by four participants, by stating that:

> *'… material reduction and validation of new resin material used to reduce cost and better quality to improve efficiency, hence the knowledge sharing occurs on these matters'; '..* share the project works and innovative ideas ..' (1/INT 1)*; 'We have 3 shifts and dig deep in case of problems. In fact, Focus groups are organised … to find in depth … the bottlenecks'; '…empower their responsibilities across all departments ….'* (1/INT2); *'… setting up the*

contracts and undergo negotiations with the suppliers ..'; 'Suppliers and buyers are well related between us' (2/INT3); and *'The decisions are also flexible to discuss to promote improvements'*; *'The relationship is healthy with suppliers and inform us on new products/changes …'* (3/INT4).

Technology deployment, through ICT tools, such as ERP, facilitates and drives information based processes through prompts and alerts, to implement more **efficient and effective** operations, over the slower manual operations. The internet is providing a means of interconnection to all SC members over the web, which through ICT applications, promote SC visibility, both within and across the SC, to be updated with real time information. With an ERP system approach, it is not always possible to meet all the processes minor requirements and hence legacy systems may still be used. Such an ICT based process environment was highlighted clearly by four participants, by stating that:

'IT solutions … makes the work processes better, avoid double effort and … data is generated from barcodes to be more creative'; 'IT systems are used real time to be updated' (2/INT 3); '*The IT integrates and checks,… with all the prompts to manage effectively'* (3/INT4). '*… the material is available but the planning is still pending to be done manually where all other processes are all automated'; 'The order trend, with suppliers is integrated over internet (IT)'; 'The SC uses cloud computing and groupware systems, …..which comprises interfaces through the web with sales office … excel as a time sheet [is used], since to set and tweak the ERP, it is very expensive'* (4/INT5); and *'The IT is also driving the process of the SC'* (5/INT6).

Similarly, for automated production processes, such machines reduce the level of human intervention in manufacturing by employing less people and at the same gives the innovative edge needed in manufacturing for the local firms to survive and remain competitive, as explained by one participant, by stating that:

'The technology investment in robotics etc, then the cheap labour is challenged since it is still human'; 'The IT facilitated the processes'; 'With full or semi automation machines … one has 24/7 shifts and high quality, since human introduce errors which are avoided' (4/INT5).

Though, the importance of the **human element** cannot be excluded, since human intervention with its technical and management capabilities is still needed to manage and improve the overall process and also to perform certain tasks which cannot be automated. It is further noted that the human element, in particular processes, has the capability to undertake better inspection of products defects, as referred by three participants, by stating that:

Machines do not cater for all activities'; 'Mistakes occur, when equipment and software is excellent, but they remove the human element [from the overall process]' (4/INT 5); '*… the manual labour can identify better some defects'* (6/INT 7); and *'…although the processes are automated needs the human element to make the job complete'* (10TS/INT7).

Logic diagram of managing process management within the SC and manufacturing tentative category

Table 4.5 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Process within the SC and manufacturing tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Optimised process	Efficient and effective process approach with the support of the technical and management human capabilities to optimise the process	No optimised process with lack of human involvement
Process integration with other players	Integrated process based on cross-cultural knowledge	Not integrated process
Process monitoring through performance measurement	Measuring and auditing of the process activities to promote improvements	No measurement at all
Process quality and sustainability	Process in line with all quality standards and sustainability measures (i.e. triple bottom line)	Lacking in both quality standards and sustainable measures within the process
Process streamlining	Lean process with immediate identification of bottlenecks to remedy at the earliest	Process with several shortcomings
Process automation	Automated activities in information management and manufacturing to be innovative	Manual process approach
Conditions	Technology deployment in ICT and automation; human technical and management capabilities; contractual agreements; effective management and leadership style; and cultural values of focal firm staff and SC members.	

Table 4.5: Managing process within the SC and manufacturing tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the managing process tentative category, since the overall SC requires a holistic driving force with the right leadership style, to pull all SC members together in a continuous improvement and collaborative approach with the focal firm, to achieve effective and efficient performance. Lean management enables the overall process optimisation to reach the expected productivity levels, in line with the established focal firm's performance measurements and KPIs. Such lean operations need to be validated to respect all quality standards and sustainable and legal requirements, to be awarded the certified approvals. Risk assessments of all actions need to be in place to identify any unforeseen bottlenecks at the earliest and to remedy in time, to minimise the possibility of any process disruption to promote business continuity. Such a holistic process approach, with the use of technology in ICT and automation, with the right engagement and interfacing capabilities of the human element, are crucial requirements to optimise the overall process.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The **managing process within the SC and manufacturing** conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as optimisation of all processes, lean operations, a holistic approach to all operations, SC flexibility, win-win outcome, continuous improvement, efficiency and effectiveness, sustainability, customer service, business continuity and competitive operations. The moderating variables are lean management, human element capabilities, collaboration, cash-flow management, effective management style, performance measurement, audit of operations, risk management, quality standards and sustainable and legal compliance, risk management, information sharing, knowledge management and technology investment in ICT applications and automation. The relationship of the **managing process within the SC and manufacturing** tentative category with all other categories is represented by the conceptual framework in Figure 4.3.

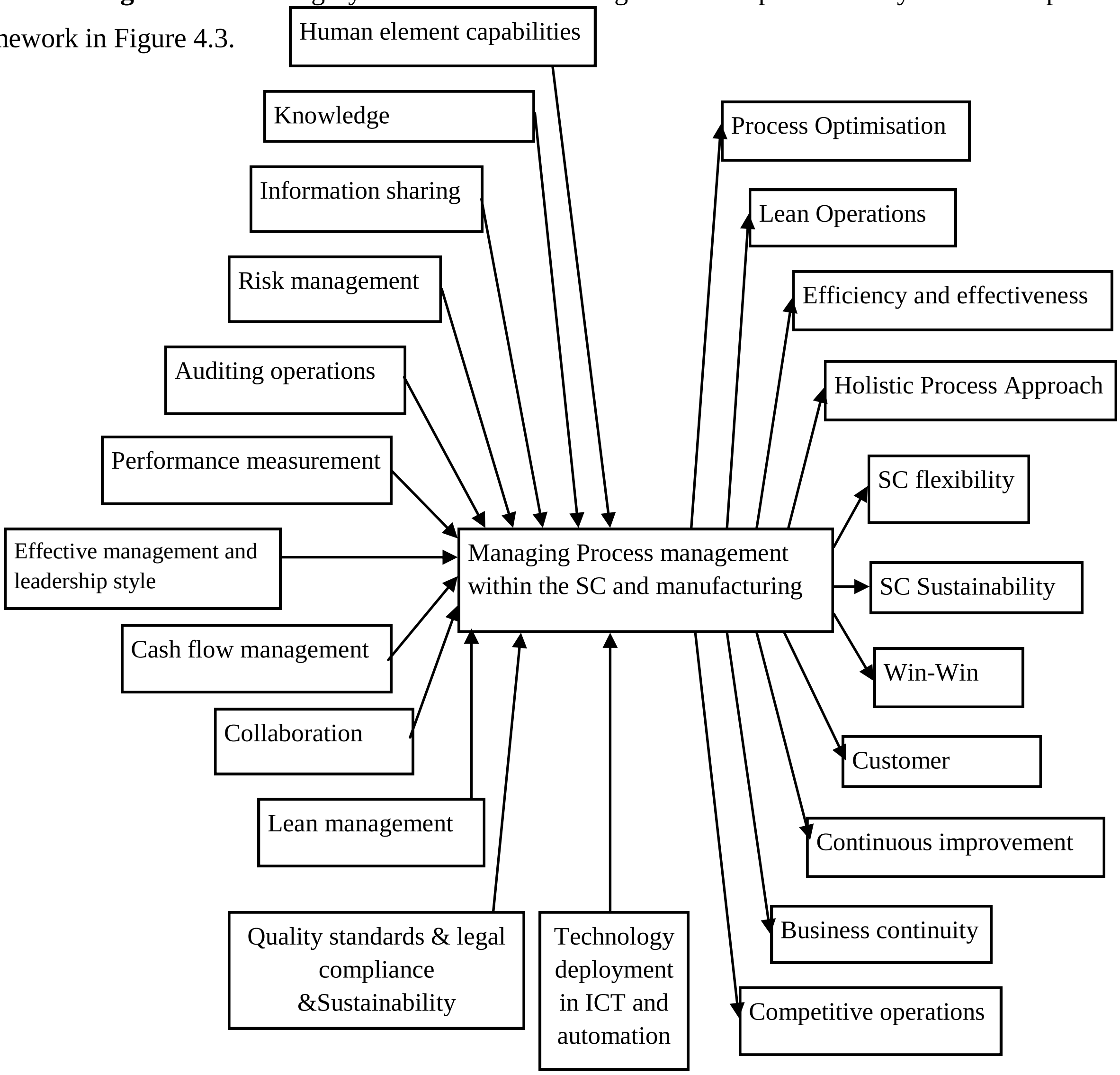

Figure 4.3: Managing Process within the SC and manufacturing tentative category (Author)

4.3.2.4 Managing supply chain integration tentative category

The supply chain integration (SCI) theme is about taking all the necessary measures to build a relationship between the focal firm and all SC stakeholders so as to create a **trustful** environment and a team work approach, depending on each SC member role. Such a teamwork approach needs to exploit each SC member capabilities with the necessary synergies, in line with all required **quality standards, sustainable measures** and **legal** requirements, to promote lean operations with the necessary **flexibility** and to perform **effectively and efficiently** so as to achieve a **competitive edge**.

SCI is key within the overall manufacturing and SC operations, since it needs that all collaborative initiatives, between the focal firm together with all SC members, to be linked in a common platform to meet jointly all quality standards and the triple bottom line, so that the overall SC performs effectively and efficiently. Such a SCI holistic approach was referred by four participants, by stating that:

> *'SCI is the core in the daily activities'; 'If you follow the success of the organisation, this is attributed to the SCI. This is not an overstatement but a reality'* (1/INT1); *'Practically the firms are merging with each other'; '… one has no option to stay out of the SCI initiatives, due to regulations and other commitments you need to integrate otherwise you are out of business'* (5/INT6); *'SCI for us is cross-functional and integrated approach'* (1TS/INT5); and *'We have two forces. The customer satisfaction and the production (profit)'* (10TS/INT7).

SCI may vary from a **close** (in-depth) to **arm's length relationship** with other SC members. The integration depth is function of each SC member's role vis a vis the focal firm. SC members who form part of the Corporate or else deliver a core part of the focal firm's products, backed by years of experience in the relationship, tend to become more closely integrated, with a higher level of commitment in all interactions, in such a way to become partners of each other. Other SC members who are involved in the basic exchange of orders have a minimal relationship engagement and are referred as suppliers. Such a SCI variation between SC members has been referred by two participants, by stating that:

> *'The SCI depth is a mixture. We have suppliers of the compressors, as the core activity since our product builds on their product and hence these suppliers are partners and have an in-depth relationship, based on years of experience … but others are referred as suppliers, that give us commodities products'* (5/INT 6); and *'We are a bit fragmented and not integrated'* (6/INT 7).

For an **in-depth integrated SC** the focal firm with all its SC members shall deploy a cross-functional **teamwork** approach between people, to promote **lean management** with a **holistic perspective**. Such an integrated approach promotes a more **collaborative effort**, between the focal firm and the different business units of other SC members, both in the upstream and downstream sides of the SC, so as to adjust to the necessary **priorities** and to promote **SC flexibility**. It cannot be excluded the importance of the **knowledge level** and capabilities of all people within all business units to have the right expertise in place for the job assigned, so as to avoid any person to be forced to a situation in **'juggling many balls'** (6/INT7). There must be **contractual agreements** to formally establish the nature of the **commitment** between SC members, but a **trustful environment between people** is critical for such a relationship to give an effective customer service. Such a collaborative approach between all SC members has been described by five participants, by stating that:

> *'…integrating through an operations department concept with a holistic responsibility with all the roles and have separate entities integrated under the Operations management'* (1/INT1); *'… all orders are managed according to the priority'; 'Integration and collaboration is needed to promote flexibility to build the relationship'; 'Training is given to eliminate waste (zero defects) more focused on the production'; 'Even office work need to be lean'* (3/INT4); *'When a client engages with a manufacturer, both engage in a trustful environment … apart from the* ***formal contracts'*** (4/INT5); *'One needs to build the SC and have expertise for each section, … to focus on some of the key areas of the SC'; 'If you were not integrated as the way we are, it will limit the customer service due to fragmented operations'* (6/INT7); and *'... effective and efficient SCI [depends] on the human element for the relationship between people'* (9TS/INT6).

When the focal firm is subjected to a poor performer SC member, it shall adopt **vertical integration initiatives,** if possible, due to the contractual obligations, so as to bypass or solve such a problem, in line with the **lean management** approach. Once the contractual agreement is terminated**,** the focal firm may either take over or else outsource such a role. A poor performer SC member leads to an **arm's length SC member relationship** and a **fragmented SC**. Such a problematic situation, with other SC members and its solution, has been described by four participants as follows:

> *'Suppliers' control is being reduced through vertical integration'; 'Such a vertical integration promotes lean management'. 'Ownership is in the input and process but not in the output to the customer'* (1/INT 1)*; 'The objective of the focal firm is to transfer all the manufacturing operations locally, referred as vertical integration'; 'Spin-off from [Corporate to an intermediary] as for the sales, delivery and transport … Malta has been restricted'* (1/INT 2); and *'We are obliged contractually to use [downstream intermediary] to reach all Europe'* (1TS/INT5).

The **overall performance** of an integrated SC shall improve on the **flexibility** through **information sharing** and **communication** initiatives by all SC members, since *'Communication is a must for the SCI depth, that all data arrives to all people and at the same time'* (6/INT8) and *'We use SCI, by talking more with each other, departments are cross-functionally operating'; 'We are more flexible to meet each other' requirements'* (16TS/INT 13).

The **leadership** approach shall empower employees and shall be used as a driver for the **integration** between staff. It can either takes the form of a **transactional leadership** approach, based on various performance measures, or else takes the form of a **transformational leadership** approach, based on an innovative and change management perspective of all operations or else a mix of both type of styles to adapt to the situation. Such a transformational leadership and transactional leadership approaches, were referred by three participants, by stating that:

> *'... [we] share the project works and innovative ideas ...'* (1/INT1); *'Projects change to meet other customers' requirements so as to innovate'; '[Managers need] to empower their responsibilities across all departments and not focus on a departmental level only'; '[Focal firm] focus[es] on cross-functional operations, open style policy, teamwork, performance measurements'* (1/INT2); and *'Leadership and the team approach is promoting the SCI'* (3/INT 4).

The focal firm needs to integrate itself, whenever possible, with suppliers and customers through collaborative agreements in stock supplies, outsourced works and in all sales deliveries respectively since the SC is strong as its weakest link. Such an integrated approach, has been described by two participants, as follows:

> *'We bring the raw material and supply to local sub-contractors that do the moulding'; 'The sales companies coordinate with the logistics centre to promote integration through the same system'* (3/INT 4); and *'... if the manufacturers are not given the integration with the suppliers, they will not buy from them'* (4/INT5).

ICT remains an **enabler** of the overall SC integrated process. **ICT** improves on the **SCI depth,** since it promotes **SC visibility,** by having all SC members updated and aligned with all **information**. Such **information management** shall assist the **risk management** across the SC, since immediate identification of all shortcomings is possible through such information, so that the affected SC member/s take all the necessary timely actions and remedies to promote **business continuity**. The deployment of ICT applications has been described by two participants, by stating that:

> *'... using IT to develop solutions from the data available and support the employees in all daily repetitive work .... The above is a business continuity measure against risk of failure'* (2/INT3); '*... monitoring is also done today by smart phones, where managers are mobile and can see the orders, make new orders and raise issues. Thanks to these tools these are pushing more integration across the SC'* (4/INT 5).

The deployment of **technology** in manufacturing, by using advanced and integrated processes, with the validation of the overall production process, promotes **SCI** within the processes through a **high value manufacturing** approach, since: *'The [use of] IT facilitated the processes. Apart from the IT software there is the Automation machines ...'; 'With full or semi automation machines (robotics arms* *etc) the cheap labour is won over'* (4/INT5); and *'Validation of processes in the shop floor ensures this integration'* (6/INT8).

Logic diagram of managing SCI tentative category

Table 4.6 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing SCI tentative category properties	**Positive extreme dimensional variation**	**Negative extreme dimensional variation**
Teamwork approach	Synergies in all actions between people within and across the SC in line with all quality standards and the triple bottom line	Conflicting approach between people with fragmented operations across the SC
SC level of control	Ownership of various SC tiers promotes improved control management (i.e. vertical integration)	Ownership of focal firm only limits the control on other SC tiers especially for low performing SC members under contractual obligations
Integration level of depth	Closely integrated approach through an information sharing platform to promote an effective and efficient customer service	Arm's length integrated approach with lack of information sharing and gaps in the overall customer service
Knowledge capabilities of SC members	Staff with specialised skills and with the right expertise	Staff end up to perform multi-tasking with lack of expertise in each task
SC holistic performance	SC members with full commitment and support to focal firm	SC members who perform below the performance expectations of the focal firm
Conditions	Technology deployment in ICT and automation; trust between SC members and the focal firm staff; effective leadership approach; and contractual agreements (e.g. technical and commercial)	

Table 4.6: Managing SCI tentative category (Author)

Conceptual summary on the tentative category

SCI within the focal firm and outside with all SC members may vary from a close to arm's length relationship. There exist **contractual agreements** to establish formally the nature of the commitments between SC members, but a **trustful environment** is crucial for such a successful relationship. A level of consensus and compromise between all SC members is always needed to make all SCI initiatives fit. For an **in-depth integrated SC** the approach to be taken by the focal firm, both within and outside it, needs to be based on a cross-functional **teamwork** approach, to promote **lean management** and **optimised processes** for a **win-win** outcome for all SC members. The focal firm may adopt **vertical integration**, to employ improvements in its **lean management approach**, by replacing poor performing SC members, once the contractual obligations are terminated. In an **arm's length SC**, the focal firm mainly focuses on the internal synergies and keeps a distance with the outside SC members, causing a fragmented SC. The **overall SC performance** improves, due to the synergy effect of all the members through such a holistic stance. The **leadership style** has a direct influence on the overall SCI approach, since all people within all SC tiers are motivated and empowered to change and innovation and at the same time perform their daily operations **effectively and efficiently**. The **ICT** remains an enabler of the overall process within the SC. **ICT** improves on the **SCI depth,** since it promotes **SC visibility,** by having all SC members updated and aligned with all **information**. Such **information management** assists the **risk management** approach across the SC by identifying any shortcomings at the earliest. The deployment of **technology** within manufacturing, by using **advanced** and **integrated automated processes** based on **high value manufacturing**, further promotes SCI within the overall manufacturing process.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing SCI conceptual element is an action category, where with the support of various moderating variables, promotes several consequences, such as SC visibility and flexibility, sustainability, effective and efficient performance, effective customer service, optimised performance, holistic process approach, business continuity, win-win outcome, lean operations, high value manufacturing and competitive performance. The moderating variables are lean management, performance measurement, change and innovative approach, quality standards with environmental, economical and social practices and legal responsibilities, collaboration, trust, risk management, leadership approach, information management, contractual agreements, information sharing and technology deployment in ICT applications and automation. The relationship of the managing SCI strategy tentative category with all other categories is represented by the conceptual framework in Figure 4.4.

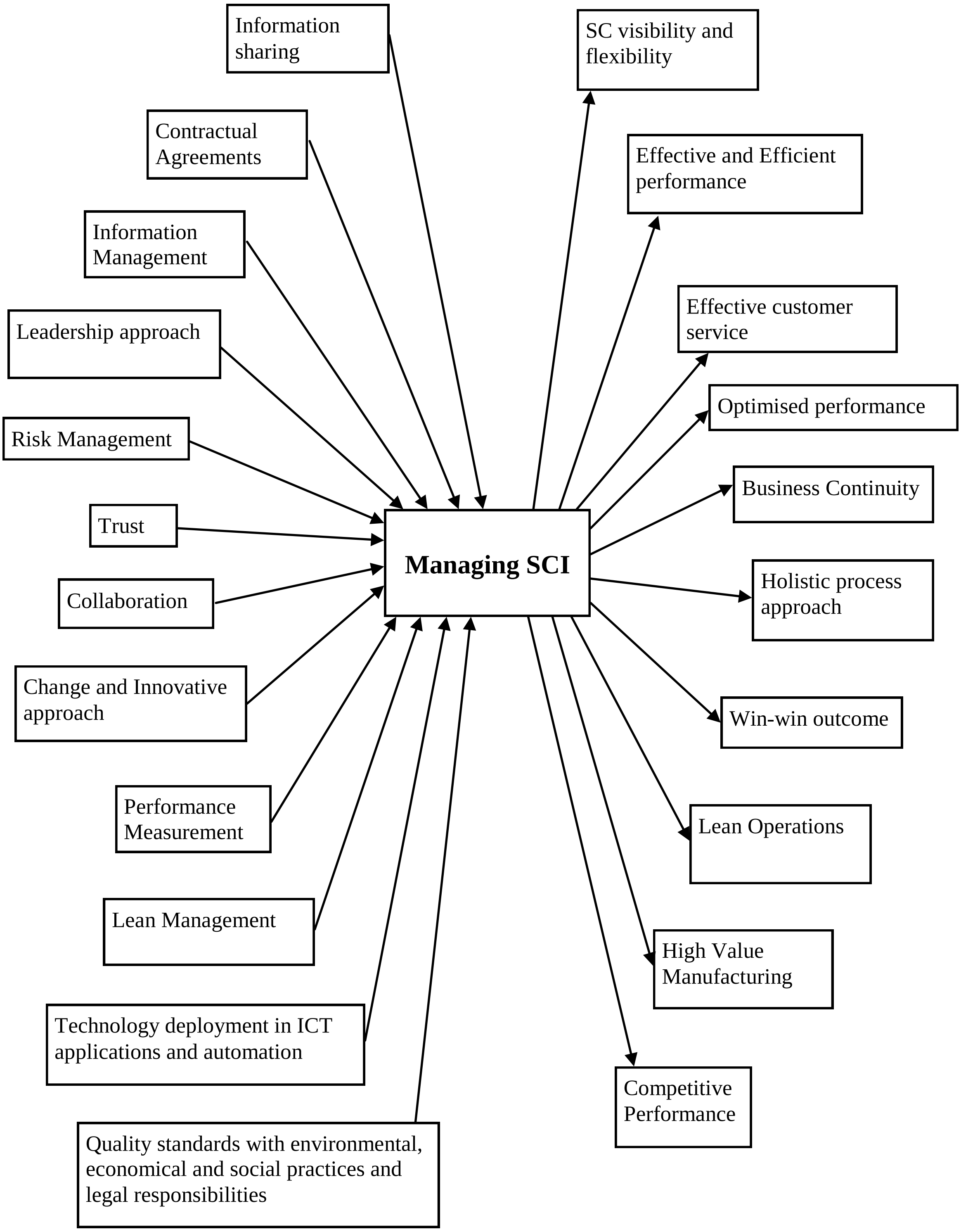

Figure 4.4: Managing SCI tentative category (Author)

4.3.2.5 Managing the SC strategy category

Managing the SC strategy theme is about a strategic approach to SCM whereby a decision needs to be taken on the SC set-up with respect to the focal firm with all other stakeholders, to perform effectively and efficiently. Such a decision needs to be taken in-conjunction with the manufacturing strategy. Such a SC strategy determines the established SCI depth of relationship between all SC members, being function of the role each SC member.

Managing the SC strategy is about a pull-SC strategic approach which places the customer at the heart of the SC strategic significance since it initiates the overall process based on the make-to-order strategic approach. The SC strategy needs to decide on the SCI strategy which may vary in the depth of the collaborative relationships with various stakeholders, both within the focal firm and outside it, to perform all activities in an optimised manner and with the right priority of all orders, for a win-win outcome. The internal integration remains of crucial importance to the overall integrated efforts across the SC. The integrated approach needs to effectively manage all the different individual objectives of all stakeholders to promote a unified and a common approach across the SC, with minimal conflicts and a balanced approach, since the **overall SC strategy** is function of all the SC members' **individual strategies** together with the **focal firm strategy**. The role of the SC strategy has been referred by five participants, by stating that:

> *'The intra SC has been a CSF'* (1/INT1); *'.. it is the pull system or sales driven, since we do not build to stock, except volume runners'* (2/INT3); *'We have suppliers of the compressors, as the core activity ... hence these suppliers are partners ... but others are referred as suppliers'* (5/INT 6); *'The various stakeholders are after the same criteria but these may be in conflict with their individual targets/criteria'; '... the cross-functional approach, levels out or is balanced vis a vis the individual interest'* (6/INT8); and *'... all the measures are needed and all are important since you are strong as the weakest link'* (10TS/INT7).

The SC strategy adopts more generic and standard SC processes, relative to manufacturing practices, since the latter is more sector-specific with dedicated processes, with a level of variation from one manufacturing sector to another one. The difference between the SC and the manufacturing strategies has been referred by a participant, by stating that:

> *'This process is the core of the company, namely the production and manufacturing differs a lot' [from one sector to another]'; 'The standardised processes are the peripherals of the SC such as client integration and raw material ordering'* (4/INT5).

All SC operations, both within and outside, are audited to promote sustainable operations and legal compliance. Such a sustainable approach has been described, by two participants, by stating that:

> *'EHS is the focus ...'; 'The results obtained with the audit were very promising ... system sustainability OK'; 'Environment and CSR [are being respected]'* (1/INT 2); and *'Legislation such a **WEEE** [is also respected]'* (2/INT3).

The SC strategy must undertake the **selection of suppliers** with respect to the trademark and products quality to have the right materials for manufacturing through an effective supply management approach in line with lean operations, without ending up into stock-out situations or cash flow problems due to excess stock. Furthermore, suppliers or third party manufacturers, who may also supply products or forms part of the focal firm manufacturing process, need to have their quality compliance assured. Such an assurance can be achieved by incorporating all the necessary control measures on all SC members, through auditing of their operations, both by the focal firm and by external certified bodies, to identify any risk associated with cutting corners or shortcomings in any of the quality standards. Such an effective management of supplies has been referred by four participants, by stating that:

> *'But with local suppliers and other external European suppliers to firm, requires the validation and audit parameters/criteria'* (1/INT1); *'We negotiate on the trademark from the available suppliers due to the specs compliant with the design, since not all components are 100% compatible'* (2/INT3); '*The products need to have all details according to that specified, to be UL certified'*; '*Quality manager monitors samples, to operate a lean process with the right quality, defects identification, inspection etc'*. (3/INT4); and '*The stock needs to be made available [but] without ending up into cash flow problems*' (5/INT6).

The suppliers and third party manufacturers, who form part of the overall SC, are not only required to meet the quality specifications, but are also obliged to respect all delivery lead times not to disrupt the overall SC timing operations, as one participant outlined, by stating that:

> *'The supplier had promised to send a number of boards as agreed. We checked for such a delay and discovered such a shortcoming. He informed us that he had a problem in the manufacturing process'* (5/INT6).

The SC strategy of firms within Malta, as a Small Island State, requires an effective logistics management to overcome all the challenging objectives associated with the selection of the **logistics routes and delivery modes of transportation**, considering the relative high volume of export and import transfers over the low volume in local sourcing. Three participants explained such a logistics challenging situation, by stating that:

> *'Logistics is the main problem in Malta'* (2/INT3); *'Most of the products are for export, locally the market is small'* (3/INT4); and *'SC in Malta I consider it as a phenomena, with various difficulties since one needs to consider various factors … weather is a factor, … we are surrounded by sea and considering that sourcing locally is minimal'* (5/INT6).

The operations, under the SC strategy, are responsible of all materials and products movements needed within manufacturing, so that the final product is delivered to the customer in the right time, at the right place and with the right price. Such an approach needs that the focal firm, with the support of all SC members, builds a quality based process associated with both manufacturing and with all collaborative initiatives with all stakeholders. Such a process needs to have full SC visibility of all operations to measure performance, through the provision of all the information, so as to be flexible enough to effectively adapt to any suppliers' delivery problems, the customers' changing requirements and the necessary after sales support with any reverse logistics requirements. Such a SC strategic approach, has been referred by four participants, by stating that:

> *'The customer has the right to return the product'* (2/INT 3); *'Integration and collaboration is needed to promote flexibility to build the relationship'* (3/INT4); *'The client [as the focal firm] has access to suppliers, the stock available and the customer [focal firm] is aware of the order and the shipping details'* (4/INT5); and *'Quality is an integral part of the model and cannot be separated from the SC and manufacturing process. Quality is part of the product, and part of the communication with respect to timely feedback'*; *'… the right product, at the right time and at the right price … the right [product] quality'* (6/INT 8).

Contractual agreements are needed to formalise the collaborative relationship with all SC members to meet all quality standards and also to cover both legal and sustainable requirements. This explains the need to have the right manufacturing strategy in-conjunction with the right SC strategy, so that both strategic approaches are weaved together to derive a holistic SCI management approach. SCI strategy remains crucial both within and outside the focal firm, especially with SC members who are key players within the SC set-up. Such a holistic process approach is needed in both manufacturing and SC operations and with an in-depth collaborative effort between all involved to promote lean and sustainable SC operations. Such a holistic approach has been referred by six participants, by stating that:

> *'Internally there is SCI'* (2/INT3); *'SCI is in depth since the outsourced activities involves part of the core processes'; 'Even office work need to be lean'* (3/INT4); and *'SCI today is not an option to integrate or not. The internationalization in the business world, one needs to integrate, to move in line with the market'; '… one has no option to stay out of the SCI initiatives, due to regulations and other commitments'* (5/INT 6).

The focal firm, in its SC and manufacturing strategies, needs to decide whether to go for **vertical integration** or **outsource** certain activities, with the objective, in either case, to achieve **lean management** and be more **competitive**. If the decision results in outsourcing, there is the need for the focal firm to promote an in-depth SCI set-up with the relevant SC member, especially if the outsourced part is part of the core activities. Wherever possible, local sourcing is preferred from overseas, due to proximity advantages. Such a decision is not a quick fix solution but a long term strategic approach. Such a SC strategic decision, in-conjunction with the manufacturing strategy, has been referred by three participants, by stating that:

> *'Getting a supply from Mexico is not lean'; 'Malta facility is an intra perspective and lean, since you are taking ownership of the SC tiers'* (1/INT1); *'We are looking for the long term and not only focussing on the short term problems'; 'In Malta subcontracting is cheaper,*

stock is kept low,… customer's market is closer, port is closer and work more efficiently having all the resources in hand' (1/INT2); *'SCI is in depth since the outsourced activities involves part of the core processes'* (3/INT4).

SCI is a growth SC strategy and to be maintained may need the focal firm to increase its SC ownership span, especially if other SC members are not meeting the focal firm's expectations, as one participant explained, by stating that:

> '*The business model is working but can operate more effectively and efficiently if taken ownership of this missing part, due to opportunity of growth is large but with [such sales and marketing downstream intermediary], this is a bottleneck'; '… one of the 5 strategic priorities on international growth… needs the right manufacturing platform with an integrated SC …'* (1/INT1).

ICT applications, through a common database (e.g. ERP) enable and drive all processes to promote visibility and traceability of all work and products all across the SC. It cannot be excluded that ICT applications may be limited or based on fragmented legacy systems that are not interfaced with each other and as a result introduce a substantial level of duplication in all tasks. Such an approach with an ideal common database solution or else with a combination of applications, is referred by two participants, by stating that:

> *'… [another system is used to] monitor the progress regarding material and efficiencies of work carried out per station not from ERP'; 'In-house systems are used to integrate with the ERP'* (2/INT3); and *'The ERP does not cater for all the company needs and firms use such satellite systems'*; *'For the SC to be fully automated, it is not that easy, since organisations originally used to have various systems in all areas'*; *'This is an open process thanks to the software available, where a closed loop exists between manufacturer, client and supplier'; '… interfaces through the web with sales office, in the global world, have access to all information'; 'On the other side of the SC, the firm also knows the suppliers' stock levels, through access given by suppliers to the firm … '* (4/INT5).

Logic diagram of managing the SC strategy tentative category

Table 4.7 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing the SC strategy category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Pull SC driven demand	Make to order except in make to stock for volume runners	Make to stock of all products
SCI depth	Close collaborative relationships internally and externally (e.g. partnership with SC members engaged in core operations)	Arm's length relationships both internally and externally with fragmented and unbalanced SC operations
Quality conformance across the SC to manage risks	All SC members (including the focal firm) are audited for quality compliance	No auditing of SC members on quality at all
Risk management of all SC operations	Identify all shortcomings through performance measurement to remedy at the earliest (e.g. stock	No risk assessment at all

	and cash flow)	
Supply management	Effective lead time management	Ineffective lead time management
SC Operations	Effective and efficient standard and lean operations with a holistic integrated approach across the SC	Lack of effectiveness and efficiencies within the SC standard operations and with a fragmented approach
SC visibility	Information sharing mechanisms in place to provide all the needed information (e.g. traceability)	Lack of information sharing
Logistics management	Delivery of merchandise at the right location, at the right time and at the lowest cost	Inefficient and ineffective logistics
Strategic planning horizon and significance	Long term effective solutions	Quick fix temporary solutions
Sustainability and legal compliance	Compliance to all sustainable measures (i.e. triple bottom line) and legal requirements	Lack of sustainable operations and legal shortcomings
SC ownership span	Ownership span is increased to promote effective and efficient operations	SC effectiveness and efficiencies is subject to other SC members, with low performing intermediaries
SC Flexibility in operations	Adapt to all changing requirements by SC members	Lack of flexibility to meet changes by SC members
SC growth initiatives	Investment in greater SC span ownership to ensure effectiveness and efficiency	No investment to increase ownership at all
Conditions	Manufacturing sector; contractual agreements; technology deployment in ICT applications; and firm location within a Small Island State with low local sourcing.	

Table 4.7: Managing the SC strategy tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled by the right SC strategy tentative category, since the focal with its pull SC strategic approach, needs to establish an integrated approach with all of its SC members, to optimise all operations and to perform effectively and efficiently for a win-win outcome. The internal integration of all the operations within the focal firm constitutes the key foundation of the effectiveness and efficiency of the overall SC strategy. Such a SC strategy needs to promote quality assurance in all products and processes and also sustainable operations, with legal compliance. Such sustainability is assured by undergoing the necessary performance measurements and auditing of all operations and processes within and across the SC. Such a measurement scenario is needed to establish at the earliest all shortcomings from the scheduled performance, by taking the most effective decisions to promote business continuity through an effective risk management approach. Supply management is effectively managed by ensuring that all products meet all quality standards and all lead times in all deliveries respectively, so as to manage cash flow effectively and promote lean operations. Logistics management needs to establish the most cost effective and efficient routes for all deliveries and at the same time promote sustainability, considering the challenges subjected to firms located in Small Island State countries. SC visibility is needed for all collaborative initiatives with all SC members through effective information sharing on all requirements. Contractual agreements are put into place to have a formal commitment in all collaborative initiatives. The SC strategy needs to determine the most effective span of operations and SCI depth (i.e. close relationship or an arms' length approach) with all different SC members, and whenever necessary to undergo vertical integration or outsourcing to other parties. Such a SC strategy on the span of operations and the SCI depth also depends on the manufacturing strategy. The SC strategy in-conjunction with the manufacturing strategy need to adopt a closely integrated approach depending on the role of the SC member who is either: a single supplier which provides customised products or services; or a contractor who performs a core part of the manufacturing process; or an intermediary in the downstream side of the SC, who acts a bridge to the customer. Technology is the enabling tool in both production and ICT applications. Technology may be deployed to enhance the production processes to increase the depth of automation and similarly to enhance information systems through the deployment of common databases to provide effective information sharing with a common system to overcome the shortcomings provided by the use of fragmented legacy systems.

Tentative relationship between all emerged potential categories in line with the coding paradigm

Managing the SC strategy conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as customer service, optimised processes, win-win outcome, priority management, sustainability, SC visibility and flexibility, holistic strategic approach, competitive operations, business continuity and lean operations. The moderating variables are collaboration, logistics management, cash flow management, information management, SCI, quality processes, lean management, contractual agreements, supply management, risk management, effective management and leadership, performance measurement, technology deployment and auditing operations. The relationship of the managing the SC strategy tentative category with all other categories is represented by the conceptual framework in Figure 4.5.

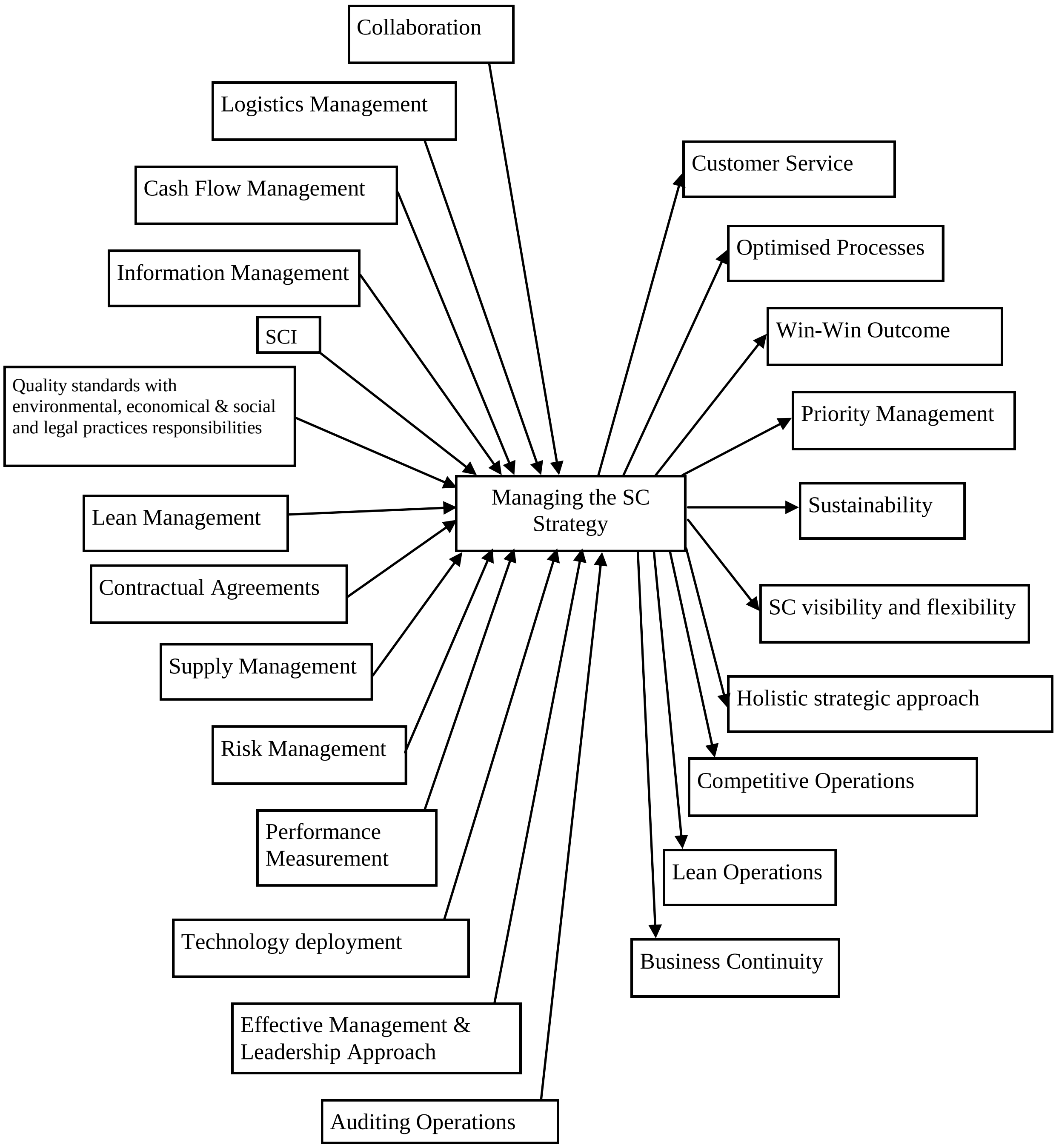

Figure 4.5: Managing the SC strategy tentative category (Author)

4.3.2.6 Managing the manufacturing strategy tentative category

Managing the manufacturing strategy theme is about the need for the focal firm to deploy the right manufacturing approach, through the make or buy decision, to be in line with all engineering practices, quality standards and all sustainable and legislative measures to adopt a lean management with a continuous improvement approach. Such a manufacturing strategy needs to consider the SC strategy, so that all the SC members perform effectively and efficiently in conjunction with the focal firm, in either outsourced works or in supplies deliveries.

Managing the manufacturing strategy, whenever possible, being dependent on the type of manufacturing sector, needs to focus both on automated SC processes and automated manufacturing processes to gain from high efficiencies in SC operations and in manufacturing productivity to promote lean management. The automated manufacturing approach needs to deploy advanced manufacturing processes to achieve high value-added manufacturing, in line with the required technical engineering manufacturing standards (e.g. ISA) and product quality standards (e.g. ISO, GMP and BSI). Managing the manufacturing strategy requires the effective management of all manufacturing and SC processes, as indicated by three participants, by stating that:

> *'… [there are] processes [which are] still done manually … This will be a bottleneck in the supply chain. That is the material is available but the planning is still pending to be done manually where all other processes are all automated'* (4/INT5); *'… to comply to the respective country standards and audits for certification purposes (e.g. ISO and TUV) within the global SC'* (6/INT 7); *and 'Quality is an integral part of the model and cannot be separated from the SC and manufacturing process'; 'The product is not high value added but we use high value manufacture'* (6/INT8).

It is a well established fact that a one size fits all manufacturing model does not exist. As a result not all manufacturing processes can be fully automated and there is the need of the human element within manufacturing. As a result the manual intervention, with its lower productivity and accuracy levels, needs to be managed effectively and efficiently, not to create a bottleneck in the overall process. The human element based manufacturing activities are: process re-engineering; linking of all the processes; flexibility in certain operations to meet any variations in the processes; and detection of certain problems with a more effective approach than automated testing. The role of the human element has been described by two participants, by stating that:

> *'There exist processes and products that still need humans' intervention'; 'Machines do not cater for all activities'; '… the production and manufacturing differs a lot [from one sector to another]'; 'As a result one full standard manufacturing model does not apply'; 'Mistakes occur, when equipment and software are excellent, but they remove the human element from it …'; 'They need to undergo business process engineering effectively and deliver the training needs to staff appropriately'* (4/INT5); and *'… the manual approach can adjust for variations [better]'* (6/INT8).

Similarly, the SC processes are not always possible to be all automated vis a vis its information management processes, due to particular manual based tasks within the overall process. In the pharmaceutical sector, for example, the manufacturing process needs a high level of validation of all processes, both within manufacturing and across all SC operations, with strict legal compliance to provide advanced medical care products without compromising human health. The level of automation in the SC operations is function of the manufacturing sector, as described by one participant, by stating that:

> *'… [there are] processes [which are] still done manually (such as excel sheet for planning) but others are OK. This will be a bottleneck in the supply chain'; 'There exists processes and products that still need humans' intervention'* (4/INT5).

The manufacturing strategy needs to determine the make or buy decision, to establish whether a manufacturing process, is outsourced or performed in-house, to promote competitive operations. With such a strategic decision, the focal firm determines the span of the manufacturing processes to promote efficiencies in line with lean operations (e.g. outsourcing in cases where there exists opportunities for lower production costs and higher quality) and effectiveness (e.g. outsourcing to focus better on the core activities of the focal firm or to meet large demands exceeding the firm's capacity). Though, it cannot be excluded, that some SC members may be assigned to perform a core part of the manufacturing process, due to the nature of the manufacturing sector or in other cases SC members are provided the raw materials and the moulds to perform part of the manufacturing. In such a case SCI efforts need to be given a high level of priority and with special attention to the intellectual property protection, with the result that such SC members become partners with the focal firm and are no longer treated as suppliers or subcontractors. As a result such a strategic manufacturing decision on the 'make', depends on a complex set of variables such as: competitiveness vis a vis the cost and quality as the result of full ownership of the whole process; type of activity (i.e. whether core and non-core); centralised or decentralised level of control over the operations; direct customer contact; volume of units to be manufactured relative to its firm's full capacity; cost feasibility of engagement in the activities to get a competitive price; local sourcing to gain from proximity issues; supplier's expertise; availability of capabilities, capacity and resources to manufacture within the focal firm; funds availability for the investment to make in-house; intellectual property protection importance; and investment recovery time-span to make in-house. Such a make or buy decision to promote lean operations, has been described by nine participants, by stating that:

> *'Intellectual protocol (IP) is an issue …. so to as keep the IP of the product [protected]'* (2/INT3); *'SCI is in depth since the outsourced activities involves part of the core processes'* (3/INT4); *'… local sub-contractors … do the moulding'; 'Our volume is low to outsource a large part of the work'* (3/INT 4); *'Lean removed the waste in the processes, to be more responsive'* (6/INT8); *'Once the volume is high enough it is feasible to be in-house otherwise we outsource'* (8TS/INT4); *'There are some functions which cannot be farmed out … [to avoid] road to failure'* (9TS/INT6); *'Some orders may be small and we hence outsource since this will be expensive for us'* (10TS/INT7); and *'The outsourcing is more expensive then working with your staff and you are also missing out the client information and requirements'* (13TS/INT10).

Such operational efficiencies within manufacturing, in line with lean management initiatives, may be improved with a continuous improvement approach, either by undergoing cost savings in materials purchasing, or by using new and cheaper raw materials through ongoing research in new materials or through process re-engineering to manufacture at lower costs. Supply management efficiencies may also be improved, whenever possible, by employing a consignment stock approach with suppliers, to save on running operational costs with better cash flow management and improve flexibility in manufacturing. Such cost efficiencies measures, has been described by two participants, by stating that:

> *'... to ensure improvement in processes, cost savings in purchasing, [and] operations efficiencies'* (1/INT2); and '*we use consignment stock, ... we have more supplies and assist to be more flexible to change plans'* (6/INT 8).

The manufacturing process needs to adopt a lean management approach and adhere to the established quality standards and all sustainable measures and legal requirements, by maximising the use of resources and eliminate all waste in all processes, both within manufacturing and SC operations. To meet such standards and requirements, the focal firm needs to audit all operations, both within and outside it, to promote assurance and compliance by all involved. Such a quality and sustainable approach in all SC and manufacturing operations, has been described by four participants, by stating that:

> *'Manufacturing variance refers to how we are cost effective to the budget'* (1/INT2); *'... to operate a lean process with the right quality'* (3/INT4)*; 'Environment and CSR, we have to separate waste, and ISO 14000 is an environment standard, needs traceability on client and supplier waste management processes'* (5/INT 6); and *'Lean removed the waste in the processes, to be more responsive to the customer requirements and is faster'* (6/INT8).

For the manufacturing process to be **innovative** and competitive, does not require cheap labour, but depends on the manufacturing strategy to implement increased investment in automated production technology, to promote an increase in the productivity measures, improve on the rejection rates and maximise on the value-added operations through value stream-mapping deployment within the process. Another **innovative approach** is to undergo the necessary **change management** approach in products design and its components to promote availability of stock. **ICT applications**, through an effective information management approach in all workflows, also enables all processes to be **innovative** and optimised and at the same time provides traceability and auditing of all key activities, such as products work-in-process; suppliers' lead time; logistics timely deliveries and inventory levels. Such a technology based process, also enables the identification of any shortcomings at the earliest, so as to remedy accordingly and to eliminate any risk of failure. Such **innovative strategic decisions**, in-conjunction with the mother company, wherever applicable, are needed to promote an effective **strategic behaviour and decision-making approach** of all implemented processes by the focal firm, across all the three management levels, namely **strategic, tactical** and **operational** and externally with all SC members, to promote an **effective risk management approach**. **Performance is measured** to determine the overall strategic performance of the focal firm in line with the **focal firm's KPIs**. Such a competitive manufacturing operational approach has been described by nine participants, by stating that:

> *'… capital investment for a manufacture area … which shall be state of the art'* (1/INT1); '*R & D is the focus of the firm to ensure that the product is cutting edge …'* (2/INT3)*; 'Risk management is important since all operations are being monitored to deliver'* (3/INT 4); *'A SC from A to Z, the cheap labour does not influence and one can become innovative'; 'The technology investment in robotics etc, then the cheap labour is challenged'; 'One needs to ensure an audit trail or traceability of every product'; 'Defective products need to be detected at the earliest'; 'Robotics, software and BPR with proper systems is leading to a workflow from the day of the order to the final product; 'The IT facilitated [all] the [manufacturing] processes'; 'Teamwork and leadership is very effective at all levels such as strategic, tactical and operational. Malta takes all the levels decisions'* (3/INT 4); '*The turnover increase through IT, with a little increase in workforce'* (4/INT5)*; 'Value-stream boards to outline the floor operations… for the key lines in the firm'* (6/INT7); *'The management team has the KPIs and these build on the shop floor efforts and performance measures'* (6/INT 8); *'Manual labour leads to failure due to the high costs required, one needs automation to be productive'* (8TS/INT4); and *'A stitch in time saves nine, …if a defect is not established from the start, then rework will be very expensive'* (10TS/INT7).

Technology deployment plays a key role within manufacturing since apart from the investment in equipment for automation to achieve advanced manufacturing techniques and processes, ICT applications are used to facilitate all processes within manufacturing and SC operations by providing to all staff the real-time information needed to take informed decisions in a timely manner across the overall process. The role of ICT has been described by three participants, by stating that:

> *'IT systems are used real time to be updated with all information and changes'* (2/INT3)*; 'The IT facilitated the processes'; 'This is an open process thanks to the software available, where a closed loop exists between manufacturer, client and supplier'; 'Technology is a big enabler in this case and has contributed to large increase in efficiencies'* (4/INT5); and *'The production efficiency is higher, around 3 times or less, due to automation …'; '.. [automation] promotes better/higher reliability from a quality perspective'* (6/INT8).

Logic diagram of managing the manufacturing strategy tentative category

Table 4.8 outlines the main characteristics of this tentative category in a logic diagram (Strauss & Corbin, 1990).

Managing the Manufacturing Strategy category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Advanced manufacturing processes with technology deployment in automation	High value-added manufacturing based on automation with an effective and efficient manual based processes	Manual approach to manufacturing with lack of value-added and effectiveness and efficiency in the human element deployment
Information systems	Technology based approach	Manual based approach
Manufacturing Process Re-engineering	Value-stream maps to innovate and improve manufacturing operations	No improvement in manufacturing processes
Manufacturing span of operations	Vertically integrated to take ownership of all operations	Production ownership only (e.g. assembly plant)
Outsourcing operations	Employing a partnership approach to outsourced core activities to integrate effectively	Arms' length integration with all suppliers/contractors independent on the outsourced activity
Lean management	Efficient operations with low waste, less cost in materials and operations and competitive production turnaround time	Lack of efficiency in all/some operations
Sustainability measures	Effective social, environmental and economical sustainability	Lack of effective social, environmental and economical sustainability
Quality standards	In line with all quality standards with the deployment of the necessary validation procedures	Lack of conformance to quality or cutting corners in certain quality measures with lack of validated procedures
Flexibility in operations	Flexible approach	Lack of flexibility
Conditions	Technology deployment in ICT and automation; manufacturing sector; outsourcing or in-house activities; intellectual property protection; and country of products' destination.	

Table 4.8: Managing the manufacturing strategy tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled by the right manufacturing strategy tentative category, since it establishes an environment where the focal firm deploys advanced manufacturing techniques, based on the relevant sector technical engineering manufacturing standards (e.g. ISA) and product quality standards, with a lean management approach in all manufacturing and SC activities, to promote high value-added manufacturing and with a continuous improvement approach across the SC. The role of the human element remains key within the manufacturing strategy, since it meets the necessary interfacing needs in all manual based processes and also provides the capabilities to re-engineer and transform the overall manufacturing process, to promote flexible, innovative, streamlined and value-added operations, through optimisation of all activities. The manufacturing strategy needs to decide on the manufacturing span of activities, through the 'make' or 'buy' decision, based on a complex set of variables, to deploy either vertical integration or outsourcing of a particular set of activities, to promote effective and efficient operations. The overall manufacturing and SC activities need to employ sustainable operations, to strengthen the business image to all customers. The manufacturing and SC operations need to be monitored in real time, with the support of information systems, based on technological applications, so as to manage effectively all operations with the necessary auditing and traceability of processes and products. With such an approach, any shortcomings from the scheduled performance can be established, so that the right decision is taken to remedy such problems at the earliest, not to disrupt the established workflow with an effective risk management approach, to promote business continuity. Effective supply management need to be used to promote efficient manufacturing and SC operations by: saving on purchasing costs; buying new and cheaper raw materials; and employing a consignment stock set-up with suppliers, to promote stock availability at no additional costs with better flexibility to meet demands.

Tentative relationship between all emerged potential categories in line with the coding paradigm

M**anaging the manufacturing strategy** conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as efficiency in manufacturing and SC operations, competitiveness, flexibility in operations, manufacturing innovative approach, high-value added manufacturing, business continuity, continuous improvement and sustainability. The moderating variables are quality and sustainable processes, advanced manufacturing technology, ICT applications, lean management, human element manual intervention, risk management, supply management, SCI, effective decision-making, change management/innovation and auditing. The relationship of managing the manufacturing strategy tentative category with all other categories is represented by the conceptual framework in Figure 4.6.

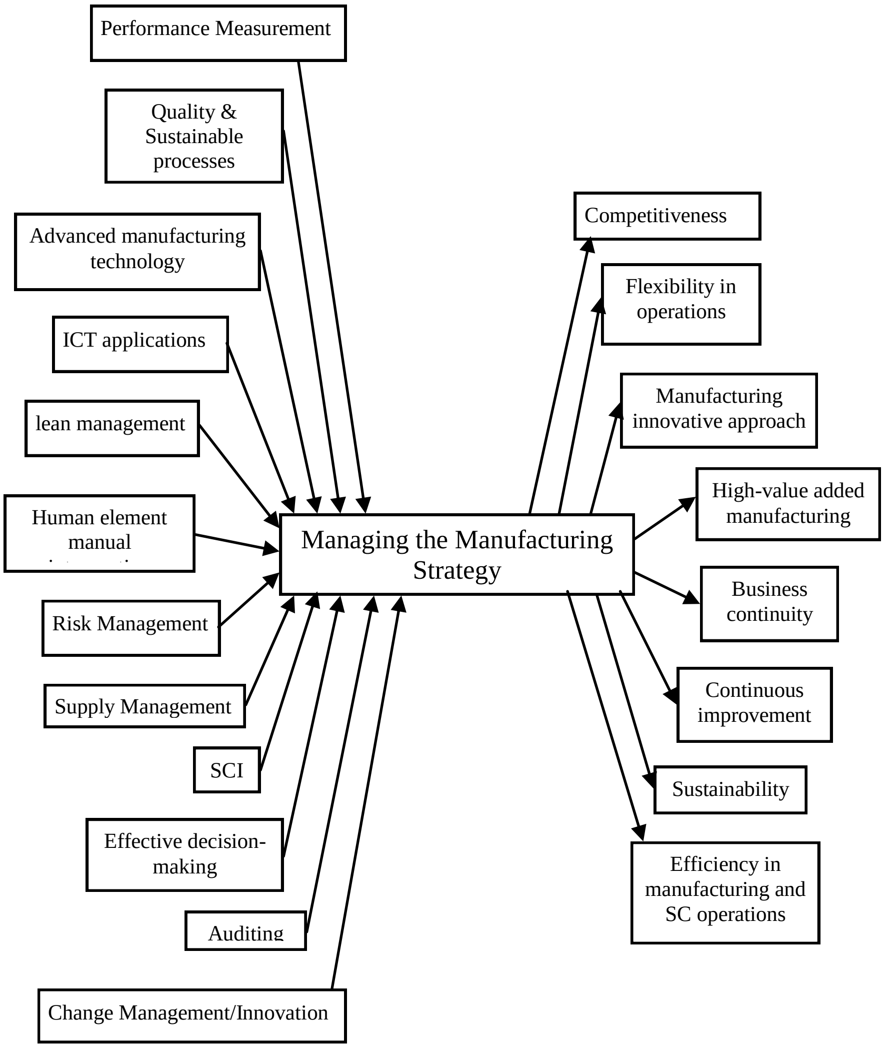

Figure 4.6: Managing the manufacturing strategy tentative category (Author)

4.3.2.7 Managing the business strategy tentative category

The business strategy theme determines the manufacturing strategy and the SC strategy. The business strategy for the local SME firm, under a multinational set-up, is determined by the Corporate's strategy. The Corporate strategy and the business strategy also determine the marketing strategy so as to establish whether the products to be manufactured shall be of a premium or generic design to focus either on a niche market or a broad market.

The local manufacturing firm business strategy for a SME, based on a multinational company set-up, is normally targeted to manufacture products which are in line with the mother company products portfolio, which may be either of a low or high value added nature or a mix of both. There is the need for an ongoing investment in technology, in both manufacturing and information management, so as to promote more efficient and effective operations through improved automation and information based processes. Such a business strategy based on the use of technology has been described by five participants, by stating that:

> *'We are high value added firm'* (2/INT3); *'All starts from the top management direction…'; 'We in fact invested in the ERP system,… using the EU funds'* (5/INT6); '*The product is low cost such as sets of tubes and chamber up to high value products …'* (6/INT7); and *'Automation investment increased'; '… we use high value manufacturing'* (6/INT8).

The marketing people, in advanced technological products SMEs, need to establish, through a customer feedback mechanism, whether the value-added features of customised products, through strategic diversification, are adding value to the customers' applications. Such a stance is needed to ensure that the premium costs attributed to such products, justifies the customised product investment, so as to compete effectively. The designed features of the manufactured product need to be fully exploited by the customers, otherwise the focal firm needs to shift away from the niche market, by deploying the right marketing strategy to compete on level ground in the market by a low cost and basic product. Such a marketing strategic approach has been described by two participants, by stating that:

> *'… we may tailor our products to the customer need'; 'The sales people and the clients all over the world are well informed on the customers' behaviour'; 'Our product is sold to big customers and large enterprises, referred as niche marketing'; 'The technology is quite advanced and more expensive than a normal customer'* (2/INT3); and *'the customers were using only default settings, without exploiting the whole set of features'* (2TS/INT3).

The sales and marketing strategy for SMEs is normally under the responsibility of the corporate or an assigned contractor/partner/distributor, due to the local SME lack of resources, but the focal firm still needs to employ a high level of commitment to sustain such an integrated organisational set-up. The corporate may even purchase the products from competing manufacturing plants, in the same line of business, to instigate a high level of competitive behaviour on the focal firm performance. Such a sales and marketing strategy approach has been described by two participants, by stating that:

> *'Sales and marketing group abroad have the key link and in contact with the customer ……they coordinate with us for the orders'; '[The focal firm has] a customer support officer … to understand the impact of the quality, service and cost on the markets. These are [mother company] people to pool all the information from the market. This is another depth of SCI'* (6/INT8); and *'Marketing company can purchase from us and even from our competitors. This shows that competitive actions taken by our [mother company]'* (16TS/INT13).

A marketing strategy, to penetrate new markets, is to be based on an on-going relationship with new customers, by adopting flexible contractual agreements to adapt to the customers' requirements and to build a track record over time to retain existing customers and also win new customers. The focal firm winning strategy is not only based on signing contractual agreements with customers or other downstream side SC members, but needs to use a continuous proactive approach with direct contact with such customers, to convince all type of customers that it is providing an effective customer service and an excellent product vis a vis its competitors. Such a business strategic winning behaviour has been described by five participants, by stating that:

> *'... we do contractual agreements. These are incentives to produce effectively'* (2/INT3); and *'We try to convince customers to purchase from us. We design and produce to show the clients that we are capable to do it. You need to proof yourself'*; *'If we wait for the contract to be signed, this leads to failure of the overall business. My saying was that: "we must go with a better valve". Continuation of investment and overcome obstacles without losing heart'* (8TS/INT4); *'... we are giving a service under a manufacture'* (10TS/INT7); '*The firm key qualities are flexibility in the approach to negotiations terms and conditions'* (11TS/INT8) and '*… manufacturing of today is a process approach based on both the manufacturing and services'* (15TS/INT 12)'

Most of the local manufacturing firms' sales are mainly dedicated for export since the local market is relatively small. Such products are either: delivered direct to the customers; or use Corporate's subsidiaries or distributors to deliver products to the customers; or use overseas warehouses as repositories of finished products, to deploy a consignment stock approach, so as to improve on the overall customer service. Though, the possibility to hold finished products in stock is not always possible, since some products, due to their intellectual property rights, cannot be sold to the public. The focal firm may also need to innovate its current products by re-designing new products, either in case the stock for the previous design is no longer available or else to launch innovative and competitive products. Such a competitive and innovative stance has been described by four participants, by stating that:

> *'Malta has the local staff work closely with US staff in collaboration for all projects, innovation and new products ...'* (1/INT1); *'[Mother company in USA] considers the canister price per unit that identified that we are better than China. Projects change to meet other customers' requirements so as to innovate'* (1/INT2); *'We try to phase out such component, by redesigning new products or part of the product'; 'The design may be changed due to the bottlenecks of lack availability in the market of parts'* (2/INT 3); and *'Most of the products are for export, locally the market is small'* (3/INT4).

The business strategy determines the manufacturing strategy and SC strategy by establishing a set of policies and Key Performance Indicators (KPIs). The business strategy is established in-conjunction with the corporate, for multinational firms, to promote consistency in the Corporate's strategy among its subsidiaries. Such a business strategy within the focal firm is applied across all management levels down to the bottom line and also across the SC, with all the SC members, to build up the overall manufacturing and SC strategy. The local firm formal organisation structure is key to the SC performance with the deployment of the right performance measurements, in line with all KPIs, across all management levels, so as to establish the tactical management approach needed to adhere to all policies and procedures in line with the business strategy. Such KPIs, at the same time, are used to establish the performance gaps to promote the necessary process improvements in all the operational management level, both within and outside the focal firm. Such a business strategic approach has been described by four participants, by stating that:

> *'For inter-company the performance is more easy to be dealt with ... But with local suppliers and others external European suppliers to firm, requires the validation and audit parameters/criteria as established with the corporate KPIs and its suppliers'* (1/INT 1); *'[Downstream side intermediary] performance is also measured and service issues are being measured and gaps identified to ensure improvement'* (1/INT 2); *'The delivery performance is all over the staff'* (3/INT 4); and *'Also the performance measurement needs to be part of the firm strategy of the future'* (5/INT 6).

The corporate strategy of the multinational company must not create obstacles in the focal firm business strategy but must integrate itself with the local plant operations to promote a one unified strategy and sustain the necessary empowerment initiatives through effective communication, so that the focal firm can effectively manage all operations. The focal firm may vary from a fully fledged manufacturing plant, which manufactures the whole product, or else acts as a contractor, which manufactures only part of the product and forms a relatively small part of the SC due to the limited resources (e.g. the focal firm may be an OEM or Tier 1 up to Tier 'n' of the SC). The parent company corporate's strategy may have other priorities which may not be in line with those of the local firm strategic objectives. As a result, such a strategic mismatch between the focal firm and the corporate strategies may delay the focal firm business strategic actions, until the Corporate awards the necessary approvals. Though, it is a must for the focal firm to deploy all its internal and external operations in an integrated approach to promote SCI with an effective and efficient performance. Such a challenging unification of the Corporate and business strategic approaches have been described by two participants, by stating that:

> *'All starts from the top management direction ...'; 'They decide the direction and create new policies. I start my work from the policy onwards'* (5/INT6); *and '[The firm is a] bit fragmented and not integrated'; '[The] actual management is outside the plant'; 'Not everything is in our control'; 'If you were not integrated as the way we are [locally], it will limit the customer service'; '[Overseas SC members are involved by] weekly meeting through **video conferencing call** with the [overseas] teams abroad to ensure the **performance** is smooth'* (6/INT 7).

Logic diagram of managing the business strategy tentative category

Table 4.9 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing the business strategy category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Strategic diversification	Value-added and customised product at a premium cost	Low value-added and basic product at low cost
Contractual agreements based on both a manufacturing and a service approach	Flexible contractual agreements to meet changing customers' requirements with a proactive and innovative approach	Rigid contractual agreements and cannot meet customers' changing requirements
Innovative products	Manufacturing new and innovative products	Manufacturing the same products
Corporate strategy	Corporate strategy is matched and integrated with the focal firm business strategy (i.e. unified strategic approach)	Corporate strategy is neither matched nor integrated to focal firm business strategy (i.e. different assigned priorities)
Business strategy is based on performance measurements across all management levels	Employ performance measurements at all management levels in line with the Corporate KPIs	Performance measurements are lacking at all management levels
Conditions	Technology investment in automation and information management; economic recession; SME limited resources; and Small Island State characteristics.	

Table 4.9: Managing the business strategy tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled by the business strategy tentative category, since it establishes an environment where the focal firm together with the Corporate establish the business strategic direction. The business strategy must be in place to promote a one unified strategy with the Corporate and sustain the necessary empowerment initiatives through effective communication, so that the focal firm can effectively and efficiently manage all of its operations. The business strategy is the source of the SC strategy, manufacturing strategy and marketing strategy. The business strategy for a SME, based on a multinational company set-up, is normally targeted to manufacture products which are in line with the mother company product portfolio, which may be either of a low or high value added nature. To achieve an effective marketing strategy deployment, considering the limited resources available by the local firm, the Corporate takes the responsibility directly or assign it to an intermediary, to take care of such a marketing strategy implementation, in-conjunction with the full collaborative commitment of the local firm. The business strategy through its marketing strategy establishes the product portfolio to be used to compete in the market so as to establish whether to manufacture customised or broad generic products. The local firm, with the support of other SC members in the marketing strategy, is not only after the right contractual agreements to promote further sales, but is mainly committed to win customers' requirements by providing proactive actions with innovative and competitive products.

The Maltese local market, being a Small Island State, needs to import and export most of the raw materials and finished products respectively. The focal firm, through its manufacturing strategy and SC strategy, needs to transform itself across time and adopt a dynamically changing approach, to manufacture competitive products across the globe. Such a transformation needs that the focal firm undergoes the necessary technological investment in automation and ICT applications, so as to improve in all processes and at the same time meet effectively any economic recession, which from time to time hit the market. The business strategy determines the manufacturing and SC strategies by establishing a set of policies and Key Performance Indicators (KPIs) to promote SCI both within the focal firm and outside with all of its stakeholders. Such a business strategy, with the established KPIs, needs to integrate the focal firm, across all of its management levels down to the bottom line and also across the SC, to build up the overall manufacturing and SC strategy with a set of best practices. Such KPIs, at the same time, are to be used to establish the performance gaps to promote the necessary process improvements, both within and outside the focal firm.

Tentative relationship between all emerged potential categories in line with the coding paradigm

M**anaging the business strategy** conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as innovative products, competitive products, customised products, generic products, effective customer service and effective and efficient performance. The moderating variables are marketing strategy, SC strategy, manufacturing strategy, customer relationship management, contractual agreements management, technology deployment in production and information management and performance measurement. The relationship of managing the business strategy tentative category with all other categories is represented by the conceptual framework in Figure 4.7.

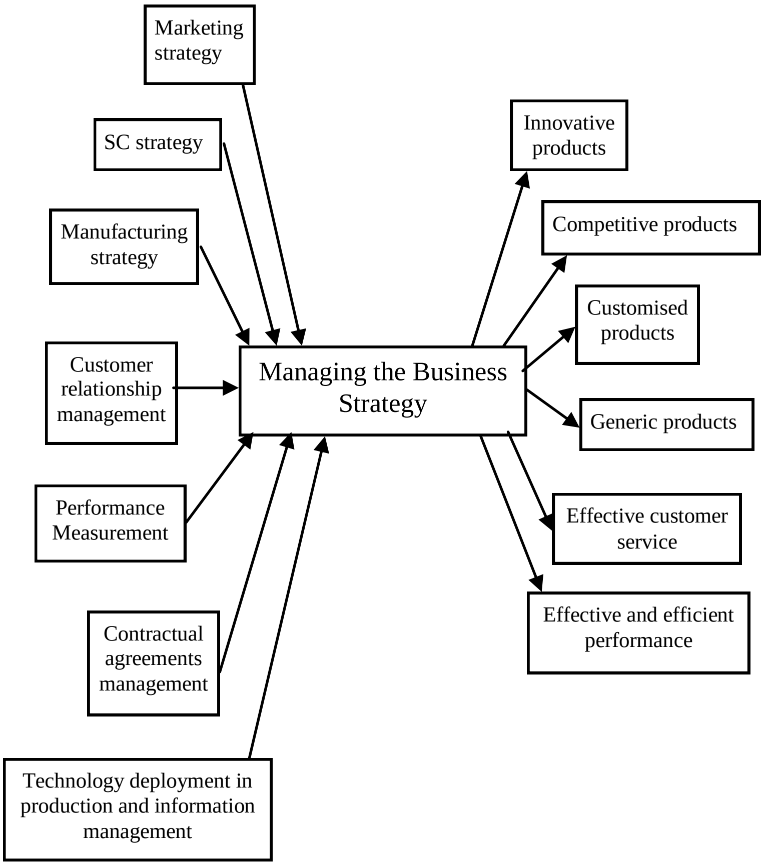

Figure 4.7: Managing the business strategy tentative category (Author)

4.4 Overview of the chapter

Within this chapter all the twenty two (22) emerged tentative categories are represented in a storyline approach through a set of memos on a category by category basis, to define and explain the key concepts, with all their relationships to other key concepts or sub-concepts. All the tentative categories are supported by the selection of the key in-vivo quotes from the data, due to the voluminous amount of data and visually mapped by logic diagrams and conceptual frameworks to assist the theorising process. The aim of the data analysis is that key concepts are going to be referred as categories and the sub-concepts as sub-categories respectively, as part of the theoretical abstraction process within the GTM. The seven (7) key categories, which were established after the completion of the Selective Coding stage in the next chapter, were all analysed in this chapter, whilst the remaining fifteen (15) non-key categories were also analysed with the same approach, but were shifted into Appendix 11 to make this chapter more manageable.

The conceptual labels are used to represent the researcher's interpretation on the data, in line with the Coding Paradigm (Strauss and Corbin, 1998), which were initially tentative open codes, in the Open Coding phase, within Section 4.2, which were fragmented but represented what the data were saying. It is then followed by the Axial Coding analytic process, within this Section 4.3, through the storyline approach, which is tracked through memos, all along the research process, to theorise on the emerged theory in a narrative and iterative process. In fact the memos within the storyline approach, for each tentative category, become more accurate and complex as the analysis progresses throughout the eight interviews, by going back and forth to each category to refine and summarise each memo.

The outcome of this Axial Coding process can be seen in the Code Matrix shown in Table 4.10. The matrix shows the audit trail of how the forty-six (46) open codes, which are theoretically abstracted to twenty-two (22) tentative categories from the Open Coding phase to the Axial Coding phase. The CAQDAS and the storyline approach are used as triangulation tools to promote research rigour in the theorising process. The tentative categories are central themes that connect all open codes, which are still grounded in data. The next chapter will show the final step of the analysis, by using the Selective Coding as the final analytic approach, so as to finalise all tentative categories around a core category with a set of five (5) main categories with their sixteen (16) sub-categories (Table 5.1).

Phase 1: 46 Open codes **(Note: 39 Actions & 7 Conditions Appendix 10 refers)**	**Phase 2: 22 Tentative categories** **(7 Key Tentative Categories)**
Leadership style; management effectiveness; and priority of works	Leading Effectively
	Managing business strategy
Manufacturing process; sub-contractors & outsourcing	Managing manufacturing strategy Managing process within SC and manufacturing
Ownership of operations	Managing SC Strategy
ICT applications	Managing Technology deployment
SC members support; SC strategic action and growth; SCI activities; SCI depth; and time management	Managing SCI
Quality of processes& EHS Standards (Sustainability); Lean management; and standards implementations	Lean Management, Sustainability and Quality Standards Compliance
Information sharing	Managing Information sharing/communication
Risk management	Managing Risks
Collaboration; teamwork; employees' engagement; cross-functional operations; communication; and coordination	Managing Collaboration
Training & share innovative ideas	Managing Knowledge
Performance measurements	Managing Performance measurements
Delivery actions; logistics; and transportation management	Managing Logistics
Plans and forecasts	Planning & Forecasting
Inventory management; supply management; and lead time	Supply management
Change management; flexibility; and innovation	Managing Change & Innovation
Customer relationship management	Managing Customer Service
Trust	Managing Trust
	Managing Culture
Auditing & traceability of operations	Auditing Operations
	Managing Cash-flow

Table 4.10: Open Coding to Axial Coding Code Matrix (Author)

Chapter 5: Data Collection and Analysis based on the Selective Coding Technique

5.1 Introduction to Selective Coding stage

The third phase of the data analysis, referred as phase 3 (Table 4.1), is based on the semi-structured interview guide under the theoretical sampling phase, as referred in Appendix 6. This phase consists from fourteen (14) semi-structured in depth interviews based on eleven (11) new firms, since three (3) of the first sample firms accepted a 2^{nd} visit (Appendix 5). The data collection and analysis approach focuses on these twenty-two (22) emerged tentative categories but remain open to any additional categories or properties from the emerged theory categories that may emerge at any moment in time.

5.2 Findings from the theoretical sampling data collection under the Selective Coding analytic approach

The theorising process in this phase refines and build on the previous Axial Coding phase with its twenty (22) emerged categories. Such a phase assists in the build up of all emerged tentative categories, with additional new properties with their variation, wherever applicable, to achieve theoretical saturation. Such updates are included in the previous chapter, as a matter of practicality, to minimise any duplication of analysis' content, but the key emerged categories' analysis, are all included in a narrative form and substantiated with key *in vivo* quotes within this Chapter. The Selective Coding stage selects six (6) key categories from the 22 tentative categories, through theoretical abstraction and the remaining 16 tentative categories are selected as sub-categories of one (1) of the six (6) key categories, as explained in the next Section 5.3 and in the code matrix Table 5.1. Such an analytic approach is an iterative process and is derived, through sense-making and theoretical abstraction, which establishes the core category with its five (5) main categories in a meaningful way, based on the constructivist paradigm approach, to generate the grounded theory.

5.3 The Coding Paradigm to represent the emerged theory

In this stage the categories are integrated and refined, with the selection of the core category, together with other five main categories and sixteen sub-categories, to represent the substantive theory. The theorising process is based on the Coding Paradigm model (Strauss and Corbin, 1998), as the tool which also guided all the previous two coding stages. Henceforth, such a model exposes the meaning contained within the emerged theory in terms of the **actions, context** and **consequences,** which also serve as a robust platform for the final theoretical framework to promote research rigour. The overall analytic process with all the coding stages, including this Selective Coding stage, is referred in Figure 5.1.

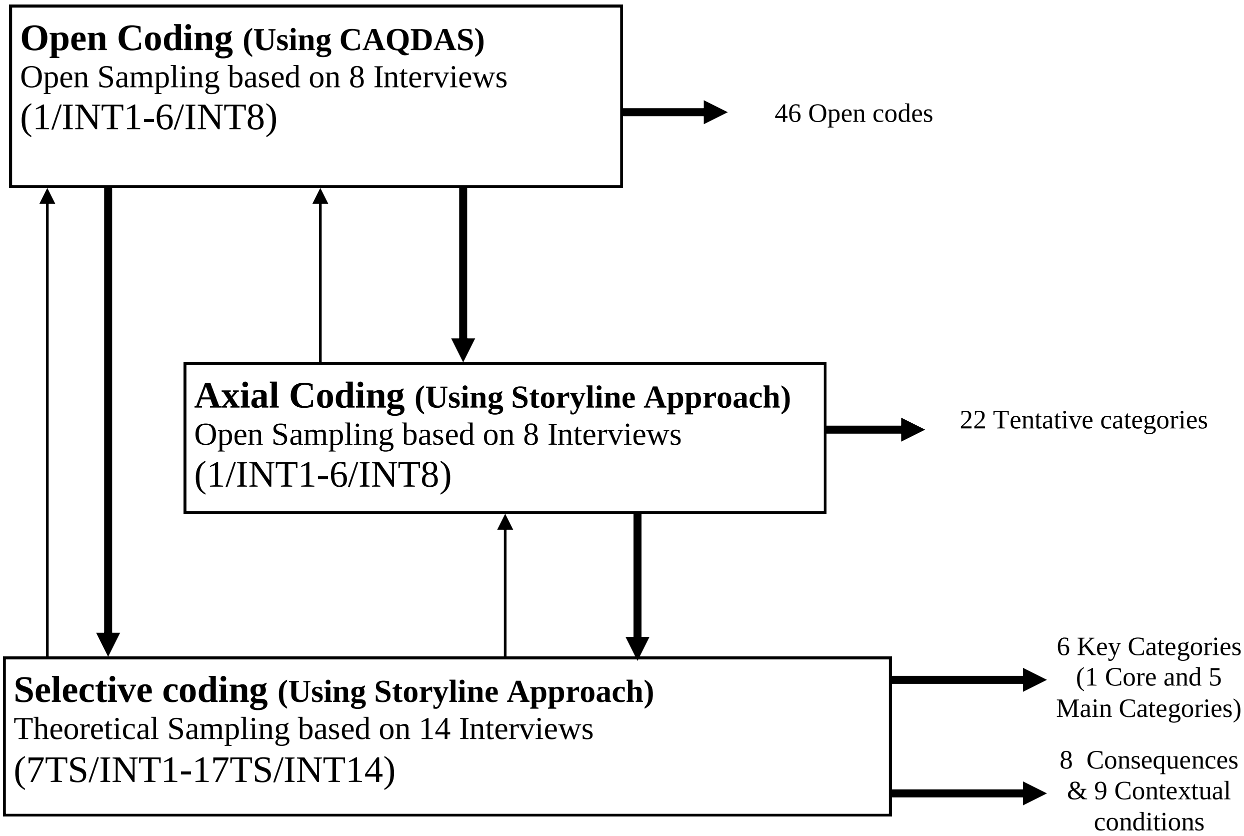

Figure 5.1: Outline of the overall GTM coding data analytic approach (Author)

5.3.1 Actions Categories of the theory: The core category with the five main categories

The core category that emerges from this study is labelled as an **'integrative management and leadership approach'**, namely abbreviated IMLA. SCI to be implemented effectively needs the integrated management approach of all processes within the focal firm and across the SC, in a unified and holistic process approach, but also needs the right integrated leadership approach to drive all SC actors in concert, to empower all staff and to facilitate all management initiatives, so as to have all people, within and outside the focal firm, ready to collaborate and to perform effectively and efficiently, in line with the focal firm KPIs. Though, there exist a variation of the leadership approach continuum, where at one end there is the strategic and the supervisory leadership approaches, based on a shared leadership style, where the leadership stance incorporates all management levels and all key SC actors to perform effectively through a teamwork approach. While at the other end there is the single centric or individual leadership approach, where the leadership style is mainly focused on the top management team based on a centralised management approach. Such an integrative management and leadership approach, with its continuum, has been referred by eight participants, by stating that:

'... to empower their responsibilities across all departments' (1/INT2); *'Leadership and the team approach is promoting the SCI'; 'Synergy and coordination is the order of the day; 'Teamwork and leadership is very effective at all levels such as strategic, tactical and operational'* (1/INT4); *'... performance measurement needs to be part of the firm strategy of the future'* (1/INT6); *'... All starts from the top management direction, from the Directors ... **They decide the direction and create new policies**. I start my work from the policy onwards ...'* (5/INT6); *'... employing an open door policy, within the focal firm and a controlled open book, with all external entities'; 'To make all ends meets, one needs to remain in [his/her] tip toes, to ensure that all processes are integrated'* (5TS/INT2); *'The holistic approach is governed by the focal firm KPIs'* (2TS/INT3); *'SCI needs total control of the process ... '* (15TS/INT12); and *'... [SCI] needs a commitment from both ends'* (16TS/INT13).

It is crucial to have the right fit between the **business, manufacturing** and **SC strategies** respectively, in line with the quality standards and all sustainable measures, for each manufacturing sector, with the deployment of the right **technology in automation and information management**. But there is also the need for an **integrated management** and **leadership approach**, to act as a catalyst and a driving force to make all ends meet and to be flexible enough to decide and adapt to all situations, so that the overall **holistic SCI management process** meets the right set of SC competitive capabilities. The human element, within the IMLA, remains key in the collaborative initiatives with all SC members up to the end customer and at the same time it is also needed within manufacturing processes, in some way or another, even where a high level of automation exist. Such a unified strategic management stance with the deployment of a holistic SCI management approach, enabled by technology deployment, with a certain level of human element involvement, has been referred by eleven participants, by stating that:

*'Internally needs the right structure ... with a holistic responsibility with all the roles and have separate entities integrated' (i.e. **holistic SCI management process**); and 'This needs the right manufacturing platform with an integrated SC' (i.e. **Manufacturing strategy**)* (1/INT1); **'Workers are involved in all decisions'; 'We are flexible to meet changes'; ' [adopt an] open style management where managers are part of the workforce'** (i.e. **IMLA**) (1/INT2); *'[the manager] supports, gives the stimulus and advice at the right time and quality of message to us in all operations, but empower us to do our job'* (1/INT4); *'There exist processes and products that still need humans' intervention. Machines do not cater for all activities' (i.e. **human element**);* (4/INT5); *'Quality in all processes is key together with sustainable measures'* (TS/INT1); *'Leadership style is like the glue to match all management levels together'* (5TS/INT2); *'All staff need as a team to have the right mentality, right people and be rowing in the same direction and strategy' (i.e. **Business strategy**); '... the workforce [need] to be adaptable to implement the changes effectively'* (1TS/INT5); *'Holistic approach is based on information sharing and technology' (i.e. **Technology deployment**)* (9TS/INT6); *'[the success is attributed to] the change management culture that accepts to be flexible and adapt to the customers' needs'* (11TS/INT8); *'... people is the most important asset in the SC' (i.e. **human element**); 'The key fundamentals in SC is to take the right decisions to avoid mistakes otherwise you miss targets' (i.e. **SC strategy**)* (13TS/INT10); *'The on-line is effective and efficient, but the human element remains key to establish a long term relationship' (i.e. **human element**)* (17TS/INT 14).

5.3.1.1 The sixteen sub-categories within the holistic SCI management approach

I. **Audit** with a systematic evaluation of all SC operations, both within and outside the focal firm, to meet all quality standards together with all sustainable and legal obligations, in an integrated approach, as referred by two participants, by stating that: '… *suppliers, who have to stick to our standards and processes and we visit them and make audits…'* (6/INT7); and *'Clients we do credit checks on them, especially if they are new'* (10TS/INT7).

II. **Manage cash flow** through an effective management of the incoming and outgoing of cash associated with the managing of supplies and sales of products based on an integrated approach with the respective SC members, as referred by a participant, by stating that: *'... we use consignment stock by getting the material and we do not pay until we use it*' (6/INT7);

III. Undertake **collaborative initiatives** with all SC entities to promote **relationship building** between people and to perform effectively, as referred by a participant, by stating that: *'[Departments] are assessed on ... collaborative effort ...'; 'Teams are formed to support and report'* (1/INT 1);

IV. **Manage change** effectively by mastering the complex and dynamic changes from both upstream and downstream SC sides, as referred by two participants, by stating that: '*We are flexible to meet changes, to meet new customers' specs'* (1/INT 2); and *'we use consignment stock, ... we have more supplies and assist to be more flexible to change plans, having more material in hand'* (6/INT 8);

V. **Managing information sharing** by capturing and sharing the right information at the right time, within and across the SC, so as to take all the necessary timely collaborative actions, so as to promote an integrated approach to all operations, as referred by two participants, by stating that: '*Data of progress is visible to all through monitors in the shop floor'; 'From suppliers' side, we share stock levels…'* (2/INT 3); and '*The sales offices will be updated on their orders and the stock and state of production of the firm'* (4/INT5);

VI. Manage effectively the **customer service**, as referred by two participants, by stating that: '*Direct contact with the customer…. is critical to achieve, to win the customer feedback and [its] management'* (1/INT 1); and '[provide customers with] *the right product, at the right time and at the right price' and 'to ensure that the product has the right quality'* (6/INT 8);

VII. **Managing knowledge** effectively through information sharing mechanisms, within and across the SC, to have an informed mindset to promote effective decision-making to deploy state of the art processes through business process re-engineering, both within manufacturing and SC operations, as referred by two participants, by stating that: *'... material reduction and validation of new resin material used to reduce cost and better quality to improve efficiency, hence the knowledge sharing occurs on these matters'; '..* share the project works and innovative ideas ..' (1/INT 1); and *'... managers are expected to improve processes, people and systems'* (6/INT 8);

VIII. **Manage logistics** through the effective transportation of all merchandise, from both the upstream and downstream SC sides, in the right time, with the right cost and in the right place, as referred by a participant, by stating that: *'The logistics is driving the whole set-up'*; '*SCI within logistics is needed since I always tried to build a good relationship with suppliers and sales (overseas)'* (3/INT4);

IX. **Managing performance measurements** effectively by measuring people's behaviour, attitude, skills and commitment to work, to determine their contribution to the overall SC performance, as referred by two participants, by stating that: *'We have a SC measurement for every line ....'* (6/INT7); and *'The manufacturing process needs to report back on a daily basis and on a shop floor level declares on an hourly basis the quality and quantity in-line to the standards'* (6/INT8);

X. **Undertake planning and forecasting** to establish the necessary plans of all orders to be manufactured, based on customers' forecasted requirements or orders, to procure all the necessary raw materials, with the collaborative approach of all suppliers, to meet all scheduled deliveries in a timely manner, as referred by a participant, by stating that: *'... agreements with the clients for a consignment stock and also with the suppliers, to balance out cash flow'* (5/INT6);

XI. **Managing risks** in quality, sustainability and legal requirements, within the manufacturing and SC operations, so as to establish any shortcomings to remedy at the earliest, as referred by two participants, by stating that: *'Risk management is important since all operations are being monitored to deliver'; 'All obstacles are being monitored to ensure such smooth delivery'* (3/INT4); and *'We revisit the procedures and systems and measure the level of risks, ... one need to be practical and do not overdo it, to avoid analysis by paralysis'* (1TS/INT 5);

XII. Undertake effective **supply management** through all the necessary collaborative measures with all suppliers, to procure the necessary stock in time, with the right quality and with a competitive price, by managing cash flow effectively, as referred by three participants, by stating that: *'The latter suppliers are available in more than one, to manage risk of failure in the supply'* (1/INT1); *'... focus more on strategic issues, say to find new alternative sources of parts due to single source i.e. all the eggs in one basket [situation needs to be avoided]'* (2/INT3); and *'... every product has a number of components to complete and hence any missing one, will be a bottleneck'* (3/INT4);

XIII. **Managing trust** is needed through effective collaborative relationships between people and organisations across the SC, to promote a level of teamwork (i.e. integrated activities) with all stakeholders, as referred by three participants, by stating that: ***'When a client engages with a*** *manufacturer, both engage in a trustful environment which promotes open communication apart from the formal contracts'* (4/INT 5)*; 'We have suppliers of the compressors, as the core activity … these suppliers are partners and have an in-depth relationship, based on years of experience'* (5/INT6); and *'We have a good relationship with the customers and hence they trust us …'* (6/INT 7);

XIV. **Managing culture** is needed so that the focal firm adopts a working attitude that promotes understanding and a flexible collaborative effort between all stakeholders, to achieve a more integrated approach with effective and efficient performance, as referred by three participants, by stating that: *'We use a culture to cater for the future and undergo cost savings'* (1/INT 2). *The EU countries are more understandable and flexible'* (3/INT 4); and '*One needs to de-train and re-train, to ensure that new processes are being used, due to the previous culture. Not to use the old systems again on the new processes'* (4/INT5);

XV. **Lean management** is needed so that the focal firm together with all of its SC members integrate themselves to deploy a systematic approach in all processes to be efficient and effective in the deployment of all resources, as referred by three participants, by stating that: *'…. with lean six sigma introduction … this led to a better integration'* (1/INT2)*; 'Even office work need to be lean to eliminate duplicated office activities'* (3/INT4); and *'Lean and six-sigma are used in quality assessment to apply the principles in … a systematic process'; 'Lean removed the waste in the processes, to be more responsive to the customer requirements and is faster'* (6/INT8); and

XVI. **Managing quality and sustainability** is needed to comply to all standard operating procedures and to align all process with a continuous improvement approach to promote quality assurance in all processes and at the same time comply to all sustainable measures (i.e. triple bottom line), as referred by four participants, by stating that: *'... one has no option to stay out of the SCI initiatives, due to regulations and other commitments you need to integrate otherwise you are out of business'; 'Environment and CSR, we have to separate waste, and [respect] ISO 14000'* (5/INT6); '*… suppliers, who have to stick to our standards and processes'* (6/INT7)*; 'Quality is an integral part of the model'* (6/INT8); and *'... quality concept is a continuous process approach across all functional areas to make the SC holistic'* (5TS/INT2).

5.3.2 Outcomes Categories of the theory: Competitive capabilities

The **competitive capabilities** from the Axial Coding stage, in Section 4.3.2, include a conceptual framework for all the 22 emerged categories with their respective outcomes. The key eight (8) outcomes from all the tentative categories are: **SC flexibility; SC visibility; business continuity;**

continuous improvement; lean (optimised) operations; effective and efficient performance; sustainability and effective customer service.

5.3.3 Context categories of the theory: Contextual conditions

Malta is mainly undergoing business with EU member states, as a single market, with various advantages, based on a Free Trade agreement, but it also operates with the rest of European countries and other worldwide countries, such as USA, North and East Africa, Middle East and Asia.

SMEs in Malta, who form part of various recognised Multi-nationals, invest a lot in the right management and leadership approach, so that all staff performs effectively and efficiently, within all the established standards and winning behaviours by the Corporate. Most of the SMEs try to be fully fledged manufacturers to perform a wide portfolio of activities. Such a wide portfolio of activities has been outlined by a participant, by stating that:

> *'Today manufacturing is focused on high value added product based on innovation. Today the companies are more focused to have fully fledged companies or else they are performing a wider range of roles than 20 years ago. If not R & D, today the stages are more broad in skills'* (12TS/INT9).

The firm context is based on a Small Island State (SIS) country, where the local Government is proactive in various supporting measures to promote Foreign Direct Investment (FDI) to contribute to the country GDP. The Government is a watchdog and a stakeholder of all the industry, especially in the manufacturing sector and related services for SMEs. The manufacturing sector is one of the Maltese four economies pillar stones, and it is also under scrutiny by both local and international bodies, through various local and world-wide indicators and ratings, such as the Maltese financial services authority (MFSA) and World Economic Forum (WEF), Standard and Poor's and Fitch Ratings. The Government is also creating an attractive package to all current investors in the manufacturing sectors, by reducing several running costs, such as reduction in licences, low lease rates for premises, the provision of investment guarantees for start-ups and tax exclusions for all exports. Furthermore, the Government is supporting the industry through incentives and funds/grants for all investment, to serve as a catalyst for innovation and to motivate the industry to remain competitive by investing in the state-of-the-art technology, such as ICT applications (e.g. ERPs) and automated equipment (e.g. heavy manufacturing machinery). Such a business context and orientation for SMEs that serve as attractive incentives for investment, due to their limited resources, has been described by five participants, by stating that:

'When there were funds to IT investment, we took the opportunity to invest in an ERP' (5/INT 6)*; 'we [are] after job creation or to launch new products'* (8TS/INT4)*; 'Malta pays no 35% corporate tax'; 'We did a vertical integration and the cost is better-off as from Jan 2012 with support of Malta Enterprise… It was a ½ million Euro [for investment in new developments]'* (1TS/INT5); *'Fiscal incentives exist to encourage export and FDI'* (9TS/INT6); *and 'SMEs suffer to invest in ERPs'* (17TS/INT14).

The manufacturing SC is function of the cultural element, which is influenced by both the local firms' human element and also from all SC members, both locally and abroad. The Maltese companies' cultural values are very attractive to investors, due the current industry cut-throat competitive scenario, since they are creating a positive culture based on innovation and learning to attract future investments. The Maltese workers are highly competent, with relatively high intellectual and practical capabilities, and demonstrate a culture based on an outstanding potential to work hard and to be flexible with a multi-skilling capabilities and are committed to adopt a life-long learning approach. Companies' KPIs include culture as one of the antecedents. The Maltese culture is catalyst for change since the local people have been subjected to a very strong educational system where learning and training has always been a priority in people's core values. It is not being excluded that certain disciplines are lacking due to the emerging dynamic trends in both traditional and evolving manufacturing sectors (e.g. printing and technology based expertise respectively). Such an employee' culture, to be hard working and multi-skilled, has been described by four participants, by stating that:

'There is a trend that the Maltese people are leading to a workaholic life with a passion-based approach to work, by trying to keep in touch with all customers' needs on a 24/7 basis due to cut-throat competition' (5TS/INT2); '*Skills for such employees on printing is short of labour availability'* (10TS/INT7); *'Maltese are very flexible to solve the problems but the German are more focused and accept the culture of specialisation. We in Malta are more widely skilled and flexible. We can do the same job with less people, having people with a wider expertise coverage'* (16TS/INT13); and *'people in Malta are flexible, and today multi-skilling is a key skill of Maltese people…'; 'The problems may be diversified and the wide skills of workers, end up to solve the problem in a more efficient way due to such [wide] expertise'* (17TS/INT14).

The Maltese island is a Small Island State and SMEs cannot exploit the economies of scales advantages, causing local SC members to run with a relatively less margin of profits. In fact, most of the sales associated with Multinationals SMEs are all export oriented. In Malta there are large also a number of SMEs, within the manufacturing sector, which are engaged with local firms as sub-contracting or else are focussing on a niche marketing strategy to build on their sales, both locally and abroad. The SMEs within the manufacturing sector is very wide, covering various sectors and has a substantial contribution to the Maltese economy. The niche products are designed to satisfy customised customers' requirements to compete with the large companies, by focussing on the value-added approach of the products' specifications. Such a small economies of scale business climate and the business strategic focus on niche marketing to strengthen the SCI efforts, has been described by four participants, by stating that:

> *'… the local market, … is relatively small'* (2/INT 3); *'The main sales are export'; '.. here we are only manufacture/production'* (7TS/INT1); *'In fact the focal firm, within the contextual conditions of its small economies of scale, being located in a small island state, undertakes niche marketing, as part of the core strategy of the firm, to promote success … with a value-added approach'* (5TS/INT2); *and 'SMEs in Malta is our motor of the economy'* (17TS/INT14).

The external economy recessions and downturn in the global sales do not normally influence immediately the Maltese workforce and productivity throughput of the local manufacturing, due to its resilience within its economy, but the effect is instantly felt in achieving an effective supply management, due to the need of the global sourcing of stock and to solve all the associated problems of inaccuracies in the forecasts figures submitted by customers and other SC members. Recessions create an imbalance in the stock availability in the market, especially for certain products, which make the SC management more challenging to manage all stock. Products which are not commodities, such as medical products and innovative products for smart homes, are normally less affected by such recessions, due to the stability of demand trends in such sectors. Such a challenging supply management approach and the Maltese economic resilience, has been described by two participants, by stating that:

> *'Recession of last year, caused 4 day week not as abroad who incurred redundancy'; 'Forecast was made as usual and due to recession the forecasts being requested were not met by the key suppliers since they gave us very long lead times'; 'This is an innovative line of activity and the sales are constant independent of the market recession'* (3/INT 4); and *'The 2008 recession are still affecting all VMIs procedures with all firms. The suppliers used to push stock but now after the recession there is lack of stock availability'* (5/INT 6*).*

The Maltese workforce is no longer competitive with respect to cheap labour since the minimum wage has increased, though it cannot be excluded that most of the salaries of professional people are relatively lower than their overseas equivalent. Such a salary assessment relative to other countries, has been referred by two participants, by stating that:

> *'The issue of minimum wage when compared to the Asian countries is no longer competitive, since in Malta this minimum wage has increased'* (3/INT 4); and '*The salaries are low compared to abroad'* (17/TS/INT 14).

The Maltese economy has no natural resources and depends on the importation of all needed resources associated with the manufacturing sector. The low economies of scale is influencing various suppliers engaged with the local manufacturing sectors' orders, since the supplies requirements are relatively low in volume and will not be feasible for such suppliers. The **local infrastructure** with its advanced technological applications and services are key to the SC context, although it cannot be excluded that improvements can be made in certain institutions such as in the standards authority and customs. The sea **transportation services**, is a key requirement to an efficient SC for sea locked islands, but such privatised maritime logistics remains the main problematic issue in Malta, with its infrequent sea shipping services and with the relative high fixed cost in all logistics operations, with respect to the high port charges and high merchandise transport cost. Such a costly logistics situation is attributed to the low economies of scale, when compared to other logistics services in world-wide countries, including EU member states, due to the relative low order volumes of all order levels from the local market. As a result, Malta is being subjected to relatively higher fixed costs to meet all logistics requirements, when compared to the larger revenue incurred by other global players. The transportation choice from Malta to any destination is restricted to either by air or sea. Once the EU or other nearby countries main land is reached, the land transport mode is used to minimise costs. The air freight is relatively expensive compared to sea freight, but is very fast and with a better logistics services. The local infrastructure, that forms part of the logistics backbone, has a competitive freight forwarders network with a large substantial number of players with low customer loyalty, but remains limited, due to various infrastructural limitations such as: a single airport; two cargo handling operators; two sea-shipping terminals; and two containers depots. On the other hand, Malta's strategic location, being in the middle of the Mediterranean sea, with its transhipment-hub, is giving a competitive logistics position to the Eastern Countries suppliers, being nearer to such countries. The transhipment-hub terminal is being exploited by carrying the local merchandise requirements over other large freight forwarders routes, to minimise all associated local logistics costs. Such a Small Island State with its small economies of scale disadvantages and the strategic location of the Island, has been described by seven participants, by stating that:

> **'…** *locally the market is small'* (3/INT 4); *'… today we have a private focused company instead of Sea Malta'* (5/INT 6); *'The Freeport bottleneck is not on speed or logistics but in terms of cost… The port charges are very high'; 'This may be attributed to the economies of scales'* (1TS/INT5); **'***Airlines for logistics are more available. Such as Lufthansa, low cost airlines etc. Cost of the item is high, it will be sent by air [to be feasible]'* (10TS/INT7); *'Malta is at the peripheral of EU but is the 1st call for Europe for sea shipments from Asia'; 'Furthermore we are an Island and insular'* (12TS/INT9); '*The orders are relatively small due to the small size of the Maltese sector and hence our fixed cost is high relative to overseas'; 'we cannot buy direct from China due to the large volume requirement by the seller'; ' This also applies to ships … We need [to] exploit on the service of others, to benefit from the others' large orders'; 'Today the Freeport made the difference in principle, since it is providing support for transhipment'; 'Monopolies within the Maltese context … impinge on SCI. This leads to less competition and apart from the price the systems are not efficient. The airport is one; two terminals both private. Ground handling is Airmalta and Global air. The facility is the same one. You have no choice to select from'; 'Containers are in Hal-Far and Freeport depots. The containers are our tools'; 'Hence the infrastructure is limited'; 'The Freight Forwarders (FF) are numerous and hence client loyalty is not found'* (15TS/INT12); and '*We are the fringe to north of Europe. The shipments are twice a week'* (16TS/INT13).

The SC running costs are also function of the changing local **electricity tariffs** since such a cost is one of the key running costs of operations, especially for SMEs. The investment in training by the industry is being greatly facilitated by **Government supporting funds** under the EU platform. The country **political, legal** and **social stability** is promoting stability of the SC, with no interruptions and possible performance degradation due to no political conflicts and neither corruption in the Maltese social and business life. The country educational system is a key strategic benchmark within the EU members, since the Maltese **educational level** is very competitive in various disciplines, which are needed to **support the industry**. The country is enforcing that all the industry complies with all **social responsibilities,** such as in **waste management** across the SC, including the end life of the products. The SC needs a solid **legal framework** for the global SC, so that all members can settle all disputes effectively, to promote fairness to all. Such a sound political, social and legal stability, environmental responsibilities and a high educational investment focus, has been described by three participants, by stating that:

> *'The social aspect, locally does not affect the SC… instability and corruption [exist in other countries]'; 'Technology in Malta is very updated'; 'Environment and CSR, we have to separate waste'; '... our legal framework is very robust, since they support the business against fraud, as compared to other larger countries, due to loop holes in their legal framework'*; *'Sometimes, during a crisis there [abroad], we cannot get the finished products and anything out of the country'* (6/INT 7); *'Small subcontractors may be drastically affected by rise in electricity charges or by any other introduced charges by the government'* (7TS/INT1); *and 'Nitrogen is used in large quantities. Such a gas ... it is not used a lot by other firms'; 'Hence the price is very expensive'* (16TS/INT13).

From the primary data, associated with the context analysis, it transpired that the nine (9) key emerging contextual themes needs to be taken in consideration by all SMEs through all strategic actions to remain in business. These themes, as referred in Table 5.1, may be both macro conditions, which are the influencing factors within the external business environment and micro conditions, which refer to the focal firm internal factors. The theorising process of such **nine (9) themes** from the data refers:

I. Most of the local SMEs need to undergo trading mainly with EU countries due to the **Free Trade zone** for EU member states, but must not exclude any commerce across the global world, although trading needs to incur **settlement of the associated global tariffs**;
II. The SMEs need to exploit the local Government and EU deep commitment to encourage investment and innovation within the manufacturing sector, by applying for all relevant **incentives and attractive opportunities of investment for innovation**, to enhance the firms' position relative to the **current cut-throat competitive scenario** (e.g. funds for ERP and advanced manufacturing equipment investments). It cannot be excluded that some **local**

services' charges are relatively expensive relative to other competing SMEs across Europe and the globe, due to Malta's small economies of scale (e.g. shipping and electricity services);

III. The local SMEs need to exploit the **Maltese employees' educational and collaborative culture**, based on learning and multi-skilled capabilities, with a high availability of professional certified people in varies disciplines, with multi-lingual competences, both within the focal firm and other locally engaged entities, by building an excellent workforce with a teamwork mentality that promotes an innovative approach to work and to meet effectively all change management initiatives;

IV. The SMEs are located within an Island with a small economies of scale, which is the cause of the relatively less margin of profits to all SC members, although sales are mainly focused on exports. To balance such a negative effect, the SMEs may need to target to niche markets, to exploit their limited resources, by manufacturing value-added and customised products with a premium price, where large sized firms, find it difficult to focus upon to increase the profit margin. Such low economies of scale is also affecting the logistics management, by being subjected to relatively more expensive charges for all transportation of materials or finished products, due to a single airport; two cargo handling operators; two sea-shipping terminals; and two containers depots. On the other hand, all SMEs need to exploit the advantages for all Eastern originated shipments, since they are faster to be received, relative to other countries, due to **Malta's ports strategic location**, being an Island in the middle of the Mediterranean sea;

V. Local SMEs supplies are being drastically affected by **economic recessions** since it is heavily dependent on the importation of various goods from different sources across the globe. As a result special measures need to be taken to manage the stock levels effectively, against stock-out situations, since recession influence the world economy and Malta being a sea locked island, requires more usage of sea or air modes of transport, which are relatively more expensive than other competing countries, to get all the required material in time; and

VI. The local and the multinational SMEs benefit from a **stable political, legal and social stability** which are key requirements for the stability and integrity of all SC operations, negotiations and settlement of disputes.

5.3.4 Results from the analysis of the secondary data sources

5.3.4.1 Participant Observation

From participant observation it was derived that: a strong relationship existed between management and staff from the way they treat and respect each other (i.e. human element aspect) and also from the way they treated their suppliers and customers and the way they discussed their pending issues and orders; there was a strict compliance climate among all staff, to firmly adhere to all quality standards and sustainable measures, by having an organised workplace with in-built quality checkpoints along the process, through both manual and automated means and with well established procedures for the collection of waste to promote an effective recycling mechanism; the use of bar-coding was being implemented in the warehouse and all across the plant to promote an audit trail of the stock being used; the warehouses were very organised with different shelving systems (e.g. space savings provisions) and different areas for incoming and outgoing material to promote an organised approach to warehousing and inventory management (e.g. dedicated consignment stock areas were also present under lock and key); manual and electronic dashboard reporting were being used through both manual white-boards and electronic boards, where all information was being retrieved from shared databases to promote awareness of all orders work-in-progress; and the use of kaizen board approach with names of employees well visible in the company premises with updated notes on various challenges to improve upon. Such Kaizen board notes were included by various employees to be visible to all staff and to update the state of improvement with board markers, to promote a continuous improvement culture among all people in all the manufacturing and SC processes and other key processes.

From the participant observation analysis, it transpired that the key emerging themes were: an effective management and leadership approach sensitive to the human element within the firm; a collaborative environment within and across the SC with special commitment to quality standards compliance and sustainability measures; auditing the overall process to ensure works traceability; deployment of technology in both automation and information systems to increase productivity through advanced manufacturing techniques and to maintain all the information regarding all works in progress respectively; and employ a continuous improvement culture based on performance measurements of all manufacturing and SC key processes.

5.3.4.2 Analysis of Documentary Evidence

From the hard documents given and on-line content on the firms' websites, it was clearly evident that: the focus on the quality standards used in all processes were very rigorous, in some cases, it was more than others, which were supported by on-line manuals and with visual aids hanging all along the factory walls to serve as a symbolic recognition of all sound values that need to serve as guidelines to promote awareness and to encourage compliance to all standards and sustainable procedures; customers, whenever possible, were given access to company database to submit or upload their orders details depending on the nature of the product (e.g. books are uploaded and requests are sent by mail); the company websites were used as a showcase to show the high level of service quality, lean operations and certified standards awarded to each firm (e.g. excellence award/s; EHS standard award/s; various quality standard certifications); and all staff were assigned access to common information systems to ensure that all works were being monitored to deliver, to avoid customer surprises, by registering all work in regular intervals to establish at the earliest any shortcomings all along the process so as to remedy at the earliest to promote business continuity.

From the above document analysis, it transpired that the key emerging themes were: quality standards and sustainable measures compliance, to create a climate based on a continuous improvement approach; information sharing through technology based systems to keep all employees informed and manage knowledge effectively to promote effective decision-making to eliminate any risk of failure; and an effective customer service.

5.4 The final emerged theory

The emerged theory is represented by the six final action key categories, eight competitive capabilities and nine contextual conditions, which can be seen in the code matrix Table 5.1, where the overall audit trail of the three analytic stages are outlined. The matrix shows how the forty-six (46) open codes are theoretically abstracted into twenty-two (22) tentative categories and then to **six (6) key categories**, namely with **one (1) core category** and **five (5) main categories** with sixteen (**16) sub-categories**.

Phase 1: **46 Open codes (Note: 39 Actions & 7 Consequences/Context conditions, Appendix 10 refers)**	**Phase 2:** **22 Tentative categories: 7 key & 15 non-key tentative catergories**	**Phase 3:** **6 Key categories (1 Core & 5 main categories) plus 16 sub-categories**
Leadership style; management effectiveness; and priority of works (3)	Leading Effectively (Phase 3 Core Category)	**Core Category**: Integrative Management and Leadership Approach (IMLA)
	Managing business strategy (Phase 3 Main Category 1)	**Main Category (1):** Business Strategy
Sub-contractors & outsourcing (1)	Managing manufacturing strategy (Phase 3 Main Category 2)	**Main Category (2):** Manufacturing strategy
Ownership of operations; SC strategic action and growth (2)	Managing SC Strategy (Phase 3 Main Category 3)	**Main Category (3):** SC strategy
ICT applications (1)	Managing Technology deployment (Phase 3 Main Category 4)	**Main Category (4):** Information and automated technology deployment
Manufacturing process (1)	Managing process within SC and manufacturing (Phase 3 Main Category 5)	**Main Category (5):** Holistic SCI management process approach with **16 sub-categories**: 1. lean management; 2. managing quality and sustainability;
SC members support; SCI activities; SCI depth; and time management (4)	Managing SCI (Phase 3 Main Category 5)	

<table>
<tr><td>Quality of processes; EHS (sustainability); Lean management; and standards implementation (4)</td><td>Lean Management, Sustainability and Quality Standards Compliance</td><td rowspan="16">3. managing performance measurements;
4. auditing operations;
5. supply management;
6. managing cash-flow;
7. managing change and innovation;
8. managing collaboration;
9. managing culture;
10. managing knowledge;
11. managing customer service;
12. managing information sharing;
13. managing logistics;
14. planning/forecasting;
15. managing risks; and
16. managing trust.</td></tr>
<tr><td>Information sharing; and communication (2)</td><td>Managing Information sharing/communication</td></tr>
<tr><td>Risk management (1)</td><td>Managing Risks</td></tr>
<tr><td>Collaboration; teamwork; employees' engagement; cross-functional operations; and coordination (5)</td><td>Managing Collaboration</td></tr>
<tr><td>Training & share innovative ideas (1)</td><td>Managing Knowledge</td></tr>
<tr><td>Performance measurements (1)</td><td>Managing Performance measurements</td></tr>
<tr><td>Logistics; delivery actions; and transportation management (3)</td><td>Managing Logistics</td></tr>
<tr><td>Plans and forecasts (1)</td><td>Planning & Forecasting</td></tr>
<tr><td>Inventory management; supply management; and lead time (3)</td><td>Supply management</td></tr>
<tr><td>Change management; flexibility; and innovation (3)</td><td>Managing Change & Innovation</td></tr>
<tr><td>Customer relationship management (1)</td><td>Managing Customer Service</td></tr>
<tr><td>Trust (1)</td><td>Managing Trust</td></tr>
<tr><td></td><td>Managing Culture</td></tr>
<tr><td>Auditing & traceability of operations (1)</td><td>Auditing Operations</td></tr>
<tr><td></td><td>Managing Cash-flow</td></tr>
<tr><td colspan="3">Eight Competitive Capabilities
SC flexibility; SC visibility; business continuity; continuous improvement; lean (optimised) operations; effective and efficient performance; sustainability (3BL); and effective customer service.</td></tr>
<tr><td colspan="3">Nine Contextual Conditions
Macro: EU Free trade zone; Global commerce outside EU needs to pay special tariffs; EU/Government incentives for investment and innovation; Malta small economies of scales makes most of the services relatively expensive (e.g. port charges, transport, electricity); Malta's strategic location for sea transport for EU, North Africa and Asia; Current cut-throat competitive scenario; political, legal and social stability; and Global or EU Economic recessions disrupts the procurement of all imports. Micro: Human resources competitive capabilities and professional competences promote good governance of SMEs.</td></tr>
</table>

Table 5.1: Code Matrix for all categories within the research phases (Author)

5.5 Overview of the chapter

In this chapter all the twenty two (22) emerged key concepts derived from Chapter 4, within the Axial Coding phase, were again reviewed in this Selective Coding phase within this chapter, to conclusively derive the set of final key categories. The theorising process is based on the coding paradigm model (Strauss and Corbin, 1998). Henceforth, such a model exposes the meaning contained within the emerged theory, with its core category, referred as the IMLA with all other categories in terms of their

actions and **consequences** within a **context**. The contextual conditions of the Maltese SMEs manufacturing sector are described in terms of the micro and macro contextual conditions, to ensure that the theory is contextualised within the data, in line with the conditional/consequential matrix (Strauss and Corbin, 1998) to promote research rigour.

The conceptual labels are used to represent the researcher's interpretation on the data, which are initially forty-six (46) tentative open codes in the Open Coding phase, with all the relevant theorising process within the codes memos. Then, the open codes are theoretically abstracted to twenty-two (22) tentative categories in the Axial Coding phase and finally, these tentative categories within this Selective Coding phase, are theoretically abstracted in terms of a core category and five (5) main categories. One of the main categories captures the sixteen (16) sub-categories. Such an analytic process, in all these three data collection and analysis phases, are tracked through memos, all along the research process, that constitute the theorising process on the emerged theory in an iterative approach in line with the constant comparison process. Such an analytic approach cannot be attributed to a smooth analytic sequential process, since it needs a cyclical analytic stance from one interview to another, without any sequence whatsoever and also from all the three coding stages between each other, as referred in Figure 5.1. In fact the theoretical memos for each phase become more accurate and complex as the analysis progresses, throughout the twenty-two (22) interviews, by going back to each category to refine and summarise each memo. The outcome of the Open Coding, Axial Coding and Selective Coding processes in terms of the categories can be seen in the Code Matrix Table 5.1.

The next chapter generates a concluding summary memo, which briefly describes the emerged SCI theory in a short narrative form with a special focus on the core category together with reference to all the five main categories and sixteen sub-categories with their dimensional variations. Furthermore, the substantive theory is also represented with the SCI theoretical framework with all actions and consequences which are all situated within the contextual conditions, as guided in Table 5.1.

Chapter 6: Theory Generation

6.1 Introduction to the substantive theory generation

The previous analytic approaches, referred in Chapters 4 and 5, within both the open sampling and the theoretical sampling phases respectively, have explored the primary data in an iterative process for the tentative categories with their properties and dimensions to include the variations in the emerged theory on the SCI phenomenon. The role of the secondary data also supported such an analysis.

The focus of this chapter is to generate a concluding summary memo, which briefly describes the emerged SCI theory in a short narrative form, which is finally represented by the emerged SCI theoretical framework, as referred in Figure 6.1. Such a theoretical framework represents the generated substantive grounded theory, which explains the SCI theory within the manufacturing SMEs in Malta.

6.2 Summary of the emerged grounded theory

The **definition** of the generated substantive theory with its component parts is: To achieve supply chain integration an **integrative management and leadership approach (IMLA)** needs to be deployed at the strategic, tactical and operational management levels, with due consideration of each SC actor contextual conditions, so as to establish and implement the right strategies for the business, manufacturing and SC, within the focal firm and in-conjunction with all SC actors, based on a holistic SCI management approach, which is enabled by technology, so as to achieve competitive capabilities.

To achieve the holistic SCI management approach, the firm needs to integrate the business strategy and the manufacturing strategy, with the SC strategy. The SC strategy defines the management approach that shall be taken by the focal firm employees at all management levels (from top to bottom) through all the processes, with all the external network of SC stakeholders. The SC and manufacturing processes are enabled through both information technology and automated technology based applications. A holistic SCI management approach can be achieved by employing an IMLA to ensure that all stakeholders' different strategic priorities are managed and led effectively and efficiently. This IMLA is the driving force that enables the achievement of a trade-off with all the SC members, from end customers to the suppliers, within their different business sectors' scenarios and with their different contextual conditions. Such a trade-off is needed to select the most effective decision that leads to the overall SC performance optimisation for a win-win situation to all, with the direct involvement of all relevant stakeholders. The decision making process is not after any particular SC member but aims to establish the common good to all involved so as to effectively meet the expected customer service (e.g. material quality issue from suppliers; delivery target dates vis a vis customers or suppliers issues; capacity issue brought about by production overload; and faulty machinery hindering production issues).

6.3 The research theory based on the core category around all of its categories

6.3.1. The Core Category: The Integrative Management and Leadership approach (IMLA)

The core category, referred as the **IMLA,** binds the SCI theory together. This category runs all along the **organisation** (i.e. the **focal firm employees**), since it starts from top management and cuts across all other management levels (i.e. strategic, tactical and operational) and includes all the SC stakeholders, such as **suppliers, intermediaries and customers**, who all perform in a **holistic approach** to achieve common goals. The lack of such a **conceptual approach** (i.e. **IMLA**) may lead to a situation of SCM failure, since in the absence of an **IMLA**, the lack of such an effective management approach may transmit a breaking domino effect on all the SC members' linkages, which are needed to hold the SC tiers to stick together, even if all the necessary strategic decisions with respect to the overall business, manufacturing, and SC are in place. This **IMLA,** when used effectively, creates the holistic commitment of the **human resources**, as the backbone of all the process activities, to achieve teamwork and employee engagement across all management levels and in all tasks, so as to synchronise all cross-functional efforts with a quality based approach in all activities both within the focal firm and across the SC and within all the manufacturing processes. An **IMLA** needs to involve all the SC tiers, from the upstream to downstream sides of the SC, which shall also include the end customers, so that the focal firm can achieve and excel in its mission, objectives and competitiveness. Though, it is to be noted that there exist a variation of the leadership approach, where at one end there is both the **strategic and the supervisory leadership approaches**, based on a shared leadership style, where the leadership stance incorporates all management levels and key SC actors and at the other end of the continuum, there is the **single centric or individual leadership approach**, where the leadership style is mainly focused on the top management team through a centralised approach.

The **IMLA**, within the focal firm, is further defined by the way that all management at all levels: cares and develops people through all interactions and training to promote a learning culture; builds on **trust** and **empowerment** of all people but does not focus on control; leads people to excel in their doings and not only manages them, but by exploiting every **individual capabilities** in all **decisions,** both individually and as a team; creates and transforms the teams and not only focuses on formal structures and systems, to promote flexibility and to accept a controlled level of informality (i.e. informal organisation); and manage all changes and risks effectively. The IMLA key leadership styles as emerged from the data are four: **transformational leadership style**, to meet change and innovation through people; **servant leadership style**, to be sensitive for people's needs and also meet business objectives; **situational leadership style**, to meet contingent situations; and **transactional leadership style**, to meet the routine flow of transactions.

In a nutshell, the key leadership qualities deployed within the IMLA adapts to today's dynamic business climate, with an openness consideration to change and innovation and with full commitment to listen and engage people at all management levels to perform effectively and efficiently. As a result, the **IMLA** mainly deploys a **transformational leadership style**, but does not exclude the other three styles, so as to manage effectively the integrated SC both from an intra- and inter-organizational perspective. Such as stance consists from a change management approach, which will drive the focal firm's readiness for creativity and innovation and develops a **human relationship** approach based on sound ideals and values, to motivate all people at all management levels. Furthermore, such a transformational leadership style exploits the people's flexibility and preparedness to keep up with external business demands and pressure, with an **unconditional approach** to succeed, and through the organization's ability to instill in all employees, at all management levels, a sense of **process ownership** that promotes commitment and engagement with the right **decision-making** mindset to perform effectively and efficiently.

The **IMLA** is used to achieve SCI by dedicated initiatives and by creating a collaborative mindset that is based on a mix of both management and leadership concepts within and across the focal firm, with all the stakeholders, for a winning behavioural approach, which goes beyond the **contractual agreement terms and references**, so as to earn respect and build long term relationships. The IMLA approach needs to apply the necessary measures of leverage through all management and leadership techniques, so as to unify the practices of both **conceptual elements (i.e. management and leadership as the two elements)** and to draw the best from the two approaches to optimise all stakeholders' contribution to achieve best practices and a competitive SC for a winning strategy.

This **IMLA approach** is based on a **mutual understanding** and level of empowerment across all management levels, which not only promotes **effective management** in a cross-functional approach, but also develops a driving **leadership approach** that inspires people to employ innovative, flexible and transformational processes in a continuous improvement approach. This **continuous improvement approach** is achieved: by the commitment of all people across all management levels to enable better ways how to achieve best practices in the right approach through individual and team value-added contributions, such as in the reduction of materials cost through the use of cheaper and better materials; by employing improved processes in production and across the SC, to become more lean, through more effective quality procedures and standards; by taking initiatives to maintain and improve on all sustainable measures (i.e. triple bottom line); by the deployment of all the workforce skills, through a continuous learning approach to achieve competitive levels of productivity; and to manage all risks effectively to promote business continuity.

IMLA core category properties are: open door policy; open management style; culture of trust and teamwork in all collaborative efforts at all management levels (i.e. strategic, tactical and operational); management need to lead by example; common objectives to work together within and outside focal firm; collaborative and joint-problem solving initiatives; adapt a common culture to make up for the different cultures of all SC members; close or an arm's length integration; holistic process approach; manage effectively all manufacturing and SC operations; adopt preventive measures; minimise any risk of failure (i.e. risk management); involve all stakeholders in all decisions and changes (i.e. apply an integrated management approach through change management and innovative initiatives in both products, manufacturing and SC processes); effective decision-making approach; leadership style needs to give direction and to unify all people in one team (i.e. integrated leadership approach); breakdown of all functional silos; management needs to employ a common mindset culture based on a two-way relationship with a **human element** that promotes understanding, appreciation, respect and with an honest approach, both within and outside the focal firm (i.e. humane orientation); make the employees understand and share the firm all strategic changes and innovative developments (i.e. change management approach); and performance measurements to review the overall SC performance and take remedial actions in all variances to keep in line with all KPIs.

6.3.2 The business strategy

The company **business strategy** is determined by the top management (e.g. Chairman, CEO, Directors and senior management) to establish the strategic direction. The company may vary between a fully-fledged manufacturing firm to a firm focused on a relatively limited part of manufacturing (i.e. contract based manufacturer or sourcing firm) with either a **local or a multinational ownership** (i.e. local subsidiary), where both type of firms need a dedicated organisation structure. The **business strategy**, in-conjunction with the **sales and marketing strategy,** are used to determine the strategic portfolio of the company, such as undergoing diversification or enter new markets and also on how to manage all operations through its **business strategic decisions** on all actions across all the management levels. Typical strategic decisions focus on: the cost cutting measures in all resources; the level of understanding and empathy to **human resources** requirements in training and support initiatives; the level of investment in technology (i.e. ICT and automation); the management policies and quality procedures to be adopted to be in line with all standards and legislative requirements, within the particular business manufacturing sector; the sustainability measures (i.e. the triple bottom line); the strong cultural values to be ingrained to perform in a cross-functional approach; the customer level of interaction and support to be adopted to each customer segment to achieve the right value-added approach per segment; and other best practices, related directly or indirectly, with the sixteen sub-categories under the holistic SCI management approach, as referred in the research theoretical model in Figure 6.1.

The top management needs to align the business strategy, with both the **manufacturing strategy** and the **SC strategy**. The manufacturing strategy needs the support of the SC strategy to reach effectively all SC members through an established SC structure. The SC strategy needs **SCI** to define the nature of the focal firm processes integration type with all of its members, within the SC structure, from the suppliers to the end customers, under a pull-SC strategy approach (e.g. employing a partnership or close collaborative initiatives or using an arm's length relationship). It is to be considered that the emerged SCI theory is based on a set of **contextual conditions**, which have an influence on the interaction of all the theoretical concepts, as referred in Table 5.1, Figure 6.1 and Section 5.3.3.

6.3.3 The manufacturing strategy

The manufacturing strategy is responsible of all the manufacturing processes to be deployed depending on the manufacturing sector, to be in line with all engineering practices, quality standards and all sustainable and legislative measures and lean management. The focal firm manufacturing strategy determines the span of the manufacturing process to be adopted. Such a strategic decision depends on a complex set of variables which need to be considered based on the '**make' or 'buy' decision** to determine the best feasible and practical solution between the 'make' and the 'buy' options.

The **'buy' decision** refers to an outsourcing strategy with the use of contractors to perform part of the manufacturing. Such an outsourcing stance may reach a relatively high level of manufacturing efficiencies, since contractors can deploy the necessary manufacturing processes at lower costs and higher efficiencies and produce the products with the right delivery time, competitive price and a high level of quality, in line with the established contractual agreement. Such a sourcing stance may also be supported by the focal firm, by supplying them the required raw materials or providing the moulds, to promote a high level of SCI and at the same time the focal firm remains responsible of the works and protects the intellectual property rights.

On the other hand the **'make' decision** depends on various variables such as: competitiveness vis a vis the operational cost and quality as the result of full ownership of the whole process; type of activity (i.e. the nature of value-added operation, whether core and non-core); level of control over the operations; volume of units to be manufactured; cost feasibility of engagement in the activities to get a competitive price; availability of capabilities and resources to meet the demand with the right turnaround time; funds available for the investment to make in-house; and investment time-span to make in-house (i.e. how long it takes to reap the investment).

As a result the manufacturing strategy, wherever possible depending on the relevant sector, shall heavily focus on technology deployment through automation so as to promote high accuracy, productivity and competitiveness with the right change management approach to promote a continuous improvement approach. Technology deployment in ICT applications, enable information management and information sharing all along the manufacturing process to promote visibility and traceability with all the needed updated notifications and assists in the improved efficiencies of the overall process, by being informed of the overall manufacturing equipment effectiveness and on any disruption from the scheduled productivity level to undertake the necessary recovery actions to minimise the risk of any failure.

The **human element** plays a pivotal role in all manufacturing and SC processes for his/her intellectual and management abilities and flexibility, but if used to perform processes that can be automated, this will lead to a higher cost, due to the lower rate of human based productivity. All the necessary preventive and corrective actions need to be undertaken within the overall process, both within the focal firm and outside with all SC members, to identify all obstacles at the earliest so as to take the right decisions not to disrupt the manufacturing process and to promote an effective risk management approach to minimise waste, in line with lean management.

6.3.4 The supply chain strategy

The **SC strategy** is function of the **size** of the firm (e.g. micro, small and medium); the type of **outsourced activities** (e.g. core and non-core outsourcing); the type of **sector** (e.g. beverages, wet and dry foods, electronics, medical accessories and automotive parts); the type of **product** (e.g. high value added product to low cost low value-added product, such as industrial AC equipment or battery valves or medical disposal items such as pipes, drips canisters); the **number of intermediaries** involved in the SC, such as distributors at the upstream and downstream sides respectively (e.g. distributors of supplies and distributors of the finished products) and the **human element**, that links all the SC members and the internal focal firm staff together, into one whole entity. Such a **holistic human**

element approach is achieved through different types of collaborative initiatives, with a certain level of flexibility to adapt to the demanding and changing requirements of all parties, to build up a responsive SC with the necessary hard and soft skills of all involved individuals, which are needed to promote effective teamwork across the SC depending on the role of each SC actor.

Henceforth, in the upstream side of the SC, SCI is function of the **type of supplies** and the established **contractual agreement terms and references**. Suppliers may supply part of the core components of the final product, which will need both SC members to engage in a **close collaborative relationships** as partners, function of the SC members **human element**, based on **technical** (knowledge-based) and **operational** information (such as stock levels, prices and quality). In case of commodities type of supplies, SC members need to engage at an **arm's length** relationship, by using suppliers to supply only raw materials, which will only exchange **operational information**. Similarly, in the downstream side of the SC, SCI depends on the type of product and whether an **intermediary** exists between the focal firm and the end customer. For **high value added products**, there is the need to employ **close collaborative relationships,** from a **human element** perspective, with the customer, in line with the established **contractual agreement terms and references**, to promote a level of understanding and a competitive edge in the given value-added services (e.g. such as site visits and demos; products traceability; and technical support). Whilst for other volume runners, the collaborative relationship type with the end customer is relatively lower, if not negligible, which may be focused on advertising the product, such as on social media or on the web or on the general media. With regards to the **outsourcing strategy**, a large firm tends to outsource more than a small firm due to the availability of the organisational resources, which as a result can manage effectively all interactions with all SC members and at the same time, can focus better on the core competences (i.e. stick to the knitting).

6.3.5 The IMLA in-conjunction with the business, manufacturing and supply chain strategies

The **business Strategy, manufacturing strategy** and the **SC strategy** with its **SCI strategy**, they all rest on the **IMLA**. The **IMLA** variation is defined by following two extreme ends. At one end, the company need to employ an effective management approach to meet its KPIs and its quality standards, sustainable work practices and legislative requirements of the manufacturing sector, with the right leadership approach, to influence and motivate the employees, in a **humane approach**, to perform effectively and efficiently. Such a stance ideally needs that all management levels have to involve all concerned staff in all decision-making activities and at the same time all staff need to adopt empowered initiatives and a culture of change management approach, in line with the **strategic leadership approach**, based on the distributed leadership style. Such a proactive effort is in line with the lean management approach, so as to gain from cost savings and higher quality in all processes, with a value-added and holistic process approach, to manage all risks effectively and efficiently. The other extreme end of the variation is a situation where the management does not involve the concerned staff in all decision-making and as a result the staff adopt a reactive approach to work, in line with the **individual leadership approach**. In the latter leadership approach, management lacks a **humane appreciation** of the employees' contribution, since there exists a management and technical divide, where the quantities count more than the quality of the manufactured products.

6.3.6 The holistic SCI management approach.

The **IMLA** is implemented through a **holistic SCI management approach** across all the SC, both within and outside the focal firm. This holistic process approach consists of a **complex and inter-related set of concepts** so that all the operations of all SC members create the necessary synergy, in-conjunction with the focal firm, so that the overall SC will **optimise and align** all processes in **one holistic approach** vis a vis an **IMLA**. A one size fits all model does not exist, since every SC needs to adopt the right holistic process according to each contextual conditions. The holistic process approach is represented by a set of **sixteen conceptual actions**, as referred in Figure 6.1 below. The responsibility of the process ownership is ideally achieved through team leaders across all the organization levels with the support of the individual employees empowered initiatives. The holistic process approach, from the **human element** perspective, shall be based on human competences which shall be multi-skilled for staff to adopt a teamwork approach both within the focal firm and with all SC actors. The manufacturing process must be in line with all quality based procedures to meet all standards and sustainable measures, in line with the respective manufacturing sector certified bodies.

On the other hand, the holistic process shall not be based on using the **human element** with a multi-tasking approach, with lack of focus on all activities, by doing everything but with lower efficiency, which may also create friction and shortcomings in performance, due to the lack of uniformity and quality-based practices.

The holistic process approach shall give the expected competitive edge to improve the overall SC performance for a win-win situation to all SC members. Any SC member failure or bottleneck within the SC operations will cause a SC disruption, unless the necessary risk management measures are in place, from a holistic perspective, to withstand such a domino negative effect, from breaking down the SC.

The **holistic SCI management approach** is enabled and sometimes even driven by **technology deployment** but its effectiveness is also dependent on the **IMLA,** since it governs the **human element** of the whole process who implements all information sharing initiatives and technological based processes. With such an IMLA, the focal firm, in-conjunction with all the SC members interconnected by an information platform, through information systems and automation based technological based applications, the human element still plays a key role to achieve the necessary integrative approach and team stimulus needed to perform effectively and efficiently to achieve a competitive performance.

The **holistic SCI management approach** consists from the following dimensions with the referred properties and their variations:

I. **Auditing Operations** (i.e. A variation exists by either auditing all internal and external processes (e.g. audit suppliers; audit internal in-house processes and external audits of SC members; and audits by Corporate). The other extreme end variation is performing no auditing at all);

II. **Managing Cash-flow** (i.e. A variation exists that either adopts a VMI or consignment stock to improve on cash-flow with favourable payment agreements with OEM suppliers or distributors and with the efficient use of all internal resources to be economically sustainable (i.e. by adopting the right cost cutting measures). The other extreme end variation is a situation of overstocking and lack of effective cost management in all resources, with the result of problems associated with both cash-flow and stock obsolescence);

III. **Managing Change/Innovation** (i.e. A variation that either the focal firm focuses on a continuous or periodical improvement approach to be innovative, creative and lean, so as to use the latest advanced processes with the support of latest technology and engage in innovative products. The other extreme end variation is a situation where people from the focal firm, and from different or all management levels, offer resistance to change to maintain a culture of status quo);

IV. **Managing Collaboration** (i.e. A variation exists where the focal firm externally adopts either an arm's length or a close relationships with sub-contractors, suppliers or subsidiaries. Such collaborative relationships depend on the role of each SC actor and are supported by contractual agreements (e.g. partnering with other SC members, such as suppliers and customers especially for high-value products). The other extreme end employs functional silos both within and outside the focal firm with no commitment to build any type of close relationship. Internally the collaborative initiatives may reach a conflicting and critical level, when the top management creates a management and technical divide, where all functional areas lack the teamwork environment. Externally with other SC members, the focal firm employs opportunism with no commitment to work together as a team);

V. **Managing Culture** (i.e. A variation exists where the SC needs to adapt and work in conjunction with various SC members with different cultures across the globe. The focal firm needs to be sensitive and flexible to build sound management practices with the right mindset and values based on a collaborative relationship to promote understanding and synergy both within and across the SC. The sources of differences are attributed to the different: values assigned to time management; calendar working days as a result of their local festivities; level of sensitivity allocated to others' needs (i.e. a one-sided view against a more flexible and understandable approach may be taken in collaborative initiatives); levels of details and support needed in all interactions (i.e. high to low level); and approach to the skills requirements for the assigned job roles (i.e. broad skills against narrow skills capabilities). As a result the focal firm needs to build a culture that excels in all operations and adopts all the necessary contingency measures against possible bottlenecks, both internally and externally, due to the various members' differences in values and deviations in their commitments that form up the SC, so as to recover from any shortcomings and to maintain the expected level of performance. The other extreme end is based on a SC network with various conflicts and disagreements in all interactions both within and across the SC due to the lack of understanding and cooperation culture originated from both the focal firm and any SC member);

VI. **Managing Customer service** (i.e. A variation exists that either the focal firm focuses on a commitment to promote proactive efforts to provide an edge in all customer service quality (such as on-site visits and real-time high value-added support with customised specifications, especially for high-value added products through niche markets) with the right sales and marketing strategy. The other extreme end is a situation where the focal firm takes a reactive or minimal effective customer service approach, where the support provided consists from a basic quality of service, targeted for the broad market);

VII. **Managing Information sharing** (i.e. A variation exists where the focal firm exploits all available types of information and knowledge to use each other' resources and capabilities so as to build a well informed mindset through effective communication of all information to the right person and at the right time, from the suppliers down to the end customers. The information exchanged may include operational, tactical and strategic information so that the recipient, either within or outside the focal firm, will be in a position to take informed decisions to reach a win-win situation. The other extreme end is a situation where information is shared to cover operational quantities and with no information and knowledge sharing at all);

VIII. **Managing Knowledge** (i.e. A variation exists that either adopts cross-cultural knowledge initiatives across the SC to promote learning and change and with ad hoc on-going training to all staff both within and outside the focal firm, with special attention to protect sensitive information through non-disclosure agreements. The other extreme end is a situation where no training is given at all to the staff within the focal firm and with no knowledge sharing across the SC and with no provisions to protect the focal firm knowledge and intellectual property from any leakages to competitors);

IX. **Lean management** (i.e. A variation exists where all operations are aligned and optimised to promote value-added activities, by minimising waste in both manufacturing and administrative processes in line with all quality standards and sustainable measures. It is a systematic approach to identify problems at the earliest and to promote a continuous improvement approach in all operations with a level of flexibility to achieve effective and efficient performance. The other extreme end is a situation where there exists wastage of all types of resources, such as reworking and duplicated activities without quality based processes and sustainable measures and an operational environment based on a lack of drive to optimise and align the overall process);

X. **Managing Logistics** (i.e. A variation exists where transportation is monitored through GPS tracking and information updates of all movements on the freight forwarder web portals, to promote SC visibility of all merchandise movement to take immediate recovery action/s in case of any shortcoming/s. The necessary measures are adopted by the focal firm to establish the mode of transport with the most sustainable route, to ensure timely delivery (e.g. employ groupage approach with other shipments). The other extreme end is a situation where transportation delays are incurred without any updates what is happening and without having the possibility to have any access to information to take the necessary provisions to make up for any delivery problems);

XI. **Managing Performance Measurements** (i.e. A variation exists where measuring is deployed on all the focal firm key work practices, so that all staff are informed on all performance achievements, and to promote a continuous improvement approach in line with the KPIs across all management levels, including the bottom-line. Upstream and downstream SC members are also included in such performance measurements, so that any bottlenecks are identified and immediately rectified so that the focal firm meets the customer side targets, with the right check and balances within the overall SC process. All the necessary initiatives are implemented to avoid measuring the wrong activities and/or failing to extract the right values. The other extreme situation is that of measuring nothing at all and keeping employees in the 'dark');

XII. **Planning/Forecasting** (i.e. A variation exists where the focal firm takes all the necessary actions to have the information from all downstream SC members, which although may be subjected to various errors, is needed to derive the master production schedule. Such forecasts drives the procurement process in a timely manner, with limited buffer stock dedicated to volume runners to effectively manage the risks of stock-out and cash flow respectively. The other extreme is a situation of no forecasts at all and the stock inventory approach adopted is based on past information or on experience which may result in stock-out or excess stock situations that may easily turn to obsolete stock with cash flow problems);

XIII. **Managing Quality & Sustainability (standards & legislations)** (i.e. A variation exists where the focal firm and all SC members need to be in line with the established manufacturing sector quality standard procedures (e.g. quality manual) and international certified bodies (e.g. Underwriters Laboratories (UL) standard, ISO and BSI) and sustainable practices. The quality standards procedures and sustainable measures promote high quality practices, a safe workplace and an environmental conscious and safe product to achieve a sustainable and high quality product from an economical, social and environmental perspective respectively. Particular sectors use tougher standards and require adherence to legislative requirements, such as in automotive and pharmaceuticals sectors (e.g. TS 16949 and GMP). In such sectors all processes need to be inspected, validated and measured to capture any deviations from the scheduled quality standards. The manufacturing process associated with all the products shall employ traceability measures to promote recovery at any point in time due to any unacceptable quality level. The other extreme end refers to situation with lack of conformance to quality either by the focal firm or by any SC member, where standards are not enforced and followed in line with the established procedures and sustainable measures, which may end up to excessive waste and rejects and even uncertified products leading to the possibility of SC failure);

XIV. **Managing Risks** (i.e. A variation exists where all operations are assessed, monitored or audited to promote quality assurance and business continuity, in line with the contractual agreements and to enable the necessary systematic and timely recovery actions from any problematic situation (e.g. lack of supplies due to delays). Risks are mitigated by taking the necessary preventive measures against such bottlenecks (e.g. use multiple supplier arrangements or reservation of stock). The necessary mark-ups within all costings are included to make up for any unforeseen increase in prices to maintain economic feasibility in all orders. The other extreme end refers to a situation where no risk assessment and/or mitigation is undertaken and failures are accepted as they come, leading to the possibility of SC failure);

XV. **Supply management** (i.e. A variation exists where stock is purchased function of demand/forecasts, quality (e.g. specifications), price and lead-time to adhere to all standards, sustainability and legislations so as to promote both an effective stock turnover and cash flow respectively. The other extreme end refers to a situation where stock is purchased to promote low cost with no safeguards against stock-outs due to low order levels or obsolete stock due to excessive volumes and its associated cash flow problems); and

XVI. **Managing Trust** (i.e. A variation exists where trust is used to build long term relationships and collaborative initiatives between all staff, both internally and externally of the focal firm. All the information and knowledge exchanged, promotes team building and represents the real requirements of all SC members to promote value-added activities in line with lean management. The other extreme end variation is a situation where silos are built both between staff within and outside the focal firm, where information exchanged is not reliable and may cause the SC bullwhip effect due to inflated requirements, leading to excess inventory associated problems, such as low inventory turnover, obsolete stock and negative cash flow).

6.3.7 The technology deployment

Technology deployment in IT applications and automation technology acts as an enabler of the holistic SCI management approach and may adopt two extreme process variations. It may either be focused on latest advances and applications to promote business process engineering in all workflows, within the focal firm and across the SC, through a high level of automation based technology. Such an approach is used to promote informed decision-making for a winning manufacturing and SC strategy, within the focal firm across all management levels and even outside with all SC members, based on an effective information sharing platform to promote an open, common and real time communications information systems (e.g. ERPs or database based applications). Such a technology deployment enables all processes to promote a high level of integration of all human interactions with streamlined processes across the SC and of all manufacturing processes (e.g. automation) to improve on the business performance. Technology adapts to all processes, and may also be used to drive all information systems and automated processes, for improved quality based processes, where within manufacturing, it enables a high level of production volumes with lower costs per unit to promote a competitive edge in all operations (e.g. achieving high levels of productivity with the right accuracy and efficiency through automation). On the other extreme end, the deployment of IT and manufacturing technology may be resisted by the workforce and instead mainly implement verbal communication methods with pen and paper methods and deploy manual manufacturing systems, which are preferred over technology based automated manufacturing, resulting in competitiveness failure.

Attention shall be given in cases of IT holistic technology based applications, such as with the implementation of an ERP or a custom database, where such a system may drive the focal firm to be less flexible and create a rigid approach to adapt to minor or basic applications requirements, causing the focal firm to become victim to the system. Under such conditions, the users will have no other option, but to bypass the current rigid IT based system and deploy traditional-based legacy systems, by patching up the rigid systems with add-on applications, to promote flexibility and meet such requirements. Furthermore, in particular job production sectors, the manufacturing processes may be heavily manually based, with minimal technology based automation, since the nature of the products cannot be manufactured otherwise (e.g. switchgear and printing manufacturing sector). Though, it cannot be excluded that, within almost all manufacturing processes, a level of human element is always needed, since it plays a key role within the overall manufacturing process. Any manual approach that needs to be adopted must ensure that the human element must not create any bottlenecks in productivity within the manufacturing process, but acts only as an interface within the overall process.

6.3.8 Competitive capabilities

The competitive capabilities, as the outcome of the model, is driven by the IMLA, through the commitment and empowerment initiatives of all involved staff (i.e. human element), within the SC and manufacturing operations, made up from the right strategies (i.e. business, manufacturing and SC strategies) and actions (i.e. holistic SCI management approach enabled by technology) within a context. It is to be noted that the holistic SCI management approach has a set of sixteen actions (Figure 6.1), which serve as the guiding yardstick for all to follow, which need to be managed effectively with the right trade-off for the common good over the individual benefits of all SC actors, which are function of their contextual conditions, so as to serve as a means to an end for the overall SC competitive capabilities.

The key outcomes from all the tentative categories were: SC flexibility and visibility; business continuity; continuous improvement; optimised and lean operations; effective and efficient performance; sustainability and effective customer service. Such an integrated approach serves as a platform for all SC actors to create value-added and optimised operations and at the same time respect all the quality and sustainable measures to produce a competitive product with a competitive service to the end customer. Such an approach enables the focal firm with all its SC actors to build distinct competencies relative to other SCs to be competitive in the market so as to promote success.

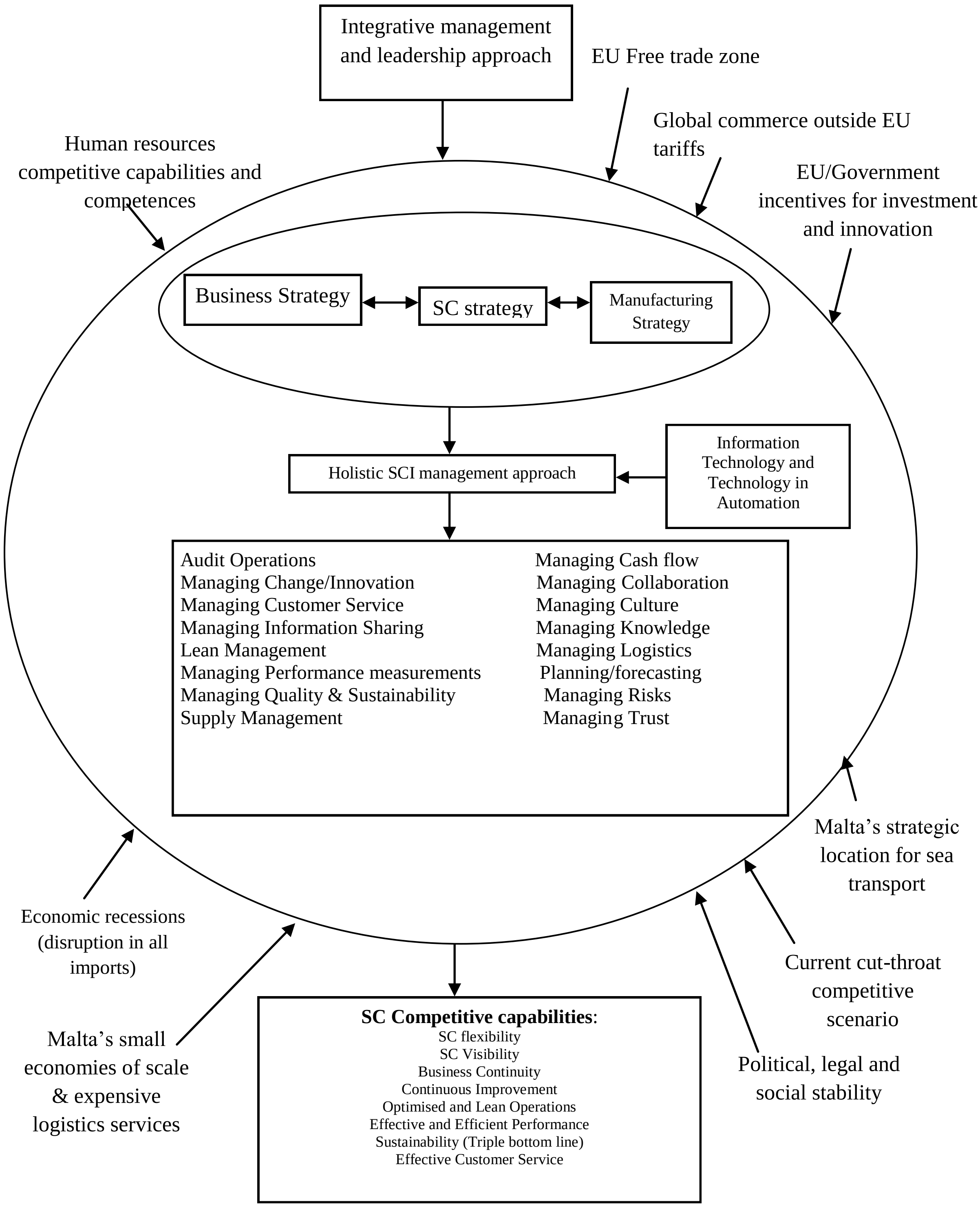

Figure 6.1: The emerged SCI theoretical model (Author)

6.4 Conclusion

This chapter has presented the final stage of the grounded theory data analysis. By applying the Straussian GTM, the core category, labelled as the 'Integrative Management and Leadership Approach' earned its way to link all the emerged theory together. The generated substantive theory is based on the core category with the relation to other five (5) main categories, where one of the main categories encapsulates 16 sub-categories, as referred in Figure 6.1 and Table 5.1.

The research rigour was maintained by undertaking all the data collection and analysis process in Chapters 4 and 5 in line with the Straussian GTM three coding techniques, to promote reliable and valid findings, as already referred in the research methodology Chapter 3. Special attention was given to the constant comparison process and memos writing, to promote an audit trail of all analysis and to ensure that all interpretations are in line with the confirmability and control research quality criteria (Glaser & Strauss, 1967). Such a stance enabled the researcher to theorise on the data with the right sense-making approach to ensure that all participants are put back to life within all data analysis, by substantiating all the emerged theory grounded in data with key selected *in vivo* quotes from the data, in line with the fitness (i.e. credibility) research quality criteria (Ibid). All research participants selected, formed part of the population within the manufacturing sector in Malta, who were highly knowledgeable of their respective businesses and well versed with the supply chain responsibilities and in the role of IT at the workplace, in line with the dependability research criteria to generate rich data (Ibid). Such a stance also contributed to the generation of an understandable theory that also fits the SCI phenomenon understudy in line with the research quality criteria (Ibid). Furthermore, the generated theory within this Chapter through the final theoretical memo has taken a holistic perspective approach and with a level of variation in all categories, due to their properties dimensional variations, which both makes the research flexible enough to comply with the GTM generality and fitness principles of research quality criteria (Ibid). Henceforth, the grounded theory generated, being in line with Glaser and Strauss's (1967) criteria of fitness, generality, understandable and control, promotes research rigour since it meets the GTM quality assessment principles based on the credibility, plausibility and trustworthiness (Section 3.6.3).

This chapter is also used to drive the post literature review (Section 2.6), since at this stage all the analysis have been completed and the substantive theory has been generated with all its emerged themes in line with the GTM (Strauss, 1987; Glaser, 1998). The post literature review is directed by all the emerged final categories to situate the substantive theory within the extant literature. With the completion of the post literature review, the researcher was in a position to proceed with the research discussion (Chapter 7), to integrate the emerged theory within the extant literature, so as to identify the commonalities, the differences and the new (Glaser, 1998).

Chapter 7: Discussion - Theoretical Integration

7.1 Introduction

This chapter will integrate the emerged theory from the data within the extant literature in line with the GTM for logical extension and comparison of the emerged theory with the literature (Strauss, 1987) and also for theory building (Eisenhardt, 1989). To achieve such a stance, a comprehensive and systematic post literature review was carried out based on all emerged themes, as referred in Section 2.6, with the completion of the data collection and analysis process in Chapter 6.

The research question that guides the study and supporting objectives is the following two-part question. First, which are the characteristics needed to achieve SCI within SMEs in the Maltese manufacturing? Second, which are the key factors that constitute SCI that promotes competitive performance within SMEs in the Maltese manufacturing?

The scope of this chapter is to relate the substantive theory with the literature, to answer the research question and to derive the study implications to the extant literature. The substantive theory is also refined by making reference to the literature. This chapter also explores all the relationships between all emerged themes within the theory of this study which is building up the SCI theoretical model.

Henceforth, the study findings are related with the relevant literature so as to situate the generated theory within the extant literature, identify where the research fills the literature gaps and also to establish the research contribution. Such research discussion and its contribution are determined by identifying the commonalities, the differences and the new, between the current literature and the substantive grounded theory (Glaser, 1998).

7.2 The emergent theory within the extant literature

The study research aim is to generate a theory on supply chain integration (SCI) by focusing on the manufacturing sector SMEs within Malta. The research main objective is to establish the key SCI characteristics. The data was obtained from a set of twenty two (22) in-depth interviews, based on seventeen (17) firms, in various sectors within manufacturing, so as to capture all the differences, since the supply chain (SC) is contextually dependent on the type of product. The study derived a core theme from the data, based on a set of other main themes and sub-themes which constitute the foundations of the generated theory on SCI. All the themes have a set of properties and dimensions with a level of conceptual variation for each theme, which constitute the SCI theory. All the themes were defined, explained and depicted in the theoretical model, as referred in Figure 6.1, after the completion of the data collection and analysis in Chapters 4, 5 and 6.

7.3 A high level overview of the key findings: The IMLA explanation, originality, significance, definition and challenges

7.3.1 The IMLA explanation and its originality

The research findings show that the theory for SMEs to achieve supply chain integration (SCI) requires an integrative management and leadership approach (IMLA). The IMLA, as the research core theme, is considered to be a concept within the SCI theory and it is defined to be both a driver and a binding force of all the SC actors. The IMLA conceptual term foundations are based on organisational behaviour theory, which guides professionals and practitioners in their relationships, engaged within the manufacturing based SC, both within any firm and also with all of its SC stakeholders.

The IMLA is based on the foundations principles built from the management and leadership concepts respectively. From a management perspective the IMLA promotes mutual understanding between people so as to comply with the established procedures in line with all the quality and sustainable measures across all the management levels to achieve competitive capabilities. From a leadership perspective the IMLA inspires people to employ innovative, flexible and transformational leadership processes with a continuous improvement approach to achieve competitive capabilities. The IMLA sustains the established cliché that management (Watson, 1986) and leadership (Bennis, 2007) are not only scientific disciplines but are also performing arts and need a level of creativity and wisdom to establish the common good both within the focal firm and across the SC.

The core theme IMLA, as the name implies, is unique within the academic literature. It represents the concept needed to achieve SCI, being based on the dual concepts of management and leadership but in an integrated approach. The empirically generated theoretical model, as referred in Figure 6.1, is also unique, since the way all the concepts are inter-linked together in a comprehensive way is also original. The IMLA is also significant and contributes towards the gaps in literature for more theory regarding how SC actors deploy SCI initiatives within the manufacturing SMEs sector to achieve competitive capabilities. The definition of the SCI theory based on the IMLA is referred in Section 6.2 and is depicted in Figure 7.1 below, based on a simplified version of Figure 6.1, by outlining the emerged core category with its five main categories and the outcome category.

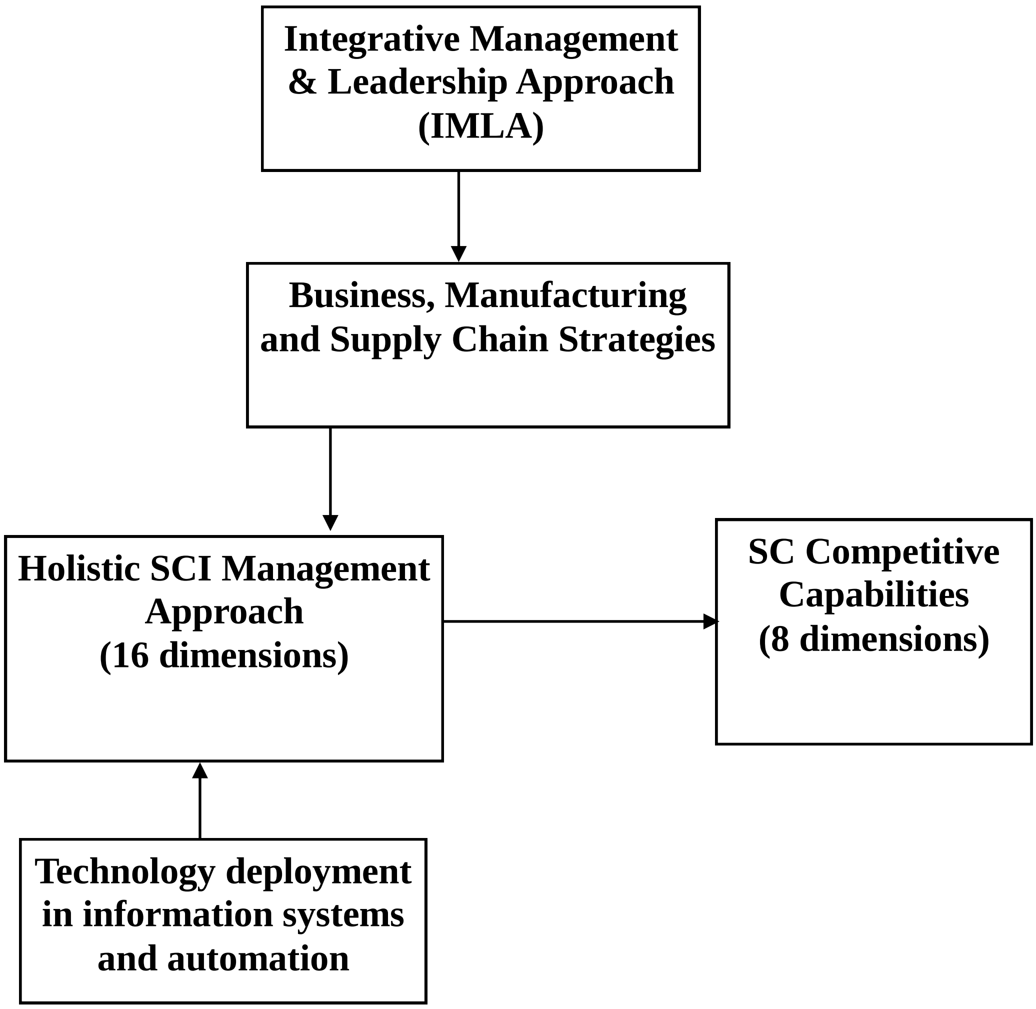

Figure 7.1: The SCI theoretical model based on the emerged main categories (Author)

7.3.2 The study significance and literature gaps from a multiple theoretical perspective

The study significance is attributed to various literature gaps:

(a) From the supply chain management literature it was inferred that research is quite limited to explain how to achieve SCI (Zhao et al., 2008) and how to determine the influencing factors of SCI (Flynn et al., 2010). Furthermore, there is little empirical research within connected supply chains containing SMEs exploring larger and smaller firms' perceptions of the value of supply chain information integration (Harland et al., 2007). Finally, it was stated that the social element, 'in terms of labour, skills and the forming of relationships' is a neglected research area (Ashby et al., 2012, p.506) and that 'downstream integration has received little attention in supply chain research' (Guan & Rehme, 2012, p.188).

(b) From the leadership literature, it was asserted that the 'management of integrated supply chain' is a 'largely ignored area' (Defee at al., 2010, p.764). There are few scholarly works which explicitly consider network based leadership in the macro context of inter-organisational networks (Sydow et al., 2011). The study validity is reinforced by assertion that the 'theory surrounding supply chain integration is still underdeveloped' (Schoen & Swink, 2012, p.110). The interest towards 'power and dependence in buyer–supplier relationships' … 'has been wavy since 1950s. However, the studies discussing the interplay between these two important topics of relationship management are rare' (Kahkonen et al., 2015, p.151).

(c) From the manufacturing literature, the manufacturing sector needs further research in the area of 'holistic research approach integrating technological, managerial and business-model solutions together with a change in the customer behaviour, with the perspective of a more sustainable manufacturing for the production of more sustainable products and services' (Garetti & Taisch, 2012, p.88).

7.3.3 Overview of the challenges to achieve SCI within the literature relative to the research core theme

The study outlines that supply chain integration (SCI) requires an integrative management and leadership approach (IMLA), as the core theme of the theoretical model, to achieve the necessary competitive capabilities. Although the leadership and management concepts are well represented in the literature within various academic disciplines, they are more focused from an organisational perspective and exclude the wider contextual perspective to include inter-organisational systems (e.g. Osborn & Marion, 2009). Lambert et al. (1998, p.12) declared that within the SCM context, 'The managerial and behavioural components were, in general, less well understood and more difficulties were encountered in their implementation', relative to the physical and technical management components (e.g. organisation structure, communication and information flow structure). It was also inferred that, 'Managing the entire supply chain is a very difficult and challenging task' (Lambert & Cooper, 2000, p.68) and it was contended that more SCI is beneficial and better than less integration (Swink et al., 2007). Furthermore, Sydow et al. (2011) inferred that studies that combine leadership and management concepts to achieve SCI, within the SC context within inter-organisational networks, is rare.

The research findings complement and address these gaps by focussing on the importance of the management and leadership concepts. The IMLA, with its empirically derived theoretical model, outlines how to manage the overall SC to meet all challenging scenarios both within and outside the focal firm.

7.3.4 Comparison of the key contemporary theoretical models from the literature with the emerged theory

A set of four scholarly works are being referred to situate the core research findings based on the IMLA within the extant literature. There are few other papers which mentioned the terms ‘management’ and ‘leadership’ to show the importance of such conceptual elements in the SC business processes but were not the main focus of the studies (Lambert et al., 1998; Cooper et al., 1997; Cowan et al., 2015).

7.3.4.1 Integrated chain management study

A close concept to the IMLA is the integrated chain management (ICM), which refers to a literature review based on German and Dutch manufacturing (Seuring and Muller, 2007). Seuring and Muller (2007) studied the ICM concept, within the context of sustainable SCM to achieve sustainable competitive advantage. In this paper abstract, ICM was described as the ‘supply chain management that takes environmental and social issues into account’ (Seuring and Muller, 2007, p.699). Such a definition left out the economical dimension, but within the paper content, it makes reference to both the economic activities and firm’s profitability. The research findings complement this paper and outline that the deployment of the social, economical and environmental practices has been found pivotal and contributes to a sustainable competitive advantage. Such research findings also corroborate with sustainable SCM practices within the extant literature (Elkington, 2002; Seuring & Müller, 2008; Buyukozkan & Berkol, 2011; Sarkis, 2012; Wu et al., 2012; Caniels et al., 2013; Glover et al., 2014; Hsueh, 2015).

The ICM theoretical framework within this paper was based on a set of transactional and transformational processes to reach competitive sustainability. ICM was also analysed from three theoretical perspectives: the material and information flow (i.e. production and logistics management); the strategy and cooperation (i.e. to actively manage product and material flows); and the industrial network (i.e. exchange of materials to promote sustainable practices). The three perspectives scope was to establish how to manage effectively all the elements, with all the necessary synergies (e.g. symbiosis), efficiencies and recycling, to promote an overall supply chain sustainability of all materials usage within manufacturing from the cradle to the grave. The findings, based on the IMLA, complement and also serve as a theory extension of the ICM concept to achieve competitive capabilities, since the emerged theory covers all the above three foundations perspectives and also provides a more comprehensive theory. The emerged theory is more comprehensive since it is based on the IMLA and supported by the business, manufacturing and supply chain strategies respectively, which all determine the holistic SCI management approach, based on set of sixteen concepts, enabled by technology deployment.

The ICM transactional and transformational processes, within this paper, were mainly based on the material flow, whereas the research findings considered also the transactional and transformational processes from a management and leadership perspective, together with the consideration of the servant and contingent leadership approaches. The IMLA also adopted a special focus on the human or social element at all management levels, which is only defined in the ICM model but is not tackled. Furthermore, the paper literature review did not locate any publications which included the social issues, so the IMLA with its human element special consideration within this thesis, is an extension of the ICM theoretical perspective both within this paper and to other referred papers within this scholarly case.

7.3.4.2 SC leadership and SC followership study

Defee et al. (2010) focused on a transformational leadership approach within a SC for both leaders and followers, which is also a close concept to the IMLA theme. The paper focused on two concepts referred as SC leadership and SC followership, using a research methodology based on a simulation game environment, provided by several US Universities. This academic work included only the transformational leadership approach and excluded all other types of leadership approaches, as referred in this thesis's findings, which are transactional, servant and contingent or situational, which are considered pivotal to meet the SC dynamic conditions. Furthermore, the paper only focused on three mediating constructs and two outcomes, namely information availability, communications and rewards, as the mediators, which led to efficient and effective performance, as the outcomes. Within the thesis's findings, a total of sixteen constructs are included to represent the holistic SCI management approach, which all cover this paper three constructs. Similarly, this thesis's findings complement the two outcomes, but also include other competitive capabilities dimensions.

Such a paper demonstrated that SC followership contribution played a significant role in the SC performance outcomes, once there exist an information sharing platform and also when they were given the opportunity to contribute ideas and make decisions and were also included in a holistic reward scheme. The thesis's findings, corroborate this academic work, since it is identified that the holistic SCI management process approach requires intra- and inter-organisational synergies by deploying: the right performance measurements both within the focal firm and across the SC; and joint-decision making, between the focal firm and all stakeholders (i.e. as followers), so that the overall SC is optimised and aligned effectively. Similarly, the thesis's findings infer that holistic SCI management approach deploys an information sharing mechanism, enabled by technology in information systems and automation, to exploit knowledge from each other and to promote an informed mindset to the right person and at the right time. Such technology deployment adds to the body of research within this paper's model.

7.3.4.3 Quality management practices study

Kaynak and Hartley (2008) inferred an empirical model, quite similar to the IMLA based theoretical model within this thesis work. The paper was based on quality management practices based on eight dimensions as antecedents that led to a set of performance outcomes (i.e. inventory management, quality, financial and market performance respectively). In the paper, the management leadership, was considered from a quality based approach, and was referred as the core driver of all the other seven dimensions: training, employee relations, customer focus, quality data and reporting, supplier quality management, product/service design, and process management.

The paper deployed a quantitative research methodology and the implications of the study suggested that management leadership, within the SC context in both manufacturing and services firms, was pivotal in creating a culture of continuous improvement, open communication and cooperation based on policies and structures that enable their organizations to be customer focused. Such a theory is also complemented by the thesis's findings through the holistic SCI management approach dimensions with the customer service as outcome with its optimised and lean operations. Furthermore, the paper inferred that the integration of both upstream and downstream processes led to improved quality performance, which is also corroborated by the research findings holistic SCI management approach. The thesis's findings are consistent with this paper theoretical model, since the IMLA complements it, by being the core driver of the findings theoretical model. The thesis's findings consider that both effective and efficient performance represent the operational and business indicators which complements the paper's financial and market outcomes. The paper inventory and quality performance outcomes were also covered within the findings by the supply management and managing quality and sustainability themes, but as antecedents within the holistic SCI management approach.

Within the research findings, the product/service design antecedent, referred in the paper, is implicitly indicated within the findings by the knowledge management (i.e. sharing of knowledge within the focal firm and across the SC), manage change/innovation (i.e. flexible and innovative design), manufacturing strategy (i.e. with its engineering and quality standards) and sustainability (i.e. ensuring low cost and environmental awareness in the product design) themes.

Finally, the findings infer that the holistic SCI management process approach includes a more comprehensive set of dimensions and is also enabled by technology deployment, which adds to the SCI conversation since this is lacking in this paper's model.

7.3.4.4 Supplier integration mechanisms study

Lockstrom et al. (2010) also inferred a theoretical model focused on focal firm leadership approach (i.e. buyer side) as the key antecedent to achieve SCI with suppliers so as to promote SC performance improvement. The research findings complements such a paper and extends on its theory, since the IMLA based theoretical model represents a more holistic picture of how to achieve SCI, by including not only the upstream side but also the downstream side of the SC.

This paper was based on empirical research to establish the factors that facilitated and inhibited supplier integration within the automotive manufacturing SC context in China. The research methodology used a multiple-case study approach on thirty firms with a grounded theory analytic stance. The results indicated that buyer-side leadership effectiveness was an important antecedent for building motivation, trust, and commitment among suppliers which facilitated strategic alignment and all collaborative capabilities and which acted as key enablers for successful supplier integration. The research findings support such an assertion, since the IMLA together with the holistic SCI management approach are creating a motivated environment, both within the focal firm and across the SC with all members, where trust is pivotal in all commitments and collaborative initiatives.

The paper outlined that there exist four main types of leadership styles: coaching/cooperative; situational; assertive; and delegating. In the research findings there also exist four leadership styles, where the situational style is common and is deployed with the scope to meet contingent situations, whilst the other three styles are all covered by the findings except that this thesis includes an added style. Meaning that the transformational leadership style, which is used to meet change and innovation through people, overlaps with this paper coaching/cooperative, assertive and delegating approaches, due to the relationship building, influencing values and empowerment characteristics within such a leadership style; the servant leadership style, to be sensitive for people's needs and also meet business objectives, overlaps with the cooperative approach due to the individual concern characteristics within this leadership style; and the transactional leadership style, was lacking in the paper, where it is used to meet the routine flow of transactions. Such a transactional leadership style expands on this paper theory, since it adds to the current conversation by giving a more comprehensive SCI approach.

The paper classified the achievement of supplier integration outcome, on two categories: supplier collaboration readiness and collaborative supplier capabilities. These categories were represented by a comprehensive set of dimensions which clearly demonstrated the multi-dimensionality nature of the SC constructs to achieve SCI. The research findings complements such a theoretical model from the literature since SC actors need to be both ready for the relationship commitment and also need to have the necessary capabilities to interact together, as referred in the IMLA core theme with the support of the business, manufacturing and SC strategies respectively with the holistic SCI management approach.

From the paper, the supplier collaboration readiness dimensions were: quality mindset/customer focus; top management support; strategic alignment; willingness to learn/improve; long-term orientation; and trust. The collaborative supplier capabilities were process management; communication; performance management; autonomous problem solving; organizational learning; planning; and engineering/innovation.

The research findings constitute all collaboration readiness dimensions through: customer service for the quality mindset/customer focus dimension; IMLA for the top management support dimension; business, manufacturing and SC strategies for the strategic alignment dimension; holistic SCI management approach employs knowledge management for the willingness to learn/improve dimension; IMLA is a long term approach for the long-term orientation dimension; and holistic SCI management approach employs trust as one of the common dimension to this paper.

The research findings constitute all collaborative supplier capabilities dimensions through: holistic SCI management approach for the process management dimension; holistic SCI management approach employs information sharing for the communication dimension; holistic SCI management approach employs performance measurement for performance management dimension; IMLA incorporates a decision-making approach for the autonomous problem solving dimension; holistic SCI management approach employs knowledge management for the organizational learning dimension; holistic SCI management approach employs planning and forecasting for the planning dimension; and holistic SCI management approach employs change and innovation for the engineering/innovation dimension.

7.4 The emergent themes within the extant literature

7.4.1 The core theme: Comparison of the integrative management and leadership approach (IMLA) within the extant literature

7.4.1.1 The Management concept within the IMLA based on the focal firm and across the SC

From the literature, as referred in Section 2.6.3.1 in the literature review of the management concept, within an organisational context, managing effectively through people to achieve results is a key concern within the human resource management (Drucker 1979; Crainer, 1998) and also within the SC context (Ashby et al., 2012; Ellinger & Ellinger, 2014). The management role is about meeting the objectives, productivity and social responsibilities but also needs to establish measurements on the individual and the organisation to monitor performance improvements and optimisation (Drucker, 1977). Nowadays, managing effectively within an organisation does not only consider the social and economic perspectives, but also needs to cater for an environmental perspective, by employing environmental friendly measures and 'green operations' to promote environmental sustainability (Bojarski et al., 2009). In fact contemporary research considers a sustainable SCM (SSCM), which means that SCM needs to be sustainable within the social, environmental and economical goals, also referred as the triple bottom-line (Elkington, 2002; Vachon & Klassen 2006; Cater & Rogers, 2008; Seuring & Müller, 2008; Buyukozkan & Berkol, 2011; Carter & Easton, 2011; Ashby et al., 2012; Sarkis, 2012; Wu et al., 2012; Caniels et al., 2013; Glover et al., 2014; Hsueh, 2015).

Such a management literature overview is complemented by the findings, since from a social perspective the IMLA is about managing people both within focal firm and across the SC, where the human element remains the backbone of all the processes. The human element within the focal firm needs to be unified in one team to breakdown all silos through a cross-functional approach, so as to employ a common mindset to promote understanding, appreciation and respect and furthermore to promote an innovative approach on the job. The findings also show that the social element needs to extend to all stakeholders, by employing a teamwork approach with all different SC actors, based on dedicated inter-organisational collaborative approaches, depending on the SC actor role with respect the focal firm (e.g. a core supplier or a one-off supplier). Such a collaborative approach needs to synchronise and optimise all activities and measure the overall performance to meet all scheduled objectives and productivity, by managing the whole SC set-up from a holistic approach. The social sustainable approach was clearly declared by the CEO of one firm, who stated that:

> *'My policy is to demolish all boundaries and work as a team. I destroy all cells or niches, since cells do not talk to each other if they are created'* (8TS/INT4).

Similarly, from an economical perspective, the findings imply the need to manage cash flow effectively and to employ lean operations to promote effective and efficient performance with the least of waste in all types of resources and processes. The economical sustainable approach was explained by the operations manager of a firm, who stated that:

> *'The stock needs to be made available without ending up into cash flow problems'* (1/INT2).

Finally, from an environmental perspective, the findings show that environmental sustainability needs to be established at source by the SC and manufacturing strategies and is part and parcel of the holistic SCI management approach, within the focal firm and across the SC, to implement all environmental sustainable measures within the product design and materials usage together within both manufacturing, such as in product design and waste management approach and SC processes, such as in logistics. The environmental sustainable approach was explained by two participants, who stated that:

> *'... audited and implemented such EHS programme'* (1/INT1); *'Environment and CSR [are both being respected]'* (1/INT2).

The findings clearly sustain the extant literature since triple bottom line sustainability is a crucial element underpinning the manufacturing and SC strategies and also within the holistic SCI management approach, as referred in the sixteen dimensions within the theoretical framework in Figure 6.1, and as referred Table 5.1. The SC sustainability needs to cater for all processes within the focal firm in-conjunction with all the upstream and downstream SC actors, since any failure in compliance from any of the SC members, will breakdown the overall SC sustainability objective (e.g. certified green operations by suppliers and logistics providers need to be in harmony with the focal firm). The SC sustainability is pivotal since it needs to incorporate all SC actors, as explained by one participant, who stated that:

> '*… suppliers, who have to stick to our standards and processes and we visit them and make audits…'* (6/INT7).

7.4.1.2 The Leadership concept within the IMLA based on the focal firm and across the SC: Strategic leadership style against individual leadership style

From the seminal works within the contemporary literature on leadership, based on the knowledge era (Uhl-Bien et al., 2007), within an organisational context, as referred in Section 2.6.3.2, the strategic leadership approach needs to shift beyond the dyad approach to a relationship approach, based across different organisations (Hunt, 1991; Finkelstein & Hambrick, 1996). Such a strategic leadership approach is complemented by supervisory leadership approach, where the latter is focused on the dyad relationships and on the organisation lower levels tasks and individual performance (House & Aditya, 1997). The **strategic leadership** approach is ideally focused on a collective or shared or distributed leadership approach (Carson et al., 2007), which is referred as connected leadership (Martin et al., 2007) and not based on a single individual (House & Aditya, 1997). As a result, an effective leadership style needs to be instituted at all levels of the organisation (Deming, 1986; O'Reilly et al., 2010) and shifts to an interdependent leadership style (McCauley-Smith et al., 2013).

On the other hand, the **individual leadership** approach, from the literature, refers to the industrial era, based on hierarchical structures, where the leadership theories were focused on the individual leader (Gronn, 2002), using the tripod ontology: leader, follower and common goals (Bennis, 2007). Ideally, the contemporary shared leadership approach constitutes the way forward to meet the current and dynamic competitive environment, through corporate intelligence (McKelvey, 2001). With such a corporate wide intelligence approach, based on both a knowledge and a learning environment, needs to be deployed so as to exploit all organisational stakeholders' contribution for both strategic leadership and organisational effectiveness (Boal & Hooijberg, 2000). Though, it cannot be excluded that the current leadership theories, in reality are not adopting the shared leadership approach, but are still embedded in the individual leadership approach, due to the past leadership experiences and cultural influences from the industrial era (Gronn, 2002). Furthermore, the extant literature clearly takes into account the pervasive influence of the individual leadership approach due to the leading role that top management takes on all the people across all management levels (Tsui et al., 2006; Ling et al., 2008).

The research findings complements the two leadership approaches referred within the literature, since from the emerged theory, there exists a variation of the leadership approach within the IMLA. The IMLA variation from the findings imply that at one end, there is both the strategic and the supervisory leadership approaches, based on a shared leadership style, where the leadership stance incorporates all management levels and key SC actors. At the other end, there is the single centric or individual leadership approach, where the leadership style is mainly focused on the top management team. As a result, the findings mainly outline that the focal firm establishes the business, manufacturing and SC strategies, either through a shared leadership approach, in line with the IMLA through the involvement of all relevant management levels across the command chain in-conjunction with all key SC actors or else such strategies are only established by the top management team, through an individual leadership approach, by implementing the IMLA between top management only.

Four participants distinguished and explained the strategic leadership approach, through a shared leadership style, as follows:

> *'Workers are involved in all decisions'; '... to empower their responsibilities across all departments'* (1/INT2);*'...leadership is very effective at all levels such as strategic, tactical and operational'* (3/INT 4)*; 'Leadership style is like the glue to match all management levels together'; '... employing an open door policy, within the focal firm and a controlled open book, with all external entities'; 'To make all ends meets, one needs to remain in [his/her] tip toes, to ensure that all processes are integrated'* (5TS/INT2); and *'I [as CEO] fully involve myself to lead by example'* ; *'We delegate both upwards and downwards'* (8TS/INT4).

One participant outlined the individual leadership approach as follows:

> *'... All starts from the top management direction, from the Directors ... They decide the direction and create new policies. I start my work from the policy onwards ...'* (5/INT6).

With such an organizational leadership perspective, the findings also substantiate that such an integrated leadership approach is not only applicable within the focal firm but also within the SC context between different SC actors. Such a statement adds to a new conversation to the leadership theory within the SCM literature beyond the SC dyad.

The findings further denote that the leadership approach incorporates the necessary strategic decisions to determine on how to effectively lead all operations, both within the focal firm, at all management levels, together with all of its stakeholders across the SC. Such an approach is determined by both the manufacturing and the SC strategies in-conjunction with the holistic SCI management approach, to ensure that the focal firm with all of its stakeholders meet both the collective SC goal and all the SC members' individual goals, in line with the tripod ontology (Bennis, 2007). Though, it cannot be excluded, that the findings also outline that, as defined by the holistic SCI management approach foundations, the focal firm deploys a change management and an innovative approach on how to lead effectively through effective knowledge management and joint collaborative initiatives with all stakeholders, as defined by McKelvey's (2001) corporate intelligence, and at the same time promote an effective strategic leadership approach beyond the focal firm, as defined by Hunt (1991) and Finkelstein and Hambrick (1996), so as to manage effectively the overall SC. Such findings also expand on the strategic leadership literature within SCM. The importance to go beyond the focal firm and undertake knowledge sharing initiatives was described by one participant, who stated that:

> *'Knowledge sharing is function of SC member (who he/she is). One must share, otherwise we cannot work'* (8TS/INT4).

7.4.1.3 The IMLA Four Leadership Traits: Transformational, Transactional, Servant and Situational leadership styles

Based on the seminal work on leadership theories, between leaders and followers, which also fall under strategic leadership approach, are the **transformational leadership** and the **transactional leadership styles** (Burns, 1978; Bass, 1985; Bass & Avolio, 1994, 2000). Bass and Avolio (2000) outlined the five basic components of **transformational leadership** (Section 2.6.3.2.3): idealized attributes and idealized behaviours, inspirational motivation, intellectual stimulation and individualized consideration, which together focus on the leaders and followers relationships and also promote social responsible business practices, which are pivotal in today's institutional environment to promote social sustainable operations.

The findings complement such two leadership theories, especially the **transformational leadership** style, since the IMLA is mainly based on a continuous improvement approach based on change and innovative initiatives to transforms teams (i.e. intellectual stimulation) and not only focuses on formal structures and systems, so as to promote flexibility and accepts a controlled level of informality to adapt to today's business dynamic business climate. The IMLA key focus is to develop the human capabilities (i.e. individualized consideration) and the relationship approach between leaders and followers (i.e. idealized influence attributed) based on sound ideals and values (i.e. idealized influence behaviour) and to motivate all people at all management levels, both within the focal firm and across the SC (i.e. inspirational motivation), which adds to the conversation focused on the key foundations of the transformational leadership style and to the SCM theory on leadership. Such a leadership approach was explained by five participants in this way:

> *'... we share the project works and innovative ideas ..'* (1/INT 1); '*We are flexible to meet changes, to meet new customers' specs'* (1/INT 2); *'We are shifting to new technology (3/INT4); and 'Continuous change is the firm policy'* (5/INT 6); and *'R & D is integrated with the plant, so that all manufacturing is backed by a strong team of expertise from R & D'* (8TS/INT4).

From the literature, the **transactional leadership** approach is the most pervasive used approach with a set of established objectives and tasks as an exchange process between the superiors and the subordinates based on reward or punishment vis a vis performance (Burns, 1978; Bass & Avolio, 1994; Bass, 1997). From the findings, the holistic SCI management approach needs to the transactional leadership style to optimise and align all processes, within the focal firm and outside it with all of its stakeholders. Such a stance can be achieved by employing all the necessary measures under the holistic SCI management approach. Basically, such a holistic process meets the routine flow of transactions in line with the established performance measures, such as KPIs, among other measures, to mention a few, such as planning, auditing and risk management to promote an effective customer service among other competitive capabilities (Figure 6.1). Such findings add to the conversation on the transactional leadership style theory and to the SCM theory on leadership. Such a routine flow of transactions with their measurements was referred by one participant as follows:

> *'We measure and discuss everyday all operations'; and '[Firm] performance is also measured and service issues are being measured and gaps identified to ensure improvement'* (1/INT2).

From the literature, Greenleaf (1970) also introduced the concept of the **servant leadership** where his theory advocates that a leader's primary motivation and role is that as a service to others, which as a result leads to successful outcomes. Such a theory is also complemented by the findings, since the IMLA, includes instances where leaders employ a more sensitive approach to human needs by showing exceptional caring behaviour to meet individual requirements such as for health problems or special requests for support to undergo dedicated training for self-development. Such findings add to the conversation on the servant leadership theory and to the SCM theory on leadership. Such a management concern for people was explained by two participants, who stated that:

> *'Human resources is not so dignifying, since they are not resources but people as individuals'; 'People respect you as you respect back'* (9TS/INT6); and *'.... the human element remains key to establish a long term relationship [with SC actors]...'* (17TS/INT 14).

The **situational leadership**, which falls under the umbrella of contingency theory of leadership (Fiedler, 1967; Lawrence & Lorsch, 1967; Thompson, 1967; Hershey & Blanchard, 1969), shifts from the leadership traits or behaviour to contingencies of the situations, where different leadership styles are needed to meet each unique situations. From the findings there exist situations where such contingency measures are taken, as a result of unforeseen bottlenecks or risks originated from both internal and/or external sources, attributed to the various members' differences in values and/or deviations in their commitments, so as to recover from these shortcomings and maintain the expected level of performance (e.g. pre-booking of stock due to stock shortages or to meet unforeseen delays in deliveries). Such findings add to the conversation on the situational leadership style theory and SCM leadership theory. Such a situational/contingency leadership approach was sustained by two participants, who stated that:

> *'Risk is a key issue, since business continuity is done and is catered by pre-planned actions for all type of contingencies'* (14TS/INT11); and *'... hence contingency measures need to be taken to bypass such a failure'* 15TS/INT12.

From the findings, the emerged theory denotes that the IMLA incorporates all the above listed four leadership styles to achieve the SCI approach, both within the organisational context of the individual SC actors and also in their inter-organisational relationships across the SC. Such leadership qualities are described as: transformational leadership style, to meet change and innovation through people; servant leadership style, to be sensitive for people's needs and also to meet the business objectives; situational leadership style, to meet contingent situations; and transactional leadership style, to meet the routine flow of transactions in line with the established performance measures. Such an emergent theory extends the leadership contemporary conversation within the both leadership and SCM literatures, since it sustains the strategic leadership theory by outlining that the established leadership theories within the organizational context are also applicable to the SC context.

7.4.1.4 The IMLA's collaborative types (close collaborative and arm's length) & processes

From the SCM literature, as referred in Sections 2.6.3.1.3 and 2.6.3.3.1, there is the need to identify which SC links need to be managed, since it is challenging and may not even render feasibility, to manage all SC links unless they are key business processes (Lambert et al., 1998). The management approach varies from one SC member to another, with a continuum based on close collaboration (e.g. key business entities) to an arm's length (e.g. one-off suppliers).

From the findings, the SC and manufacturing strategies determine the relationship to be adopted with all of its stakeholders. The manufacturing strategy through its 'make' or 'buy' decision, establishes the most feasible approach to promote effectiveness and efficiencies with all of its stakeholders. The SC strategy determines how the focal firm engages with each SC actor, such as through close collaborative efforts or arm's length relationships, depending on the role assigned to each SC actor vis a vis the focal firm manufacturing operations. The referred findings add to the conversation within the SCM literature within manufacturing. Such collaborative types, was explained by one participant, who stated that:

> *'We have suppliers of the compressors, as the core activity … these suppliers are partners and have an in-depth relationship, based on years of experience and history record …. but others are referred as suppliers, that give us commodities products and may be new suppliers. You need to pay before you purchase for such suppliers …'* (5/INT6).

From the literature, the SCM processes may be classified into two types: physical and technical management components and managerial and behavioural management components (Lambert et al., 1998), which implied that such a dual approach is needed for an effective management approach. The scope of the management approach across the SC is to manage from a holistic perspective all SC actors, even at the expense to sub-optimise the individual performance of one or more SC members for the common good of the overall SC (Cooper et al., 1997). The role of the management is to ensure that all SC members, especially buyers and suppliers, through operational linkages, need to have in place 'the systems, procedures and routines that facilitate the more effective flow of goods, services and information' (Cox et al., 2003, p.137). Furthermore, they also added that such linkages 'can extend beyond a single dyadic relationship and operate across many exchange partners within the supply network' (Cox et al., 2003, p.137).

From the findings, the IMLA with the manufacturing and SC strategies in-conjunction with the holistic SCI management approach, manages effectively, from both an engineering and management perspective. The manufacturing strategy, with the IMLA adopted by team leaders and knowledge workers, need to deploy both advanced manufacturing processes, to achieve high value-added manufacturing, in line with the required technical engineering manufacturing standards (e.g. ISA) and product quality standards (e.g. ISO, GMP and BSI) and also to deploy all the necessary managerial practices to manage the human element effectively. The SC strategy, with the IMLA adopted by team leaders and staff, need to manage effectively with all of its SC actors, through the holistic SCI management approach, through the established collaborative initiatives between all people within the focal firm and across the SC, to meet each other' commitments, even at the expense of a win-lose situation of anyone from the SC actors. Such findings complement both the technical and management components outlined by Lambert et al. (1998), also sustain the arguments by Cooper et al. (1997) win-lose situations and finally highlights the importance of all operational requirements needed by all SC actors as referred by Cox et al. (2003), since in case of the latter, the findings extends this theoretical argument by outlining the need for holistic SCI management approach being based on a set of systems, procedures and routines as established by the sixteen measures under the holistic SCI management approach, as referred in Figure 6.1. The HVM based on a holistic SC process approach for the common good of all SC actors, was explained by one participant who stated that:

> *'Quality is an integral part of the model and cannot be separated from the SC and manufacturing process'; 'The product is not high value added but we use high value manufacture'*; and *'The various stakeholders are after the same criteria but these may be in conflict with their individual targets/criteria'* (6/INT8).

7.4.1.5 The IMLA vis a vis SCI and performance

With a focus on the leadership concept, within the inter-organisational SC context literature, as referred in Sections 2.6.3.3.1 and 2.6.3.4.2, it was established that the leadership strategies are pivotal for SCI and performance (Whipple & Frankel, 2000; Osborn & Marion, 2009; Shub & Stonebraker, 2009). From the findings, the IMLA, clearly substantiate that the leadership strategies contribute to both the achievement of SCI, being the core theme of this study and also to performance, as referred in Figure 6.1, with the model outcome, being made up from a comprehensive set of eight competitive capabilities, where one of which is effective and efficient performance. Such research findings extend all the cited scholarly work theories, referred above, meaning that leadership strategies contribute to SCI and performance.

7.4.1.6 IMLA's collaborative initiatives: cooperative/non-coercive and aggressive/coercive strategies

The management and leadership approach across the SC is very challenging, since all SC actors are independent entities and not as a single organization (Lambert et al., 1998; Sydow et al., 2011). The priority assigned to establish which SC actors are to be managed effectively, is guided by the stakeholder salience within the stakeholder theory, meaning that the SC actor is treated according to the **power type**, the **established requirements** and the **urgency of the request**, to meet both static and dynamic commitments (Mitchell et al., 1997). The power concept within the leadership literature is considered as a key source of control by influencing the people's behaviour (French & Raven, 1968, Mullins, 2005). Co and Barro (2008) builds on Mitchell et al.' s (1997) attributes and typologies of the stakeholder theory in supply chain collaboration, to establish whether the focal firm should deploy a **cooperative** or **aggressive** collaborative strategy with the other stakeholder (Section 2.6.3.3.2). The collaborative strategy selection depends on above three criteria so as to decide for most fruitful outcome and at the same time build or sustain the established relationship without failure. Yeung et al. (2009) supports such a theory by labelling the two collaborative strategies as **non-coercive** and **coercive power** approaches.

From the findings, the emerged theory is being refined by the terms used within the literature, meaning that to achieve SCI the collaborative initiatives within the IMLA need to adopt a cooperative/non-coercive approach, which is away from any forced imposition of an aggressive/coercive approach (Co & Barro, 2008; Yeung et al., 2009). From the findings, the latter approach needs to be adopted only as a final resort, after the cooperative approach fails to achieve the expected results, not to disrupt the relationship. The research findings extends Co and Barro' s (2008) lack of trust dimension as a key condition associated with the adoption of an aggressive approach, by including the final resort condition which serves as an added decision criteria. Such a finding adds to Co and Barro's (2008) aggressive strategy in supply chain collaboration, based on the stakeholder theory. This option was explained by a participant who stated:

> '*Even when problems exist, I try to coordinate in a positive approach not to demolish relationship, like a give and take situation'* (3/INT4).

Furthermore, from the leadership literature, within the SC context, as referred in Section 2.6.3.3.5, the nature of the cooperative strategy is function of the SC actors' power symmetry to asymmetry continuum (Cox et al., 2003; Hingley, 2005; Chicksand, 2015), since such a power difference between the dyad, determines the level of trust. The trust decreases inversely proportionally with such power difference between SC actors (Huxham & Beech, 2008). From the findings, the focal firm needs to establish dedicated collaborative initiatives with all of its SC stakeholders. Furthermore, the findings outline that such relationships vary from an arm's length to a close collaborative approach, depending on the nature of the product and the role assigned to each SC actor, in line with the contemporary literature except that the literature uses the terms non-adversarial and adversarial relationships to demonstrate the continuum of such a relationship variation (Cox et al., 2003; Hingley 2005; Chicksand, 2015). In this case, the literature refines the emerged theory on IMLA based on an arm's length to a close collaborative approach, in the collaborative relationships with SC actors, since the relationship may take the form of either a non-adversarial or an adversarial relationship.

The findings also complements Cox et al.'s (2003) framework, referred in Figure 2.3, since there exist cases from the data, when suppliers are power dominant (i.e. supplier dominance) and the focal firm needs to accept de facto the assigned **contractual terms and conditions**, and there are also other cases when suppliers engage in a deep commitment to work together with a power sharing approach and even invest their resources within the buyer premises. Similarly, from the data, the focal firm may have relatively higher power than its stakeholders (i.e. buyer dominance), and determines the contractual terms and conditions, which the supplier needs to accept. Furthermore, from the data, there also exist other cases where the focal firm engages with a power sharing and with an interdependent approach and invest within either the supplier or customer premises and vice versa. Such an emerged theory also corroborates Chicksand's (2009) buyer-supplier power matrix, as referred in Figure 2.2.

Within the literature, the cooperative strategy is more appropriate: for change management; to demonstrate the interdependence; and as a sign of contribution of benefits to each other (Co & Barro, 2008). The emerged theory extends the outcome of a cooperative strategy within the literature, by underscoring the scope of such a cooperative strategy by two other objectives: to undertake a continuous improvement (Section 6.3.1) and to meet the everyday challenges, being both IMLA properties through, SC flexibility (Section 6.3.4), since the change management objective is in line with the literature. Such a finding from the study extends the knowledge on the cooperative strategy approach referred by Co and Barro's (2008) paper and hence contributes to the SCM literature.

7.4.1.7 The IMLA's human element from a social sustainable perspective within the SCM literature

From the SCM literature, it is currently considered pivotal that organisations need to undertake the necessary investments in all human resources for social sustainable practices, through training, performance evaluation and rewards (Jabbour et al., 2010; Wagner, 2013), since within the global business it is a must to have the right people with the appropriate skills and talent (Rothwell, 2002; Sarkis et al., 2010; Tarique & Schuler, 2010; Xu & Thomas, 2011). Such an approach is taken since the role of people with the right human resource management is crucial to the success of the SCM approach (Ashby et al., 2012; Ellinger & Ellinger, 2014). Management also needs to safeguard the employees' health and safety and their equal treatment (Leire & Mont, 2010). Though, it cannot be excluded the key role of the human element in all problem solving and critical thinking abilities, since humans are able to process information with an amazing efficiency and often perform better than the most highly sophisticated machine (Kuhn, 1999; Halpern, 2003). Within the SC context, the human resource strategies such as the role of the human resources activities (e.g. training) and organisation variables (e.g. structure), through the transaction-based (e.g. efficient processes) and emerging relationship-based (e.g. employee loyalty and commitment) respectively, were all proposed theoretically to contribute to SCI and performance (Shub & Stonebraker, 2009). The human element knowledge also enables SCI through the people's capabilities to understand all the changes needed to adapt, in a flexible way, to all requirements and to meet all competitive performance measures (Gowen & Tallon, 2003; Gunasekaran et al., 2008; Cheung et al., 2012; Ellinger & Ellinger, 2014).

From the findings, the basic attributes and values of the IMLA, as referred in Section 7.4.1.3 above, consists from the four leadership traits. These leadership styles are mainly focused on the human element, where managers and leaders exercise their roles to meet the dynamic and challenging business objectives. The leadership styles need to employ the necessary management and leadership skills based on a substantial level of charisma, empathy and ethical behaviour, to win people's commitment, motivation and trust. Such a stance is needed to serve as a spring-board in all synergies between all staff at all management levels, both within the intra- and inter-organisational interactions. The IMLA takes roots in the human relationships gained over the years of experience and engagement, both within and outside the focal firm. The human element plays a pivotal role in the management of all operations, since it forms up the backbone of all the collaborative initiatives within the focal firm and SC actors' activities. Staff within the focal firm needs to be safeguarded against all hazards, trained and updated with all strategic changes and innovative developments, to enhance their capabilities and build on a trustful relationship so to promote engagement, involvement and commitment in all challenges. The human element collaborative initiatives, within the focal firm and with all SC stakeholders, consist from sharing of ideas, information and knowledge on the SC and manufacturing processes and in meeting all needed changes, due to in-built human flexibility and competence capabilities, even where the manufacturing processes incur a high level of automation (e.g. the human element role may still be crucial even if s/he only performs the interface part within one automated process to another). Such findings add to the conversation on the role of the human element and the leadership theories within the SCM and manufacturing literatures. The important role of the human element was explained by three participants who stated that:

> *'There exist processes and products that still need humans' intervention'; 'Machines do not cater for all activities'* (4/INT5)*; '... the manual approach can adjust for variations [better than machines]'* (6/INT8); *'If you miss the knowledge from people, you may miss the product success'; 'We work as a family'* (8TS/INT4).

Furthermore, the findings indicate that the human element performance depends on the way people are treated, appreciated and respected by each other in an honest approach, independent from the management level and/or position within the firm and also in the way management invests in the human resources self-development through training. Management and leaders may lack the human appreciation of the employees' contribution, since there may exist a management and technical divide. Such an outline of the emerged theory, associated with the human element, also corroborates the referred literature outline associated with the human element (Section 6.3.1), which adds to the conversation on the pivotal importance of people within the SC context. The human element performance is function of the management respect as highlighted by two participants who stated that:

> *'We believe in respect to all and between all'* (8TS/INT4); and *'Human resources is not so dignifying, since they are not resources but people as individuals'; 'People respect you as you respect back'* (9TS/INT6).

The role of the people was also underscored within the manufacturing strategy literature as one of the four infrastructure decision areas that contributes to the operations strategy (Hayes & Wheelwright, 1984; Hayes et al., 2005). Furthermore, from the organisational literature, transformational leadership drives people to see the deeper purpose in their work, treats them as unique and valuable human beings, and instils in them a belief in what the leader is trying to achieve (Ardichvili & Manderscheid, 2008). Such a view is also substantiated by Bass and Avolio (2000) where people's needs are considered before the leader's needs with a deep belief in moral and ethical concern and with a motivational climate to adopt an innovative approach in the way of doing things.

From the referred human element findings outlined above, through the rich insight and detailed account, as referred in Sections 6.3.1 up to 6.3.6, the findings contribute to HRM discipline within the SCM, organisational and manufacturing literatures respectively. The emerged theory focuses on the role of the human resources activities of both the intra- and inter-organisational relationships, which are pivotal for the success of the manufacturing and SC operations, since the literature on the social element or the human element, regarding the labour, skills and the forming of relationships, are a neglected area of research (McCarter et al., 2005; Shub & Stonebraker 2009; Ashby et al., 2012; Lengnick-Hall et al. 2013). One participant explained the pivotal importance of the role of the human element within manufacturing, who stated that:

> *'Mistakes occur, when equipment and software are excellent, but they remove the human element from it ...'* (4/INT5).

Furthermore, the emerged theory, as refined by the literature, outlines that such a relationship approach between people, must not be based on a coercive or aggressive approach, but must be based on a unity and an understanding culture based on a cooperative approach, as referred in Section 7.4.1.6 above. As a result, a cooperative approach between the SC actors, from the emerged theory, promotes a sense of community with a dedicated concern for all mutual relationships and creates a motivated workforce based on cross-cultural trust, that enable a holistic SCI management approach of the overall SC and manufacturing operations, with the contribution of all the SC stakeholders for a win-win outcome. It is to be noted that circumstances may also exist, when anyone of the SC actors may end up to a win-lose situation in any particular transaction, but still retains the position and the obligations within the SC, not to lose the trustful relationship built over time between people and looks forward for the future win-win outcomes. Such an emerged theory supports the literature since the SC inter-firm relationships may either lead to a win-win or win-lose outcome or a level of imbalance of distributed benefits (Cox, 2004d; Hingley, 2005; Claycomb & Frankwick, 2010; Terpend & Ashenbaum, 2012).

7.4.2 Business strategy and the IMLA within the supply chain context

From the literature, due to the nature of the study, being focused on the SME manufacturing sector, the terms corporate and business strategies were assumed to be common terms (Section 2.6.4.1), due to the relative small size of the firms within the research (Thompson et al., 2005). The business strategic management approach consists from three management levels that covers the strategic, tactical and operational levels, and needs to unify all functional areas together with all SC members with their capabilities and limitations (Skinner, 1969; Stonebraker & Afifi, 2004; Swink et al., 2007).

From the findings, as already defined in Sections 6.2 and 7.3.1, the IMLA serves as a driver for the focal firm strategic, tactical and operational management levels, so as to formulate the business strategy, even by considering the SC actors requirements, once a shared leadership approach is adopted based on a strategic leadership style. Such findings complement the literature focused on the strategic management literature and also contribute to the leadership theory within the business strategy and SCM literatures.

From the literature, the operations strategy of the focal firm refers to the firm's business strategy implementation, with a continuous improvement approach of all operations and with an integrated SCM approach, to achieve a sustainable competitive advantage, by focussing on the entire SC (Narasimhan & Carter, 1998; Chen & Paulraj, 2004; Lummus et al., 2008).

The findings complement the operations strategy literature, since as already referred in Section 7.3.1 and 7.4.1.3, the IMLA, especially through the transformational leadership style, adopts a continuous improvement approach based on change and innovative initiatives, to transform teams (i.e. intellectual stimulation) and not only focuses on formal structures and systems, so as to promote flexibility and accepts a controlled level of informality to adapt to today's business dynamic business climate to promote competitive capabilities. Such findings also add to the operations strategy conversation within the SCM context.

From the literature, the strategic management approach is based on the inter-relationship between the strategic analysis (i.e. understands its environment and its strategic capabilities), strategic choice (i.e. gather all relevant information), strategic fit (i.e. to decide effectively on the best option) and strategy implementation which determines the focal firm competitive advantage (Johnson & Scholes, 1999) (Section 2.6.4.1). The scope of the SC to meet its competitive capabilities is needed since those SCs that lag behind and fail to deliver the value will lose in the competitive market (Cox, 1999).

From the findings, the business strategy in-conjunction with the manufacturing and SC strategies respectively determine the strategic fit of the overall SC, as referred in Sections 7.4.3 and 7.4.4, after undertaking the strategic analysis and choice. With the overall three strategies in place, with the holistic SCI management approach, promotes the overall competitive capabilities. Such findings complement the literature focused on the strategic management (Johnson & Scholes, 1999).

7.4.3 Comparison of the manufacturing strategy emerged theory within the extant literature

7.4.3.1 High value manufacturing and sustainability within SMEs

From the extant literature it was established that for developed countries, with high cost economies, such as Malta, SMEs within manufacturing are adopting HVM practices, based on the triple bottom line sustainable practices in all processes, both within manufacturing and also across all SC operations, so as to achieve competitive advantage (Martinez et al., 2008; Technology Strategy Board, 2012). The SC entities forming up the SC need to be integrated as a single entity (Chan et al., 2003; Sanders, 2007) and wherever possible focus on virtual integration rather than vertical integration to optimize the use of all core and distributed resources to form a single holistic SC (Prahalad et al., 1994; Power 2005; Wang & Wei, 2007; Gunasekaran et al., 2008). The term sustainability today integrates social, environmental and economic responsibilities (Elkington, 2002; Bojarski et al., 2009; Buyukozkan & Berkol, 2011; Gimenez etal., 2012; Lee et al., 2012; Caniels et al., 2013; Glover et al., 2014).

From the findings, the current approach being adopted by SMEs, within the Maltese manufacturing, is to ensure that all SC actors forming up the SC build on each other' value added operations with high quality (e.g. ISO) and professional engineering (e.g. ISA) standards respectively and with the right provisions for sustainable practices, so as to promote a competitive approach based on holistic value-proposition to the customer. The manufacturing operations trends, in line with the literature, are to focus on virtual integration rather than vertical integration, with value-added manufacturing to gain from outsourcing manufacturing efficiencies based on integrated initiatives and make use advanced manufacturing techniques in line with HVM, so as to operate as a one holistic SC. Contextual circumstances for one firm, within the data, favoured the in-house option of a particular manufacturing process and had to vertically integrate locally that upstream side process, to improve on the overall performance. This emerged theory corroborates with the manufacturing literature and adds to the contemporary conversation on manufacturing strategy and SCM literatures and also emphasizes on the importance of HVM.

7.4.3.2 Manufacturing Strategy and Supply Chain Strategy for the SC competitiveness

From the extant literature, the manufacturing strategy determines the type of SC strategy to be adopted with all SC actors. The manufacturing strategy needs to decide whether a manufacturing process is kept in-house or is preferably outsourced (i.e. make or buy) to sustain its competitive advantage (Harrigan, 1985; Klein, 1988; Bajec & Jakomin, 2010). This strategic decision may either be based on the core competency of the focal firm (Cox, 1999), where the core activities are performed in-house and peripheral activities are outsourced, in line with the resource-based view (Barney, 1991), so as to exploit the resources of the focal firm and of its suppliers to improve on the overall competitiveness (Cox, 1999; Baloh et al., 2008). The other option may be based from a cost efficient rationale by the focal firm, in line with the transaction cost analysis (Williamson, 1985), to exploit the cost of operations of the focal firm and of its suppliers to improve on the overall competitiveness (Williams, 1985; McIvor, 2010). In reality this decision is multifaceted since it is function of a complex set of other contextual conditions, such as suppliers' availability, focal firm's products portfolio and/or capacity of production, sector type and proximity of suppliers.

The findings complements the literature by outlining that the manufacturing strategy is function of the make or buy decision, with their relative advantages, as referred in Section 6.3.3. Such a decision has a direct effect on the SC strategy approach to be adopted, since it establishes whether to go for vertical integration (i.e. make) or virtual integration (i.e. buy), as referred in Section 7.4.4.1. The data outlines that such a decision is very complex and has a quite comprehensive laundry list which is also based on several contextual conditions of each firm to determine the final decision, in particular, whether the focal firm shall make or buy a specific part of the manufacturing operations strategy. Such findings not only complement the literature but adds to the conversation, since it was established various conditions that determine the make or buy manufacturing decision, together with the SC strategic options, based on either a vertical integrated or a virtual integrated approach respectively with the engaged SC actors, to determine all the needed actions to achieve the SC competitive capabilities.

7.4.3.3 The IMLA and the manufacturing strategy for a competitive strategy

From the extant literature, the value proposition for a competitive strategy is mainly based on a set of priorities and trade-offs based on a top-down management approach with right manufacturing policies which are linked to the competitive and strategic facts in line with Skinner (1969)'s focus on the importance of the manufacturing strategy to competitiveness and Hayes and Wheelwright's (1984) best practices (Section 2.6.5). Skinner (1969) also focused on the importance of the manufacturing leadership practices to pursue the operations strategy, which were later followed by the two manufacturing strategy categories, dedicated to the structural decisions and infrastructure decisions areas (Hayes & Wheelwright, 1984; Hayes et al., 2005). Furthermore, management commitment is dedicated to streamline and align the manufacturing strategy in line with McKinsey 7-S model seven elements, namely strategy, structure and systems (hard elements) and the shared values, skills, style and staff (soft elements) (Waterman et al., 1980). The key management focus, with reference to the 7-S model, is the people shared values to promote unity and teamwork, where the human element is given a pivotal role within the strategic implementation process, as clearly established in the literature, that people are a key and invaluable asset (Rothwell, 2002; Tarique & Schuler, 2010; Xu & Thomas, 2011).

From the data, as referred in Sections 6.3.1 up to 6.3.6 and Section 7.4.1.7 above, the IMLA, gives crucial importance to the effective management of people, which is synonymous to the shared value element referred in the 7-S model. This is further emphasized in the findings with the deployment of the shared leadership approach both within the focal firm and across the SC. Such an emerged theory can be clearly seen, both from a manufacturing perspective, in the processes coordination initiatives between various people from different functional areas and also from a SCI perspective, by both intra- and inter-organisational synergies and work practices. Such an emerged theory adds to the contemporary knowledge on the pivotal role of manufacturing leadership, as referred by Skinner's (1969) and Hayes & Wheelwright's 1984 scholarly works, and at the same time addresses the gaps of leadership practices within the context of manufacturing literature (Liden & Antonakis, 2009).

7.4.3.4 The manufacturing strategy and the operational capabilities

From the extant literature, the manufacturing strategy is directly linked to the SC integrated activities of both upstream and downstream to link all stakeholders with the focal firm (Ragatz et al., 1997; Flynn et al., 1999; Frohlich & Westbrook 2001; Paulraj et al., 2008; Flynn et al., 2010) to meet the key operational objectives of cost (i.e. quality and features), dependability (i.e. on specifications, time and service), quality (i.e. process quality) and flexibility (i.e. product and volume) (Flynn et al., 1999). Furthermore, it was referred in both the a priori and post literature reviews, that in today's industry, the manufacturing is based on lean and agile manufacturing with a broad focus on competitive operational capabilities with special attention on responsiveness and flexibility (Yusuf et al., 2002; Gunasekaran et al., 2008; MacBryde et al., 2013) and innovation (Binder et al., 2007).

From the emerged theory, the empirical based theoretical model, referred in Figure 6.1, represents the operational objectives with two key competitive capabilities outcomes, namely effective and efficient performance and SC flexibility. Furthermore, the literature supports this study theoretical model by giving a comprehensive outline of all the referred operational objectives, as indicated in the literature above, since it is pivotal for the manufacturing process to meet the low cost, right delivery time, high quality and flexibility objectives to achieve the overall SC competitive capabilities. Such a literature is used to refine the emerged theory outline on theoretical model competitive capabilities outcomes, vis a vis the operational performance outcome, as referred in Section 7.4.7, with refined SCI theoretical model in Figure 7.2.

7.4.3.5 The servitization of manufacturing

From the literature, the competitive manufacturing scenario need to be seen within the context of European Technology Platform (ETP), through the 'Manufuture' report and the Community Research and Development Information Service (CORDIS), under the EU funding programmes for research projects, through the 'Horizon 2020 framework programme for research and innovation' such as 'Manutelligence', where all contextual manufacturing effort is being focused on a product-service emerging trend based on servitization of manufacturing (Lightfoot et al., 2013) or integrated solutions of manufacturing (Davies et al., 2006). From the emerged theory, the product-service emerging trend is supported by the data and it is to be noted that the product type determines the nature of the relationship with the customer, since the sectors which included higher value-added products, the more are the dedicated customer service measures, which result in a more in-depth servitization approach. Such a statement extends the work focused on the servitization of manufacturing within the extant literature. The emerged theory (Figure 6.1) has the effective customer service as one of its competitive capabilities.

7.4.4. Comparison of the SC strategy emerged theory within the extant literature

7.4.4.1 The IMLA within the SC Strategy with its virtual enterprise approach: Vertical or Virtual Integration

From the literature, the SC strategy is concerned with the integration and coordination decisions within the focal firm in-conjunction with the set-up to be implemented with all SC stakeholders (Gunasekaran et al., 2008; Green et al., 2014) to achieve competitive capabilities (Kim, 2009). The SC strategy also needs to adapt and structure its resources to effectively align to the changing competitive conditions (Thompson, 1967; Hofer, 1975; Kim, 2009). Such SC foundations due to the variation in conditions, implies that a contingent model needs to be adopted to fit each business situation (Stonebraker & Afifi, 2004). The new emerging manufacturing paradigm, is being referred to as high value manufacturing (HVM) based on the virtual enterprise (VE) concept (Shi & Gregory, 2005; Livesay, 2006; Martinez et al., 2008). This management paradigm shift incorporates a change from vertical integration to virtual integration (Prahalad et al., 1994; Power, 2005; Gunasekaran et al., 2008), based on unity of efforts, to optimize the use of all core and distributed resources to form a single holistic SC.

The findings extend the contemporary conversation on SC strategy since it serves as a platform for the manufacturing strategy so that through a holistic SCI management approach, achieves the overall SC competitive capabilities. The findings also outline that the SC strategy needs to be established in-conjunction with the manufacturing strategy and in view of today's competitive scenario, the SC is normally based on virtual integration rather than vertical integration, in line with the literature from both the SC strategy perspective, as already referred above, and from the manufacturing strategy perspective, as referred in Section 7.4.3.1. Though, cases still exist from the evidence within the data, where vertical integration needs to be incurred so as to overcome the problems associated with particular SC actors, as referred in Section 7.4.3.1. As a result such an emerged theory gives a more complete picture of the SC strategy to that referred in the literature. Such different situations, as indicated by the data, imply that the SC strategy is not a one-size-fits-all approach, whereby such a statement corroborates with the SC strategy literature on the need to take SC contingency measures (Stonebraker & Afifi, 2004) such as vertical integration, to optimise its operations. Furthermore, the findings sustain the literature both on the contingent approach, through the situational leadership style, and also on the HVM approach, with its virtual enterprise concept, through the strategic leadership style by involving all SC actors, based on the IMLA. Such findings sustain the applicability of the IMLA to meet different SC strategic scenarios within the SCM literature and also add to the leadership theory within the SCM literature.

From the literature, the focal firm needs to employ a cost/benefit analysis to establish the feasibility of the way forward, since SCI is risky and may not be appropriate in all situations (Stonebraker & Afifi, 2004). The SC strategy needs to decide on how to gain from the optimum performance from each SC members so as to eliminate the risks associated with sub-optimisation effect that may result from friction between SC actors optimal (Cox et al., 2004a; Narayandas & Rangan, 2004). The way forward is not to blindly employ an integrated approach with all stakeholders, but to understand the power struggle over the appropriation of value between all SC actors at every point of the SC with their relevant contextual conditions and with due consideration of all competitors in the market and then decide the type of relationship to be deployed with each SC member (Cox, 1999). The pivotal role of employing effective relationships has also been supported by key management gurus, such as Peter Drucker (1999), who advocated that business growth and expansion have to be based on alliances, partnerships, and all kind of relationships.

The findings imply that the SC strategy apart from establishing the type of relationships (Section 7.4.1.4), also needs to set-up the necessary terms and references of all contractual commitments to determine the cost/benefit of each engagement through the contractual terms and conditions with all SC actors, as already referred in Section 7.4.1.6. Under both the vertical integration and especially in the virtual integration approaches, due to the difficulties to manage the external SC actors, the focal firm SC strategy, with the holistic SCI management approach (Section 7.4.5.2), needs to employ all the necessary measures, to align and optimise the overall SC performance. Such findings complements the literature focused on SCM and SCI, since the focal firm needs to unify all SC stakeholders' individual objectives to be balanced effectively to achieve optimised overall operations, through either vertical or virtual integration, since the effectiveness of the overall SC strategy depends on the success of the individual strategies of all SC actors.

7.4.4.2 SC strategy design to fit different manufacturing sectors

From the literature, the SC strategy is a complex concept in the SCM literature (Rose et al., 2012) and consists of both a strategic and operational capabilities and with their alignment (Cox, 1999; Kim, 2009) function of the contextual conditions (Cox, 1998). Due consideration needs to be given to the type of product (i.e. functional or innovative type) to achieve a strategic fit by matching the appropriate SC design based on either a manufacturing approach with efficient processes or a marketing approach with responsive processes (Fisher, 1997), as referred in Section 2.6.6.2. From the findings, the firms covered both functional and innovative types of products, though from the data, a certain level of innovation was also being employed in the functional products type, such as: deploy special materials with better characteristics (e.g. disposal medical accessories improved features); employ different ingredients (e.g. meeting different customers' taste in food manufacturing); and implement improvements in appearance (e.g. printing of books with different types of edge colouring in the paper). Such an approach dedicated to the functional product types contributes for an innovative final product with an improved competitive edge in the market. Such findings challenges the literature, by adding to the conversation on Fisher's (1997) matching criteria for performance improvement, meaning that success is also achieved by employing an innovative approach even in functional products.

7.4.4.3 The sustainable SC strategy

The literature outlines that the SC strategy of the focal firm needs to fit its environmental sustainability requirements within its business strategy and also across the whole SC, including the selected suppliers and logistics providers (Vachon & Klassen, 2006; Hsu et al., 2013; Caniels et al., 2013). It is to be noted that the term SC sustainability today integrates social, environmental and economic responsibilities (Elkington, 2002; Bojarski et al., 2009; Buyukozkan & Berkol, 2011; Gimenez et al., 2012; Lee et al., 2012; Caniels et al., 2013; Glover et al., 2014; Hsueh, 2015). The findings, from the SC strategy perspective, show that sustainability is pivotal in all strategic decisions, both within the focal firm and across the SC with all stakeholders. The data outline that SC strategy serves as a driver for the holistic SCI management approach which needs to have in place all sustainable measures from the triple bottom line perspective. Furthermore, the data show that the sustainability measures are more demanding in certain sectors, since tougher standards exist with respect to both quality and/or legal obligations, such as in the automotive (e.g. TS16949 as standards) and pharmaceutical (e.g. GMP as standards and legal requirements). Such findings add to the SC strategy sustainability and manufacturing conversation, by outlining the need for a sustainable holistic SCI management approach to achieve competitiveness and by describing the demanding requirements of specific manufacturing sectors.

7.4.4.4 The SC Strategy enabled by technology deployment for performance improvements

From the literature, the SC strategy is concerned about upstream (Carter et al. 2000; Scannell, Vickery, and Dröge, 2000; Kim, 2009; Swink et al., 2007) and downstream (Ellinger et al., 2000; Kim, 2009; Swink et al., 2007) relationships to give a competitive edge with performance improvement. The SC strategy to achieve integration, both within the focal firm and throughout all the SC tiers (e.g. logistics and supplies), needs to be backed by an IT infrastructure, to achieve both manufacturing and performance improvements (Carr & Smeltzer, 1999; Wisner, 2003; Gonzalez-Benito, 2007) and competitive success (Eisenhardt & Tabrizi, 1994; Birou et al. 1998; Kim, 2009). The SC capabilities may result in distinctive competitive capabilities within both the focal firm, in line with the resource-based view (Wernerfelt, 1984, Barney, 1991) and also from a wider approach to operations, where the focal firm deploys all resources outside its boundaries with its SC actors, in line with the extended resource-based view of a network of firms (Matthews, 2003). Furthermore, it is well established by the literature, adding to the above assertion, that the role of IT promotes performance improvement, that IT also enables all collaborative processes, through: connectivity of all SC actors; it captures all real time information; it adopts the necessary information management techniques to promote SC visibility; it provides value added services; and it achieves a holistic management approach of the SC

(McAfee, 2002; Chesbrough & Teece, 2002; Koudal & Wellener, 2003; Fawcett et al., 2007; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014).

The findings complement the SC strategy literature, since the data established that SCI is achieved by employing an IMLA, together with the SC strategy in-conjunction with the business and manufacturing strategies, through the holistic SCI management approach, enabled by technology, to achieve effective and efficient performance. The findings also add to the conversation within the literature focused on both upstream vis a vis a core and non-core product types and downstream vis a vis a high-value added and a low-value added product types, since different collaborative initiatives are dedicated to meet such different conditions at both ends of the SC, as referred in Section 7.4.1.4.

Furthermore, the findings also complement the literature on the deployment of IT, as referred above, since the data reveals that the holistic SCI management approach is enabled by technology deployment in both information systems and automation, to promote effective and efficient performance. The emerged theory infers that the SC strategy with its challenging targets needs to establish the necessary visibility of all operations, through information sharing mechanisms adopted by all SC actors, to have all the needed information, to remedy all problems and adapt to all changes so as to promote SC flexibility and responsiveness. Such a technology deployment enables all processes to promote a high level of integration of all human interactions with streamlined workflows across the SC (e.g. between different functional areas of the focal firm and outside) and of all manufacturing processes (e.g. automation) to improve on the business performance. This emerged theory outline adds to the body of knowledge on information systems and in automation within manufacturing and SC context.

7.4.4.5 The SC strategy long term effects

From the extant literature, the overall SC is using a pull-based system (Kros et al., 2006), to align the production and business processes throughout the supply chain to the changing demands of the chain's ultimate customers (Cox et al., 2003; Green & Inman, 2005; Green et al., 2007; Lambert, 2008). From the findings it is established, in line with the literature, that the SC strategy is a pull-SC strategic approach, which places the customer at the heart of strategic significance. But, not located within the literature, is that the SC strategy through **SCI promotes growth** and from the data it was also established that the focal firm may need to increase the SC ownership span (i.e. vertical integration) to meet improved performance. Furthermore, it is also inferred, from the emerged theory, that the SC strategy is a **long term strategic** approach, since most of decisions and collaborative measures are not quick fix solutions, but involves long-term commitments and investments. In fact from the literature, it was inferred that the focal firm prefers to secure a long-term relationships with a few dedicated suppliers to create an improved value and yield lower transaction and production costs (Bayraktar et al., 2009) but no direct reference was found that such an approach is part of the SC strategy formulation except for the collaborative enterprise management approach (Clegg & Binder, 2007, 2008; Clegg et al., 2012; Clegg and Wan, 2013), as referred in Section 2.5.2. As a result, the findings add to the SC strategy literature by inferring that the SC strategy formulation is a long term strategic approach and that through SCI it promotes growth.

7.4.5 Holistic SCI management approach

7.4.5.1 The SC strategy from a holistic SCI management approach enabled by technology

The literature broadly defines supply chain integration as the extent to which a firm is strategically interconnected and aligned with its supply chain partners (Das et al., 2006; Jayaram et al., 2010). This means that SCI is a strategic approach which is needed to achieve the running of the focal firm through the integrated operations within all of its functional areas and also with all its stakeholders' network. As a result supply chain integration approach, both within the focal firm and across the SC, promotes performance improvements (Braunscheidel & Suresh, 2009; Flynn et al., 2010; Koufteros et al., 2007; Swink et al., 2007; Wong et al., 2011; Zhao et al., 2011). The broad integration set-up of customers and suppliers to form a holistic supply chain management approach has been considered of pivotal importance for the formulation SC strategies that are optimal for the whole SC (Wilding, 1998; Lambert & Cooper, 2000; Perona & Miragliotta 2004; Power, 2005; Lambert, 2008). This holistic approach across the SC could be made possible with the advent of the internet based technologies, since through the web, one is able to provide an integrated platform for customers and suppliers for all activities across the SC, to take the most appropriate decisions by considering all constraints (Frohlich & Westbrook, 2002; Bayraktar et al., 2009). Furthermore, IT applications (e.g. ERPs and databases) provide the ability to capture all real time information and adopts the necessary information management techniques to promote SC visibility, enable value added services and to achieve a holistic management approach of the SC (McAfee, 2002; Chesbrough & Teece, 2002; Koudal & Wellener, 2003; Fawcett et al., 2007; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014).

This holistic approach is in line with the principle that the new SCI paradigm is designated to consolidate all the SC members' resources and capabilities, for the benefit of the whole SC to achieve performance improvement, since the performance of all SC actors influence each other's performance (Huo, 2012). Furthermore, Fawcett et al. (2008, p.36) added that all potential SC 'barriers' need to be seen in 'combination or holistically', so as 'to separate the trees for the forest'. Though, it cannot be excluded that SCI needs a level of commitment and investment from all SC actors, but as Schoen and Swink (2012, p.100) advocated that: 'In general, however, researchers have supposed that the benefits derived from integration activities outweigh their associated costs, leading to overall greater levels of operational performance'.

The findings clearly sustain that SCI starts from the focal firm and extends throughout with all stakeholders, to set-up a unified SC, with dedicated collaborative initiatives depending on the role of each SC member. The data also indicates that the scope of the SCI is to achieve a win-win outcome for all SC actors and this cannot be achieved unless the focal firm is in a position to consider the big picture, in particular, from a holistic approach. The holistic SCI management approach, through integrated operations, both within the focal firm and across the SC, promote improved synergies with all SC actors, which altogether contribute to the SC competitive capabilities. From the data SCI does not only provide benefits but may bring about negative issues, such as greater inflexibility (i.e. needs switching costs to change systems due to established processes with other SC actors), decreased innovation (i.e. locking to particular approaches with suppliers), costly investments to integrate with partners (e.g. invest in common technologies to promote further synergies with suppliers). Furthermore, the findings also outline that the holistic SCI management approach, which is enabled by technology, facilitate all processes but does not replace the human element, both within the manufacturing and the SC processes respectively. Such findings complement the literature on the significance to apply a holistic approach within the SC context and also adds to the SCI literature on the several challenges that the focal firm may need to address to remain competitive and also adds to the conversation on the deployment of IT and the human element role within the SCM literature to achieve a holistic approach.

7.4.5.2 Holistic SCI management within manufacturing

A common term to holistic SCM is the Demand Chain Management (DCM) which is used to describe how the SC actors shall manage and coordinate all the links from the customer backwards to the suppliers, based on an extensive integrated approach to have an adequate understanding of the demand (Vollmann et al., 2000; Frohlich & Westbrook, 2002; Juttner et al., 2007). Such a holistic significance has been found useful to complete all tasks quickly to reap a greater profit based on a triple-A SC, meaning that the SC processes need to be aligned, adaptable and agile (Lee, 2004; Ishaq et al., 2012) in line with the theory of swift, even flow, where the manufacturing processes variations are narrowed to promote a more streamlined flow (Schmenner & Swink, 1998). Gunasekaran et al. (2008, p.550) support this view and advocate that agile manufacturing 'should not only be based on responsiveness and flexibility, but also on the cost and quality of goods and services'.

A common saying used nowadays is 'time is money'. As a result, the findings, clearly outline, that all SC operations are employing lean operations to streamline all manufacturing and SC processes and to minimise all waste in all types of resources, and also to optimise, align and improve all operations from a holistic perspective, in line with the literature. The holistic SCI management approach through the IMLA is adapted to fit and manage effectively each SC actor with its particular contextual conditions. The IMLA achieves this through the holistic SCI management approach with its sixteen conceptual actions, which are used to meet the expected competitive capabilities, such as SC flexibility with an effective customer service, among others, as referred in Figure 6.1. Such sixteen measures include a number of pivotal requirements to be implemented to achieve this holistic process approach, in particular, by the measurement of all operations across the SC together with the compliance to all quality based processes and with the deployment of all sustainable measures, in both manufacturing and SC operations, as already referred in Sections 6.3.6 and 7.3.1. Such findings sustain the arguments referred by all cited scholarly works on SCI with its holistic significance by outlining all measures that constitute such a holistic approach by addressing the lack of literature on holistic measures. Furthermore, it also adds to the leadership theory within SCI and the importance of streamlined activities within the manufacturing literature.

7.4.6 Technology deployment in information systems and automation

From the extant literature, the role of technology is pivotal in enabling all information based processes (Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014) and processes within production automation and across the SC, such as supply management and logistics to mention a few (Gunasekaran et al., 2008; Jin et al., 2014). Being in this information age, the businesses within the SC are highly dependent on an effective information processing approach to develop and manage knowledge across the SC through information technology applications (Dyer & Singh, 1998; Ofek & Sarvary, 2001; Schoenherr & Swink, 2012) and with the deployment of technology to eliminate waste in several processes, by making them more efficient (Cox, 1999; Gunasekaran, 2004; Sanders, 2008). The importance of IT adoption is without doubt very beneficial for SMEs survival (Gagnon & Toulouse, 1996), since it is well cited that IT capability leads to superior performance (Determirhan et al., 2007). In fact, information technology has been recognised in the last two decades that it is a source competitive advantage due to provision of systems that assist organisational processes for developing and deploying relational capabilities (Bharadwaj, 2000; Hult et al., 2002; Paulraj et al., 2008; Sanders, 2008; Gunasekaran et al., 2008; Clegg &Wan, 2013).

Furthermore, from the literature, in certain processes, the human element interplay is changing since the 'role of people in the fulfilment process is changing progressively from processor to process monitor and enhancer' (Kagermann et al., 2011, p.104). The human approach role is further elaborated by the fact that there is a growing consensus for IS implementation success (e.g. ERPs), by adopting a teamwork approach, so as to integrate, collaborate and share their expertise on technology based platforms to capture information so as transform and exploit knowledge from each SC actor (Sarker & Lee, 2003; Faraj & Sambamurthy, 2006; Fawcett et al., 2007; Schoenherr & Swink, 2012; Clegg &Wan, 2013). Though, it cannot be excluded the key role of the human element in all problem solving and critical thinking abilities, as referred in Section 7.4.1.7. From the RBV of the firm (Wernerfelt, 1984; Barney, 1991) and the extended RBV (Matthews, 2003), it is being outlined that the SC flexibility with its competitive edge is being created not from the investment in technology, but how the technology is being used, through its dedicated information sharing mechanisms (e.g. ERP customisation of integrated processes), both within and across the SC, which are treating both the information management and the IT infrastructure capabilities as resources, which may be distinct from other SCs (Prajogo & Olhager, 2012; Schoenherr & Swink, 2012).

In fact from the data, the technology remains crucial, especially for particular manufacturing sectors that implement heavily based automated activities, since technology investment needs to be considered within the business strategy, by involving all key stakeholders, both within the focal firm and all the relevant key stakeholders. Nowadays, the technology investment is needed, to meet the current dynamic and competitive business environment, so as to ensure that all automated based processes efficiencies and throughput are not limited by the human element intervention, but are function of the equipment and machinery. Though, it cannot be excluded that the human element remains pivotal within the manufacturing (Section 7.4.1.7), since not all operations can be automated and furthermore there is always the need to exploit the human capabilities and competences in: re-engineering; linking of processes; flexibility in certain activities; and detection of problems. Social sustainable measures are also being addressed, through technology based applications, for safeguarding the health and safety of the human element, such as in lifting and handling heavy loads, through robotics and for fumes protection, through ventilated environments and through technology-based training, for individual self-development. As a result the findings also outline that ICT facilitates the repetitive administrative work through the use of information management applications and also promotes knowledge sharing, such as with the use of databases or ERPs and also enables and improves, and in some cases even drives, the overall manufacturing and SC processes to promote effectiveness and efficiencies. The findings add to the conversation of technology deployment within the literature, with special focus on the role of the human element in view of technology based applications, which adds to the social sustainability literature within SCM and manufacturing (Section 7.4.1.7). The findings also contributes to knowledge within the manufacturing and SCM technology literature, since technology within academic work was either considered alone or with a relatively reduced set of constructs in several models and in some other cases it was also excluded from SC-based holistic models.

7.4.7 The competitive capabilities

Porter's seminal work within the strategy literature (Section 2.6.9) refer to Porter's (1980) competitive forces model and how activities contribute to a competitive strategy; Porter's (1985) value chain model and how firms assess the costs and the differentiation to create a competitive advantage; and Porter's (1985) Generic Competitive Strategies matrix guides between cost leadership or differentiation or focused strategy respectively, to achieve a sustainable competitive advantage. Such sources of competitive advantage can be attributed to various SC actors' activities, where with a SC holistic view, the set of activities will sum-up to an overall competitive advantage (Porter, 1996; Juttner et al., 2007).

From the findings, the data shows that most of the focal firms adopt a value-stream mapping approach to monitor all value-chain processes, both within the focal and across the SC to promote effectiveness and efficiencies. The firms understudy had different type of products and deployed different competitive strategies and as a result had adopted different value-propositions in line with Porter's strategy literature.

SCM is considered as a crucial operations strategy for organizational competitiveness in the twenty-first century, with the direct involvement of people (Gunasekaran, et al., 2008). The contemporary context associated with SCM, is that today competition is not focused between firm to firm competitiveness but between entire supply chains (Dyer, 2000; Christopher & Holweg, 2011). This competitive edge is substantiated by the resource based view of the firm, where such distinct resources competitors cannot match or replicate due to the four criteria: value, rareness, imperfect imitability and non-substitutability (Wernerfelt 1984; Barney 1991). Within the SC context, the investment in technology within the organisation functional areas and outside the organisational boundaries to provide relevant, timely and accurate information is a source of competitive capabilities (Fawcett et al., 2007; Bayraktar et al., 2009) in line with the extended-RBV (Matthews, 2003). Within a SC, various stakeholders may need to link all activities in line with the value-chain approach (Porter, 1985), to promote both effectiveness and efficiencies and a value-added approach in all chain of activities, referred as vertical integration or vertical linkages (Swink et al., 2007; Guan & Rehme, 2012). On the other hand, the horizontal linkages of the value-chain activities are attributed to the integrated activities performed by the organisation to promote a competitive advantage (Porter, 1985). The integrated activities across the SC, need to consider the activities' values and costs of all the SC members' activities that contribute to the overall SC process, so as to promote a win-win mindset leading to competitiveness and profitability (Dyer 1994; Lambert et al., 1998; Rosenzweig et al., 2003;

Ketchen & Hult, 2007; Swafford et al., 2008; Bayraktar et al., 2009; Flynn et al., 2010; Zhao et al., 2013). It is to be noted that 2

The findings complement the SCM literature, since social sustainability, through the role of the human element, has been considered pivotal within the IMLA and in all processes. The deployment of technology, is also in line with the IT literature, since it has also been considered crucial in all information based and automated based processes, within the holistic SCI management approach, which is being enabled and sometimes even driven, by the IT deployment. Such a holistic process approach contributes to the overall SC effective and efficient performance with a continuous improvement approach to promote competitive capabilities. Such findings add to the conversation on SCI initiatives through technology deployment, both within the focal firm and with all SC actors.

The contemporary frequently cited SC key competitive operational capabilities for both the focal firm and with all upstream and downstream SC sides are: cost, flexibility, speed/delivery and quality (Hayes and Wheelwright, 1979b; Frohlich and Westbrook's 2001; Kim, 2009; Richey et al., 2010; White et al., 2010). Similarly, the financial or business competitive capabilities are sales, market share, and growth (Johnson, 1999; Flynn et al., 2010) and return on assets, return on sales and return on investments (Rosenzweig et al., 2003; Flynn et al., 2010). It is well cited in the literature that operational or manufacturing capabilities lead to business performance either in individually or in concert (Flynn et al., 1999; Rosenzweig et al., 2003; Swink et al., 2007).

From the findings, the competitive capabilities were considered as the outcome of the theoretical model. The emerged theory is hereby refined by the literature, since the theoretical model, as referred in Figure 7.1 above, must be extended beyond the competitive capabilities, as referred in Figure 7.2 below. Meaning that the competitive capabilities are all valid but are considered as intermediate outcomes, and that the actual outcomes are the operational (i.e. cost, flexibility, speed/delivery and quality) and the business (i.e. sales, market share, growth, return on assets, return on sales and return on investments) performance indicators respectively, as in line with the literature above and as shown in Figure 7.2.

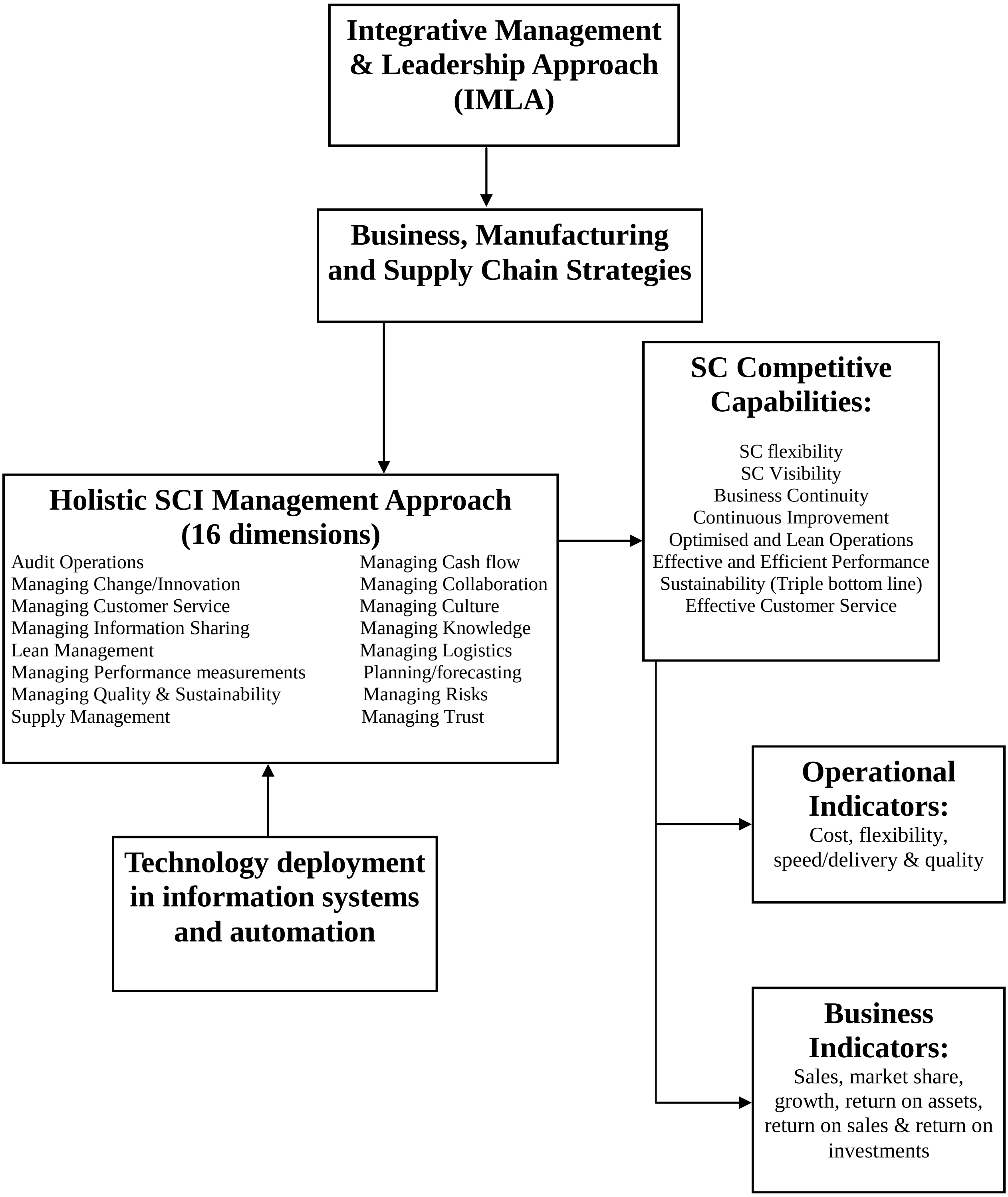

Figure 7.2: The final SCI theoretical model (Author)

7.5 Summary of the discussion chapter

The multidisciplinary aspect of this research takes into account aspects of strategy, management, leadership, manufacturing, SCM, OM and technology in automation and in ICT applications, among other conceptual elements building up such disciplines. It is quite common that research within SCM is based on a multidisciplinary approach (e.g. Croom & Romano, 2000; Parente et al., 2008).

The research generated a substantive theory and derived a conceptual framework where the core theme to achieve a SCI management approach is the IMLA, which includes an organisational management set-up based on the focal firm and on all of its external SC stakeholders. The research stance had to appropriate such an interdisciplinary perspective, both directly and indirectly, with several intersection areas within different disciplines, to build a solid foundation of the key concepts that are involved in the design and management of an integrated SC set-up. It is to be noted that the research main focus of the post literature review was focused on supply chain management within manufacturing with special attention on all emerged themes from the data as the literature main keywords.

As a result the breadth and depth of the topic was very extensive and was a very challenging task to derive a synthesis of such a comprehensive and voluminous scholarly work and to finalise the research sense-making process to relate such a literature to the generated substantive theory with its conceptual framework. Henceforth, although the emerged core theory was based on both a management and leadership concepts, the research scope was not focused on the critique of the management and leadership theories, but was mainly focused to answer the research question on how to achieve SCI, with a special focus on SCM literature based on a holistic significance, which incorporated a complex set of concepts.

Henceforth, this chapter, with the support of the comprehensive post literature review (Section 2.6), as summarised in Table 7.1, provided explicit links of the literature to the conceptual model and also enabled the researcher to derive the study implications to the extant literature, by integrating the emerged theory within the relevant literature for logical extension and comparison (Strauss, 1987) and for theory building (Eisenhardt, 1989). Such an approach also enabled the researcher to fill the literature gaps, refined the theoretical framework (Strauss & Corbin, 1998; Charmaz, 2006), as referred in Figure 7.2, and also identified the research contribution (Glaser, 1998; Strauss & Corbin, 1998). It cannot be excluded the role of the a priori literature review (Section 2.3), which also provided a broad but a solid foundation of the literature to assist the final sense-making process within this chapter.

Integrative management and leadership approach (IMLA):
• Seuring and Muller's (2007) study used the **integrated chain management (ICM)** concept, within the context of sustainable SCM, based on a set of transactional and transformational processes on three perspectives, in particular material and information flow (i.e. production and logistics management); the strategy and cooperation (i.e. to actively manage product and material flows); and the industrial network (i.e. exchange of materials to promote sustainable practices) to reach competitive sustainability. • Defee et al.'s (2010) study focused on a **transformational leadership approach** within a SC for both leaders and followers, with three mediating constructs and two outcomes, namely information availability, communications and rewards, as the mediators, which led to efficient and effective performance, as the outcomes. • Kaynak & Hartley's (2008) study was based on quality management practices based on eight dimensions as antecedents that led to a set of performance outcomes. The **management leadership**, was considered from a quality based approach, and was referred as the core driver of all the other seven dimensions: training, employee relations, customer focus, quality data and reporting, supplier quality management, product/service design, and process management. The outcomes were inventory management, quality, financial and market performance respectively. • Lockstrom et al.'s (2010) study inductively derived a theoretical model focused on focal firm **leadership approach** (i.e. buyer side) as the key antecedent to achieve SCI with suppliers so as to promote SC performance improvement, where the buyer-side leadership effectiveness was found to be a pivotal antecedent for building motivation, trust, and commitment among suppliers which facilitated strategic alignment and all collaborative capabilities and which acted as key enablers for successful supplier integration.
Management concept from the IMLA:
Managing effectively through people to achieve results within the firm and across the SC is a key concern (Drucker 1979; Crainer, 1998; Ashby et al., 2012; Ellinger & Ellinger, 2014); monitor performance improvements and optimisation (Drucker, 1977); to have the right people with the appropriate skills and talent within and across the SC (Rothwell, 2002; Sarkis et al., 2010; Tarique & Schuler, 2010; Xu & Thomas, 2011; Ashby et al., 2012; Ellinger & Ellinger, 2014); there is the need to ensure employees' health and safety and their equal treatment (Leire & Mont, 2010); human element is pivotal in all problem solving and critical thinking abilities (Kuhn, 1999; Halpern, 2003); the human resource strategies contributes to SCI and performance (Shub & Stonebraker, 2009); the role of the people contributes to the operations strategy (Hayes & Wheelwright, 1984; Hayes et al., 2005); management is about achieving results through people (Crainer, 1998); management discipline is not only a science but also an art (Watson, 1986); 'key business processes need to be integrated and managed' (Lambert et al., 1998, p.11); collaboration is a continuum based on close collaboration (i.e. partnership) to an arm's length type of relationship (Lambert et al., 1998; Cox et al., 2003; Chicksand, 2015; Cuevas et al., 2015); there is the need to establish the common good of the overall SC (Cooper et al., 1997); and the operational linkages (i.e. systems, procedures and routines) for the effective flow of goods, services and information need to extend beyond a single dyadic relationship (Cox et al., 2003).
Strategic leadership from the IMLA concept:
It includes a leadership approach which consists from a leader, a follower and the contextual conditions (Tannenbaum & Schmidt, 1973; Tosi, 1991; Osborn et al., 2002; Liden & Antonakis, 2009); consists of soft (e.g. trust, commitment and attitude) and hard (e.g. contractual obligations, product design, process and information technology) skills between all SC actors, so as to collaborate together (Whipple & Frankel, 2000; Shub & Stonebraker, 2009; McCauley-Smith et al., 2013); shifts beyond the dyad approach to a relationship approach, across different organisations (Hunt, 1991; Finkelstein & Hambrick, 1996); is focused on a collective or shared or distributed leadership approach (Carson et al., 2007; Martin et al., 2007); is instituted at all levels of the organisation (Deming, 1986; O'Reilly et al., 2010); adopts a shared leadership approach and is achieved through corporate intelligence (McKelvey, 2001); is an interdependent leadership style focussed on leadership and power sharing respectively, to promote empowerment in a decentralised leadership approach (McCauley-Smith et al., 2013); achieves organisational effectiveness (Boal & Hooijberg, 2000) and cannot be based on a single individual (House & Aditya, 1997), though it cannot be excluded that the individual leadership style still exists and it is based on hierarchical structures focused on the individual leader (Gronn, 2002; Tsui et al., 2006; Ling et al., 2008); is pivotal for SCI and performance (Whipple & Frankel, 2000; Osborn & Marion, 2009; Shub & Stonebraker, 2009); with its leadership structure surely affects the level of commitment of SC members (Cooper et al., 1997); with its power concept within the leadership literature is considered as a key source of control by influencing the people's behaviour through either a cooperative or aggressive collaborative strategy

(i.e. non-adversarial and adversarial relationships) (French & Raven, 1968; Mitchell et al., 1997; Cox et al., 2003; Hingley, 2005; Mullins, 2005; Co & Barro, 2008; Yeung et al., 2009; Hingley, 2005; Chicksand, 2015); and needs the right power deployment in all collaborative relationships to promote a win-win approach with trust-building (Hingley, 2005; Terpend & Ashenbaum, 2012) although a win-lose approach cannot be excluded which may also be beneficial for both parties (Cox, 2004d).
Leadership traits within the IMLA:
Transformational leadership: is based on five basic components, which are idealized attributes, idealized behaviours, inspirational motivation, intellectual stimulation and individualized consideration (Bass & Avolio, 2000); it drives people to see the deeper purpose in their work, treats them as unique and valuable human beings, and instils in them a belief in what the leader is trying to achieve (Bass and Avolio, 2000; Ardichvili & Manderscheid, 2008); and it produces powerful outcomes (Wang & Zhu, 2011). **Transactional leadership styles:** is based on a set of established objectives and tasks, as an exchange process between the superiors and the subordinates, leading to reward or punishment vis a vis performance (Burns, 1978; Bass & Avolio, 1994, 2000; Bass, 1997). **Servant leadership:** is based on the leader's primary motivation and role, to be a service to others and with distribution of power to followers (Greenleaf, 1970, 2002); and such an employee relationship leads to the achievements of the goals (Smith et al., 2004). **Situational leadership:** is based on the contingency theory of leadership (Fiedler, 1967; Lawrence & Lorsch, 1967; Thompson, 1967; Hershey & Blanchard, 1969).
Business strategy:
It establishes the direction and scope of an organization over the long-term to meet the needs of the markets and to fulfil stakeholder expectations by the configuration of resources within the contextual environment (Johnson & Scholes, 1999); to unify all functional areas together with all SC members with their capabilities and limitations (Skinner, 1969; Stonebraker & Afifi, 2004; Thompson et al., 2005; Swink et al., 2007); and operations strategy implements the business strategy by focussing on the entire SC (Narasimhan & Carter, 1998; Chen & Paulraj, 2004; Lummus et al., 2008).
Manufacturing strategy:
It needs manufacturing leadership practices to pursue the operations strategy, through the business's manufacturing policies and people, to promote a competitive edge (Skinner, 1969; Hayes & Wheelwright, 1984; Hayes et al., 2005); with respect to the people shared values importance, as referred in McKinsey 7-S model (Waterman et al., 1980), outlines the key role of the human element, within both the manufacturing and SC leadership processes (Rothwell, 2002; Tarique & Schuler, 2010; Xu & Thomas, 2011); deploys HVM practices, based on the triple bottom line sustainable practices in all processes, both within manufacturing and also across all SC operations, so as to achieve competitive advantage (Martinez et al., 2008; Technology Strategy Board, 2012); decides on the make or buy option so as to sustain its competitive advantage (Skinner 1969; Harrigan, 1985; Klein, 1988; Bajec & Jakomin, 2010); decides of the make or buy based on the core competency of the focal firm (Cox, 1999; Baloh et al., 2008); exploits the cost of operations of the focal firm and of its suppliers to improve on the overall competitiveness (Williams, 1985; McIvor, 2010); and is based on lean manufacturing for cost and efficiencies, and deploys agile manufacturing, for a more responsive approach at the downstream side of the SC (Yusuf & Adeleyei, 2002; Gunasekaran et al., 2008; MacBryde et al., 2013) to meet the changing demands of the chain's ultimate customers (Cox et al., 2003; Green & Inman, 2005), referred as servitization of manufacturing (Lightfoot et al., 2013).
SC strategy:
Is needed to perform well in the 'competitive market' (Cox, 1999); is concerned with the integration and coordination decisions within the focal firm in-conjunction with the set-up with all SC stakeholders (Gunasekaran et al., 2008; Green et al., 2014); needs to consider the variation in conditions by undertaking a cost benefit analysis to determine the focal firm way forward for the type of SCI and also implies that a contingent model needs to be adopted to fit each business situation (Cox, 1999; Stonebraker & Afifi, 2004); is not a 'one-size-fits-all' model, since it does not exist, due to the unique characteristics of each SC (Heide, 1994); is function of the new emerging manufacturing paradigm, referred to as high value manufacturing (HVM) based on the virtual enterprise (VE) concept (Shi & Gregory, 2005; Livesay, 2006; Martinez et al., 2008); this management paradigm shift incorporates a change from vertical integration to virtual integration, based on unity of efforts, to optimize the use of all core and distributed resources to form a single holistic SC (Prahalad et al., 1994; Power, 2005; Gunasekaran et al., 2008; Cheung et al., 2012); from an enterprise management perspective may deploy either a selection or a mix from VIE, EE, VE and DE collaborative relationships among all SC actors in its inter-organisational approach, according to the collaborative enterprise governance, which outlines the continuum of the operations strategy, in line with the Dynamic Enterprise Reference Grid (DERG), to achieve competitiveness (Board & Clegg, 2001; Binder & Clegg, 2006, 2007; Clegg et al., 2012; Clegg and

Wan, 2013); within a SC, various stakeholders may need to link all activities in line with the value-chain approach (Porter, 1985), to promote both effectiveness and efficiencies and a value-added approach in all chain of activities, referred as vertical integration or vertical linkages (Swink et al., 2007; Guan & Rehme, 2012); needs to decide on how to gain from the optimum performance from each SC members so as to eliminate the risks associated with sub-optimisation effect that may result from friction between SC actors optimal (Cox et al., 2004a; Narayandas & Rangan, 2004); consists from both strategic and operational capabilities and with their alignment (Cox, 1999; Kim, 2009) function of the contextual conditions (Cox, 1998); is function of the type of product (i.e. functional or innovative type) to achieve a strategic fit, by matching the appropriate SC design based on either a manufacturing approach with efficient processes or a marketing approach with responsive processes to be competitive (Fisher, 1997); is based on a pull-based SC system (Kros et al., 2006), to align the production and business processes throughout the supply chain to the changing demands of the chain's ultimate customers (Cox et al., 2003; Green & Inman, 2005; Green et al., 2007; Lambert, 2008); must consider long-term relationships with a few dedicated suppliers to create an improved value and yield lower transaction and production costs (Bayraktar et al., 2009); and SC needs to cater for social, environmental and economical goals, also referred as the triple bottom-line (Elkington, 2002; Vachon & Klassen 2006; Cater & Rogers, 2008; Seuring & Müller, 2008; Bojarski et al., 2009; Buyukozkan & Berkol, 2011; Carter & Easton, 2011; Ashby et al., 2012; Gimenez et al., 2012; Lee et al., 2012; Sarkis, 2012; Wu et al., 2012; Caniels et al., 2013; Hsu et al., 2013; Glover et al., 2014; Hsueh, 2015).
Holistic SCI management approach (with its 16 sub-categories as referred in Figure 7.2):
Supply chain integration is the extent to which a firm is strategically interconnected and aligned with its supply chain partners (Das et al., 2006; Jayaram et al., 2010); the SC entities forming up the SC need to be integrated as a single entity (Chan et al., 2003; Sanders, 2007) and wherever possible focus on virtual integration rather than vertical integration to optimize the use of all core and distributed resources to form a single holistic SC (Prahalad et al., 1994; Power 2005; Wang & Wei, 2007; Gunasekaran et al., 2008); there is the need to shift from an intra management perspective to an optimized management approach across the SC with the effective involvement of all SC actors, since rarely a single firm has the entire technical expertise (Boardman and Clegg, 2001); the manufacturing strategy is directly linked to the SC integrated activities of both upstream and downstream to link all stakeholders with the focal firm (Ragatz et al., 1997; Flynn et al., 1999; Frohlich & Westbrook 2001; Paulraj et al., 2008; Flynn et al., 2010); holistic supply chain management approach has been considered of pivotal importance for the formulation SC strategies that are optimal for the whole SC (Wilding, 1998; Lambert & Cooper, 2000; Perona & Miragliotta 2004; Power, 2005; Fawcett et al., 2008; Lambert, 2008; Bayraktar et al., 2009; Cheung et al., 2012); take the most appropriate decisions by considering all constraints across the SC (Frohlich & Westbrook, 2002; Bayraktar et al., 2009); all potential SC 'barriers' need to be seen in 'combination or holistically', so as 'to separate the trees for the forest' (Fawcett et al., 2008, p.36); 'the benefits derived from integration activities outweigh their associated costs, leading to overall greater levels of operational performance' (Schoen & Swink, 2012, p.100); the Demand Chain Management (DCM) is based on an extensive integrated approach across the SC to have an adequate understanding of the demand (Vollmann et al., 2000; Frohlich & Westbrook, 2002; Juttner et al., 2007); SC processes need to be aligned, adaptable and agile (Lee, 2004; Ishaq et al., 2012); and the leadership style needs a holistic stance to ensure that all stakeholders' requirements are considered, to promote synergy of all actions with a teamwork vision (Bass et al., 2003; Schippers et al., 2008).
Technology deployment:
The SC strategy to achieve integration, both within the focal firm and throughout all the SC tiers (e.g. logistics and supplies), needs to be backed by an IT infrastructure, to achieve both manufacturing and performance improvements (Carr & Smeltzer, 1999; Wisner, 2003; Gonzalez-Benito, 2007) and competitive success (Eisenhardt & Tabrizi, 1994; Birou et al. 1998; Kim, 2009); the role of technology is pivotal in enabling all information based processes (Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014) and processes within production automation and across the SC, such as supply management and logistics (Gunasekaran et al., 2008; Jin et al., 2014); the role of IT promotes performance improvement and also enables all collaborative processes, through: connectivity of all SC actors; real time information provision; information management techniques to promote SC visibility; value added services; and a holistic management approach of the SC (McAfee, 2002; Chesbrough & Teece, 2002; Koudal & Wellener, 2003; Fawcett et al., 2007; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014); IT through dedicated ISs are making such enterprise management a technical reality to promote a competitive edge (Rodon et al., 2011; Clegg & Wan, 2013); the holistic approach across the SC could be made possible with the advent of the internet based technologies, since through the web, one is able to provide an integrated platform for customers and suppliers for all activities across the SC (Frohlich & Westbrook, 2002); the traditional ERP, referred as ERP I is undergoing a paradigm shift from single organisation management approach to an inter-organisational collaborative environment based

on e-commerce and web base technologies, referred as ERP II (Echartz et al., 2009; Clegg & Wan, 2013). Such technology deployment (e.g. EAI, SOA and SaaS) is also supporting agile manufacturing (Banker et al., 2010); IT applications (e.g. ERPs and databases) provide the ability to capture all real time information and adopts the necessary information management techniques to promote SC visibility, enable value added services and to achieve a holistic management approach of the SC (McAfee, 2002; Chesbrough & Teece, 2002; Koudal & Wellener, 2003; Fawcett et al., 2007; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014); there is the need to use of smart technology within both manufacturing processes and products to promote competitiveness which is attributed to the IT-driven transformation through smart connected devices providing three perspectives: physical, smart and connectivity with the provision of IoT. The four areas of advantages are: monitoring, control, optimization and autonomy (Porter & Heppelmann, 2014); the businesses within the SC are highly dependent on an effective information processing approach to develop and manage knowledge across the SC through information technology applications (Dyer & Singh, 1998; Ofek & Sarvary, 2001; Faraj & Sambamurthy, 2006; Fawcett et al., 2007; Schoenherr & Swink, 2012) and with the deployment of technology to eliminate waste in several processes, by making them more efficient (Cox, 1999; Gunasekaran, 2004; Sanders, 2008); information technology with its systems assists organisational processes for developing and deploying relational capabilities (Bharadwaj, 2000; Hult et al., 2002; Paulraj et al., 2008; Sanders, 2008; Gunasekaran et al., 2008; Clegg &Wan, 2013); and all relevant information from all IT systems from SC actors can be consolidated by using 'DSS for holistic decision making' to make the most suitable decision (Bayraktar et al., 2009, p.137).
Competitive capabilities (operational indicators & business indicators):
Today's competition is not focused between firm to firm competitiveness but between entire supply chains (Dyer, 2000; Christopher & Holweg, 2011); an effective SC strategy needs to adapt and structure its resources to effectively align to the changing competitive capabilities (Thompson, 1967; Hofer, 1975; Bojarski et al., 2009; Kim, 2009); the SC capabilities may result in distinctive competitive capabilities within both the focal firm, in line with the resource-based view (Wernerfelt, 1984, Barney, 1991) and also from a wider approach to operations, where the focal firm deploys all resources outside its boundaries with its SC actors, in line with the extended resource-based view of a network of firms (Matthews, 2003); the various SC actors' activities sum-up to an overall competitive advantage (Porter, 1996; Juttner et al., 2007); SCM is considered as a crucial operations strategy for organizational competitiveness with the direct involvement of people (Gunasekaran, et al., 2008); supply chain integration approach, both within the focal firm and across the SC, promotes performance improvements (Braunscheidel & Suresh, 2009; Flynn et al., 2010; Koufteros et al., 2007; Swink et al., 2007; Wong et al., 2011; Zhao et al., 2011); agile manufacturing 'should not only be based on responsiveness and flexibility, but also on the cost and quality of goods and services' (Gunasekaran et al., 2008, p.550); IT capability leads to superior performance (Determirhan et al., 2007); information technology has been recognised in the last two decades that it is a source competitive advantage due to provision of systems that assist organisational processes for developing and deploying relational capabilities (Bharadwaj, 2000; Hult et al., 2002; Fawcett et al., 2007; Paulraj et al., 2008; Sanders, 2008; Gunasekaran et al., 2008; Bayraktar et al., 2009; Clegg &Wan, 2013); from the RBV of the firm (Wernerfelt, 1984; Barney, 1991) and the extended RBV (Matthews, 2003) SC flexibility with its competitive edge is being created not from the investment in technology, but how the technology is being used, through its dedicated information sharing mechanisms (e.g. ERP customisation of integrated processes), both within and across the SC, which are treating both the information management and the IT infrastructure capabilities as resources, which may be distinct from other SCs (Prajogo & Olhager, 2012; Schoenherr & Swink, 2012); the integrated activities across the SC, with the consideration of the activities' values and costs of all the SC members' activities, contribute to the overall SC process with a win-win mindset leading to competitiveness and profitability (Dyer 1994; Lambert et al., 1998; Rosenzweig et al., 2003; Ketchen & Hult, 2007; Swafford et al., 2008; Bayraktar et al., 2009; Flynn et al., 2010; Zhao et al., 2013); SC member creates value-added operations (e.g. innovation, improved customer service, superior product attributes) and also manages effectively its appropriation of value (e.g. extracts above average profits, build brand name), since both value creation and value appropriation are strategic objectives required for achieving sustained competitive advantage (Mizik & Jacobson, 2003; Zhang & Chen, 2008); internal integration is the foundation of SCI initiatives across the SC since it also provides the bridge between the supplier and the customer integration initiatives to promote performance improvement and/or operational capabilities which in turn leads to improved business performance (Frohlich & Westbrook, 2001; Koufteros et al., 2005; Swink et al., 2007; Bayraktar et al., 2009; Flynn et al., 2010; Schoenherr & Swink, 2012); operational or manufacturing capabilities lead to business performance either in individually or in concert (Flynn et al., 1999; Rosenzweig et al., 2003; Swink et al., 2007); business growth and expansion have to be based on alliances, partnerships, and all kind of relationships (Peter Drucker, 1999); SC strategy is concerned about upstream (Carter et al. 2000; Scannell, Vickery, and Dröge, 2000; Kim, 2009; Swink et al., 2007) and downstream (Ellinger et al., 2000;

Kim, 2009; Swink et al., 2007) relationships to give a competitive edge; sustainable performance or sustainable competitive advantage not only refers to an economical perspective but also from a social and environmental perspective (Elkington, 2002; Luken & Stares, 2005; Lee, 2008; Lee & Klassen, 2008; Glover et al., 2014; Hsueh, 2015); the environmental perspective alone has become a source of competitive advantage (Vachon & Klassen, 2006; Ketchen & Hult, 2007; Hsu et al., 2013; Caniels et al., 2013). • **Operational indicators:** operational objectives of cost (i.e. quality and features), dependability (i.e. on specifications, time and service), quality (i.e. process quality) and flexibility (i.e. product and volume) (Hayes & Wheelwright, 1984; Flynn et al., 1999); competitive operational capabilities with special attention on responsiveness and flexibility (Yusuf et al., 2002; Gunasekaran et al., 2008; MacBryde et al., 2013) and innovation (Binder et al., 2007); competitive operational capabilities for both the focal firm and with all upstream and downstream SC sides are: cost, flexibility, speed/delivery and quality (Hayes and Wheelwright, 1979b; Frohlich and Westbrook's 2001; Kim, 2009; Richey et al., 2010; White et al., 2010). • **Business indicators:** financial or business competitive capabilities are sales, market share, and growth (Johnson, 1999; Flynn et al., 2010) and return on assets, return on sales and return on investments (Rosenzweig et al., 2003; Flynn et al., 2010).

Table 7.1: Summary of the conceptual model categories within the literature (Author)

The next chapter concludes the thesis by outlining the key findings with a set of propositions, the emerged theory outline and the research contributions, limitations and suggestions for future research.

Chapter 8: Conclusion

8.1 Introduction

This chapter concludes the thesis by outlining the key findings and the contributions generated from the data through the Grounded Theory methodology, based on Corbin and Strauss (2008). The GTM research design comprised of two literature reviews, namely the initial and the final literature reviews respectively. The initial literature review mainly assisted the researcher's theoretical sensitivity, in such a way that the researcher was in a better position to understand what the data were saying, throughout the research data collection and analysis process. The final literature review was mainly focused on the emerged themes from the research findings, which were used to contrast the emerged theory implications within the extant literature. Furthermore, the final literature review also played a crucial role at the end of the data analysis process, since the extant literature served as another source of data (Strauss, 1987; Glaser, 1998; Charmaz, 2006), which was used to refine the outcome part of the final emerged theory within the theoretical model, as referred in Figure 7.2.

The researcher's objective is to a build theory on how to achieve SCI by establishing the key characteristics through a cross-disciplinary approach, so as to identify and describe its underpinning theoretical foundations. The generated substantive theory to answer the research question (Section 1.6) is very comprehensive and consists from a multiplicity of factors which have a varying degree of impact on what constitutes SCI with its respective outcomes and within a set of both micro and macro contextual conditions (Table 5.1). As a result the researcher from this study has drawn out the research key ideas, some original insights and propositions and also established the substantive theory implications to the extant literature and to policy and practice. Furthermore, the research also included the research limitations and ideas for future research.

The generated substantive theory is focused on how to achieve SCI, which is a concept within the discipline of SCM, which is in turn a sub-field of operations management. The research touches various other disciplines to promote a holistic understanding and to show that SCI within manufacturing is a multidisciplinary phenomenon, with a wide-thinking perspective. As a result the SCI foundations are based on several disciplines, other than SCM, such as technology deployment (i.e. information systems and manufacturing technology), organization behaviour (i.e. management and leadership roles), psychology (i.e. human behaviour role) and sociology (i.e. SC actors' role in a society).

The inductively derived emerged theory with its theoretical model is original (Figure 7.2) and is also compared with other models within the extant literature, to derive the commonalities and the differences (Section 7.3.4). Furthermore, the researcher has examined and theorised on the research phenomenon by using well established seminal theories to promote a robust theorising approach, based on strategic management (such as RBV and extended RBV), business ethics (such as stakeholder theory), sociology (such as institutional theory), economic theory (such as transaction cost analysis (TCA)) and social exchange theory (such as resource dependency theory).

Such a research study promoted theory extension of the main fields under focus (e.g. SCM, SCI and leadership) and solidified the contributions, by not only contributing to the latest current disciplines, such as operations management and SCM among other main fields in the literature, but also contributed, through their application, to the established and conventional theories which are used in various scholarly works to promote understanding of the emerging concepts and the theorising processes within the SCM and OM extant literature, such as RBV, TCA and stakeholder theory.

This chapter summarises the research scope with the substantive theory main issues and challenges in the first section. The second section is focused on the research significance. The third section is dedicated to the emerged core theory outline. The fourth section is focused on the relevance of the core theme, which is followed by the main themes, with additional snapshot of all the sub-themes, as a roadmap to practitioners. The fifth section lists the theoretical and methodological contributions, which is followed by the contributions to practice and to policy. The final section links the research study with the research limitations and future research.

8.2 Research scope and the substantive theory main issues and challenges

The data clearly showed that the supply chain operations within the Maltese manufacturing sector SMEs have a certain set of homogenous indigenous characteristics, although with a certain level of variation. The key manufacturing based SC process is assumed to consist from four main stages: procurement, fabrication, assembly and distribution among all other supporting and inter-linking related stages, such as research and development, quality inspections, testing, waste management and reverse logistics. The homogenous characteristics refer to the: flat organisation structures; promising cultural values of people at the workplace, based on high intellectual capabilities and skills (e.g. bilingual and highly certified) and with a deep commitment to learn and to work together (e.g. team spirit); proximity to local contractors (i.e. mainland logistics) and to customs/shipping terminals (i.e. sea and air logistics); high quality standards implementation; ICT applications (e.g. barcode readers and databases) and process automation equipment deployment (e.g. robotics); an effective management approach focused on both SC and manufacturing based processes, with a particular focus on lean operations, quality certification and legal compliance; and streamlining of operations based on a deep concern on environmental sustainable measures, together with a special focus on the social and the economical sustainable measures.

It is to be noted that a main variation existed vis a vis the innovative commitment embedded within the human element, which was more visible in the processes for high technology-based manufacturing sectors, since the technology-based products, such as electronic devices and equipment, are very dynamic and undergo a relatively faster pace of developments in the market relative to other sectors, such as healthcare, printing, food and toys. Though, it cannot be excluded that with today's advent of technology based processes and knowledge sharing environment across the SC and with the customised services' provision to a wide type of customers' segments, innovative developments in products and processes are also touching all types of sectors, but with a different level of intensity, which makes the business scenario very dynamic and challenging.

From the above contextual outline, the research has produced a parsimonious model of a set of antecedents with their relationships and a set of outcomes, embedded within different micro contextual conditions of each SC actor. Although all SC actors have the macro local contextual conditions common, they have different macro international contextual conditions, due to the different products' destinations. The model, as referred in Figure 7.2, is based on a set of six inter-organizational main conceptual elements that all stakeholders building up the SC, including the focal firm, need to manage effectively to achieve competitive capabilities. It is to be noted that SCI practices need to walk through several functional areas within the focal firm and furthermore, also need to have access to different SC actors across the SC. Such a stance requires an integrative management and leadership approach (IMLA) with a level of cross-cultural knowledge and charisma and a high level of expertise on how to go about such relational approaches, so as to be sensitive enough to manage such critical strategic moves to promote successful overall SC performance. This argument is being put forward, since the SC crosses several boundaries, both within the focal firm and across all SC tiers, where access is function of all players, with a mix of dependent and independent entities. To take command of external SC actors is very challenging, since depending on each SC actor role, the interactions may vary from non-adversarial to adversarial type, within both the arm's length and the close collaborative types of relationships respectively. Furthermore, it is the norm, that the collaborative initiatives, to achieve each other' requirements, are mainly based on a cooperative approach, function of the role of each SC actor, which is built on a trustful relationship over time. Though, it cannot be excluded that other circumstances may also exist, where the lack of trust, may drive any SC actor to take an aggressive stance. Such a cooperative collaborative environment is pivotal within the SC operations, since SCI consists from various interactions and needs to be performed effectively to exploit from each other all the resources, so as to promote business continuity from all dynamic situations and to achieve competitive performance for a win-win outcome to all SC actors.

From such a Maltese manufacturing sector context and the emerged theory outline situates the significance of the core research theme, where the IMLA is needed to meet the demanding holistic SCI objectives in view of all the challenging complexities and contingent situations.

8.3 Research significance

Existing literature is replete with both conceptual and empirical scholarly work on SCI within manufacturing, but somehow lacks holistically integrating models (Sections 2.5.9 & 2.6.10.2) that encapsulate the SCI phenomenon in terms of various conceptual elements in one model, since most of the theoretical models are fragmented and focus only on a few number of concepts at a time (Pibernik & Sucky, 2006; Svensson, 2007; Flynn, et al., 2010; Lorentz et al., 2012; Schoenherr & Swink, 2012).

Furthermore, the extant literature is also well supported by scholarly work focused on the dimensions of SCM practices from a variety of perspectives, but there is lack of literature on how to manage and lead the overall SC (Lambert & Cooper, 2000; Fawcett et al., 2008; Flynn et al., 2010). In particular, within the SCM extant literature various scholars derived: **SCM conceptual frameworks** (e.g. Chicksand's (2009) Power Matrix; Cox et al.'s (2003) Buyer-Supplier Relationship Types Matrix; Fisher's (1997) Model); **SCM principles** (e.g. Cooper et al. (1997); Lambert et al. (1998); Stonebraker & Afifi (2004)); and **SCM best practices** (e.g. SCOR Model (SCOR, 2010). But, holistic models are lacking, and furthermore, it is clearly being referred within the literature, that SCI is complex, dynamic and contingent to every situation between each dyadic SC relationship or within an extended relationship approach between various SC actors (Vickery et al., 2003; Pero et al., 2010; Garetti & Taisch, 2012; Macbryde et al., 2013). In fact, the scope of the research addresses the gap for a holistic SCM approach, as referred by the statement within the garment manufacturing industry, that:

> *'Globalization and proliferation of multi-national companies, joint ventures, strategic alliances and business partnerships have changed the business environment. For survival under the pressure of turbulence, it is critical for companies to reorganize and optimize their supply chain effectively, by taking a holistic view of the supply chain'* (Cheung et al., 2012, p.3923).

The emerged themes within the holistic SCI model were also contrasted within the extant literature, to derive the commonalities and the differences and it transpired that there were many areas of congruence but there were also a number of new insights. The main difference is attributed to the core emerged theme, which is original, in particular the holistic stance undertaken, since no literature seems to capture such a comprehensive approach.

Within the global scenario, the core theme, being based on a management and leadership approach, has also captured the importance within the World Economic Forum report (WEF, 2014b), where it was outlined the importance of high performance leadership best practices in international organisations, within EU, whereby it outlined the key areas of focus that facilitates good leadership:

> '(1) selecting and re-electing leadership on merit, (2) managing performance, (3) setting and evaluating ethical standards, (4) developing and retaining talent, (5) setting strategic priorities, (6) engaging with a wide range of stakeholders, and (7) evaluating independently and effectively' WEF (2014b, p.5).

Such leadership awareness initiatives, referred by WEF, are key guidelines for practitioners so that all firms set-up the right instruments, establish sound and ethical principles and put in place accountability mechanisms for effective governance, both within the focal firm and across with all SC actors. Such an approach is in line with the research IMLA core theme objectives within this study. The leadership approach within this thesis is used to fit the situation and there exists both structured and unstructured situations which need to be catered by the four leadership traits in-built within the IMLA.

8.4 The research emerged theory outline based on the core theme: The IMLA

The emerged core theory, as referred in Section 6.3, implies that for the focal firm to achieve SCI, it needs to implement an IMLA with the support of its business, manufacturing and SC strategies, which together drive the holistic SCI management approach, enabled by technology deployment in manufacturing and in information systems to achieve competitive capabilities.

The IMLA creates direction and alignment across the SC without any boundaries (i.e. beyond the dyad), so that the overall SC will be in a position to pursue a multiple set of competitive priorities. With such an approach, the IMLA needs to be focused on the use of all the SC actors' resources and capabilities effectively and efficiently to be sustainable in all actions. Such a stance enables the overall SC to promote value-added operations and achieves performance improvements in both the manufacturing and the SC processes to achieve its competitive capabilities.

As a result the focal firm, being part of the SC, needs to have the right set-up with a number of different stakeholders, who in-conjunction needs to build a collaborative commitment to fit in each others' strategic goals for a win-win outcome. It is not being excluded that a win-lose situations may even occur from time to time, for both the focal firm and any other SC actor, but the scope of SCI is based on long-term relationships and is not on quick fix solution, and as a result all SC stakeholders consider long term benefits over short term failures to build on the established SC relationships. The SC is as strong as its weakest link, where the SC needs to apply a set of holistic performance metrics, through its holistic SCI management approach, to detect such bottlenecks, so as to prevent from any domino effect originated from any SC actor's failure over the overall SC. Such a stance enables the focal firm to achieve performance beyond a level that it could have achieved on its own through the effective commitment, synergy and empowerment of all SC members.

The IMLA, depending on the management leadership values, ideally adopts a strategic leadership approach, based on a shared leadership mindset, but may else adopt an individual leadership approach, based on a centralised leadership mindset. The IMLA is rooted within four types of leadership styles: transformational; servant; transactional and situational styles respectively, to meet different situations, as referred in Section 6.3.1.

From the findings, it was also derived that to achieve SCI, the management and leadership practices are instrumental in getting the work done at all management levels, with a higher influence on the bottom line. Considering the small size of the firms understudy, being SMEs within the manufacturing sector, the interaction between all management levels with the bottom line employees is evident, since even the CEO tries, on a daily basis, to keep in touch with all staff, to build on a positive relationship between all workers and the top management. Though, one cannot exclude the pronounced effect, of the one-to-one contact and strong relationships that exist between the supervisors and the line managers with all the bottom-line staff. All such interactions constitute SCI initiatives based on an IMLA with a level of shared leadership variation between all staff within the focal firm. Similarly, such a relationship environment is also established with all SC actors across the SC depending on the role of each stakeholder.

The SC also needs to include the customer, since apart from the pull-SC mentality, which has been a widely accepted business principle (Kros et al., 2006; Green et al., 2007; Lambert, 2008), where the customer also needs to be given its due importance. Such a customer interaction commitment, requires that the SC success depends on an open mind and an inclusive mindset of all the SC players, based on both the customers' and SC stakeholders' interests. Though, it is to be noted that the effective customer service approach depends on the manufacturing sector/product type and the SC actor role. As a result, there are firms which act as sub-contractors and make only a part of the whole product, or deliver a service, so the customer is another SC member (e.g. a distributor to a firm). Other firms are fully fledged manufacturers and have a direct link to the customer and as a result the service offered is direct to the final customer, with the possibility to engage in a more closely integrated customer-relationship approach to promote an improved customer service.

In summary, the research main contribution is that the study inductively derived a conceptual framework which extends the current literature, which is mainly based on a dyadic relationship (Croom et al., 2000; Cachon et al., 2007; Xiao et al., 2010; Huang et al., 2012) to a substantive theory that captures all the SC members. The emerged theory outlined that for an integrated SC to achieve its competitive capabilities in different criteria (e.g. sustainability and efficient and effective performance), as referred in the SCI conceptual framework Figure 7.2, requires a complex set of concepts which revolves around the IMLA. Any failure of any SC member to meet the established performance targets may have a negative domino effect on the overall SC. As a result the recommended **roadmap for all SC actors** to follow so as to achieve SCI, based on all the other five (5) main strategic actions, which revolves around the IMLA, is referred in Appendix 12. Though, one needs to keep in hindsight that finally the ultimate pivotal objective for the overall SC is to win in the market and to stay in business.

8.5 Theoretical, methodological and practitioners' contributions

The scope of this research is to produce novel ideas through the extension of current management and leadership theories within the SC context, together with SCI theory and a SCI theoretical framework to assist academics in contemporary and future research and assist practitioners in implementation of best practices to improve overall SC performance.

8.5.1 Theoretical contributions

From this research six theoretical contributions, with a set of seven propositions as summarised in Table 8.1, can thus be identified from the emerged theoretical themes, associated with SCI within the manufacturing SMEs supply chain:

First, this study presents a unique empirical research on SCI initiatives in SMEs within the Maltese manufacturing sector.

To my knowledge, research focused on SCI initiatives within the manufacturing sector in Malta, as a Small Island State, does not exist. Though, one cannot exclude the fact that SCM has been under the focus of several Maltese practitioners, in both manufacturing and services sectors, over a number of years, more than the commitment taken by the local academic institutions. Only lately tertiary education curricula has introduced SCM dedicated courses, except for the disparate individual commitments taken by some people a number of years ago, to push the subject from the business arena, through one-off training programmes, so as to drive policy makers to recognise the importance of such a subject. Hence, such a contribution adds to both the extant literature on SCI and to the Maltese academic work.

Second, the research contributes to the generation of a holistic SCI substantive theory, together with its conceptual framework (Figure 6.1), which is firmly grounded in an in-depth analytic approach based on a broad and multidisciplinary perspective of the data, gathered from SMEs within the Maltese manufacturing sector.

Such a contribution refers to the generated theory based on a holistic theoretical rationale, which captures all the SC members within a SC set-up, beyond the dyad relationship. Such a theory establishes an understanding of what constitutes supply chain integration to meet the overall SC competitive capabilities, within today's dynamic and challenging competitive environment. Such SCI holistic models are scarce or sparse in the extant literature (Vickery et al., 2003; Pero et al., 2010; Garetti & Taisch, 2012; Macbryde et al., 2013). Hence, such research, contributes to the SCI holistic models within the extant literature (Prahalad et al., 1994; Frohlich & Westbrook, 2002; Power 2005; Shi et al., 2005; Fawcett et al., 2008; Gunasekaran et al., 2008; Bayraktar et al., 2009). Furthermore, the extant literature is also used to refine the theoretical model's outcome to strengthen its significance, by extending the competitive capabilities outcome, as an intervening antecedent concept, to both operational and business indicators outcomes, as referred in Figure 7.2.

Third, the research addresses the importance of manufacturing and SC sustainability, technology, quality and lean management bodies of knowledge, in line with the extant literature, where it was established that it is a common belief that both manufacturing and SC strategies need to be targeted according to both the 3BL (triple bottom line) or Triple Ps (people, planet and profit) and the lean management objectives, with the right use of technology, to achieve competitive capabilities.

This research further extends these bodies of knowledge, by stating that this sustainable approach needs to be implemented in all processes including also the administrative and managerial based operations within all manufacturing and SC processes. Such an approach needs the adoption of due diligence and lean procedures through empowered initiatives, in both technical standards (e.g. ISA) and quality standards (e.g. ISO and GMP) together with all managerial approaches, at all management levels, with the right use of technology in ICT and automation to promote economical, social and environmental sustainable processes. The findings established the need of technology deployment in both information management and knowledge sharing initiatives (Sarker & Lee, 2003; Faraj & Sambamurthy, 2006; Fawcett et al., 2007; Schoenherr & Swink, 2012) together with the support it gives to all manufacturing and SC operations to promote competitive efficiencies (Gunasekaran et al., 2008; Bayraktar et al., 2009; Cheung et al., 2012; Abdullah & Musa, 2014; Jin et al., 2014). Technology is also used to eliminate waste in several processes, in line with lean management, by making them more efficient (Cox, 1999; Gunasekaran, 2004; Sanders, 2008). The technology deployment also promotes social sustainability, such as in health and safety issues (e.g. use of robotics in handling heavy items). The findings add to the conversation of technology deployment in manufacturing and SC operations and also to social sustainability within SCM and manufacturing literatures'. The research findings corroborate with the sustainable SCM literature (Elkington, 2002; Seuring & Müller, 2008; Buyukozkan & Berkol, 2011; Sarkis, 2012; Wu et al., 2012; Caniels et al., 2013; Glover et al., 2014; Hsueh (2015). Furthermore, the research findings also complement the lean management literature (Womack & Jones, 1996; Juttner et al., 2007; Bayraktar et al., 2009). It is not being excluded though, that some manufacturing sectors may even demand more stringent sustainability measures, having tougher standards in quality and/or legal measures. Such a contribution also refers to the fact that the economy is inevitably shifting the business climate to a scenario based on low cost operations, with low carbon footprint and with high societal responsibilities. Such a key concern outlines that all SC stakeholders need to implement both sustainable and lean best practices: through the use of environmental friendly resources; by employing environmental focused logistics and by adopting a lean management approach to ensure minimisation of labour, material usage and waste, in line with the 4 R's (reduction, remanufacturing, recycling and reuse); through less energy consumptions based on improved and efficient technology based systems; through less labour costs with improved operations and automation investment; and through more organised human-based activities with the right management and leadership approach.

Fourth, the research established that all SMEs through an IMLA, need to assess and revise on an ongoing basis and with a continuous improvement approach their manufacturing and SC operations, both internally and externally with all the SC stakeholders, to achieve a holistic SCI management approach, enabled by technology, through high quality and sustainable processes, with a particular focus on both managing change/innovation and SC flexibility/responsiveness respectively, so as to improve on the overall SC competitive capabilities.

Such a contribution refers to the fact that a holistic approach enables that all processes are to be innovative and lean, in line with both the quality standards and sustainability measures, which are all summing up to a set of competitive capabilities, as referred in the previous contribution. The literature advocates that to achieve a SCI across the overall SC from a holistic perspective is very challenging (Lambert et al, 1998; Cox, 1999; Lambert & Cooper, 2000; Storey et al., 2006). But, such a holistic approach is a need in today's competitive market, so that the SC becomes responsive and flexible as a unit (Cooper et al., 1997; Cox et al., 2003; Gunasekaran et al., 2008). Such responsiveness and flexibility measures are needed so that the overall SC is in a position to continuously improve all operations through an effective change management approach to promote innovation and maintain or improve on its competitive capabilities (Gowen & Tallon, 2003; Gunasekaran et al., 2008; Cheung et al., 2012; Ellinger & Ellinger, 2014). As a result, the Maltese SMEs, with such an innovative-driven approach with avante-garde technology based solutions, due to their limited use of resources and low labour count, will be able to drive themselves much easier than large firms, so as to achieve high levels of improvements, in line with both sustainable practices and high value manufacturing. Such a contribution adds to the conversation on competitive capabilities literature, since the holistic view of the firm with its value-added activities sum up to such competitive capabilities (Porter, 1985, 1996, 1998; Juttner et al., 2007) by giving a competitive edge over its competitors (Ward et al., 1994). Furthermore, such a contribution also adds to the SMEs literature and to Fisher's (1997) model vis a vis functional products, since SMEs are undertaking innovative initiatives even for such products, which also adds to the competitive manufacturing capabilities. Finally, the technology deployment within the organisation functional areas and outside the organisational boundaries, which provides relevant, timely and accurate information is also considered as a source of competitive capability (Fawcett et al., 2007; Bayraktar et al., 2009; Clegg & Wan, 2013). As a result, the innovative approach taken on functional products and the deployment of technology, are both considered sources of competitive advantage, which are also substantiated by the RBV of the firm (Wernerfelt, 1984; Barney, 1991) and the extended RBV of the overall SC (Matthews, 2003).

Fifth, the research established that the overall SC, through its IMLA, holistically need to involve the human element in building up all the SC up to the end customer, through all the necessary collaborative initiatives, to achieve competitive capabilities. Such a holistic SCI management approach, through the involvement of all the key stakeholders, which is enabled by technology, needs to build on trust and to jointly-derive the necessary business, SC and manufacturing strategies across all management levels, which are all needed to achieve the SC competitive capabilities.

Such a contribution refers to the fact that the IMLA is the managerial and driving force to achieve such a holistic SCI management approach and is also the theoretical concept that acts as the glue that holds the SC members all together in unity, with no boundaries whatsoever, so as to promote synergies and competitive capabilities. This research addresses Sydow et al. (2011) call for further research on the use of management and leadership concepts to achieve SCI. Furthermore, this study substantiates the need of leadership based research across different organisations (Hunt, 1991; Finkelstein & Hambrick, 1996; Osborn & Marion, 2009), even up to the end-customer through downstream integration (Guan & Rehme, 2012). Such a stance cannot be achieved without deploying the right mix of the human element capabilities with the technology based applications, in both ICT and automation, to promote SC visibility, flexibility and responsiveness. It is of pivotal understanding that technology does not replace the human element, but enables and sometimes even drives processes, through improved efficiencies, but the human element remains a crucial asset in both interfacing and decision-making processes. Such a theory based on the pivotal role of the human element complements the need to have the right people with the appropriate skills and talent (Rothwell, 2002; Sarkis et al., 2010; Tarique & Schuler, 2010; Xu & Thomas, 2011) and also substantiates the argument that the role of people with the right human resource management is crucial to the success of the SCM approach (Ashby et al., 2012; Ellinger & Ellinger, 2014). With such a contribution, the focal firm set-up within its functional areas, and even with all SC tiers, with the appropriate collaborative initiatives, will ensure to deploy the human element appropriately, through a holistic SCI management approach, enabled by technology, to achieve the SC competitive capabilities. Hence this study also substantiates the argument that the leadership strategies are pivotal for SCI and performance (Whipple & Frankel, 2000; Osborn & Marion, 2009; Shub & Stonebraker, 2009). Furthermore, in line with Co and Barro's (2008) cooperative and aggressive strategies, all SC actors need to play a pivotal part in all collaborative initiatives. Such a social element requires a new platform based on integrated initiatives (i.e. formalization/collaboration), systemic trust, distributed decision-making and broader and more participative organic structures through continuously trained employees, in line with strategic leadership focused on a distributed leadership approach (Hunt, 1991; Finkelstein & Hambrick, 1996). Such a contribution adds to human resource management, in line with social sustainability criteria, SCM, leadership, strategic management and technology applications, in information systems and manufacturing, within the extant literature.

Finally, this research extends the current set of definitions on SCI by incorporating a more comprehensive theoretical understanding of how to achieve SCI from a holistic approach through the deployment of an IMLA together with its five action main categories and sixteen action sub-categories to achieve competitiveness within a context.

Such a contribution refers to the fact that the emerged conceptual framework is based on a multidisciplinary approach focused on OM, SCM, IT, human resource management, management, leadership, sociological and psychological disciplines. Such a substantive theory is based on the IMLA with its empirical derived theoretical framework is an original contribution to the SCI phenomenon within the extant literature (Zhao et al., 2008; Flynn et al., 2010; Pero et al., 2010; Garetti & Taish, 2012; Schoenherr & Swink, 2012). The IMLA with its four types of leadership traits, it was inductively derived that: with the transformational leadership style, it meets change and innovation through people; with the servant leadership style, it is sensitive for people's needs and at the same time meets the business objectives; with the situational leadership style, it meets contingent situations; and with the transactional leadership style, it meets the routine flow of transactions in line with the established performance measures. This study complements the theories on the four leadership traits: Transformational (Burns, 1978; Bass, 1985; Bass & Avolio, 1994, 2000); Servant (Greenleaf, 1970); Situational (Fiedler, 1967; Lawrence and Lorsch, 1967; Thompson, 1967; Hershey & Blanchard, 1969); and Transactional (Burns, 1978; Bass & Avolio, 1994; Bass, 1997). Such a research also adds to the theory on strategic leadership, based on a distributed leadership approach across the SC within the leadership, SCM and manufacturing extant literatures, in line with McCauley-Smith et al.' s (2013, p.99) inference, where they stated that there is the need of 'sharing of good practice through an interdependent leadership approach'. Though, such a contribution does not exclude the fact that some SMEs may still have a top management style that adopts an individual leadership approach.

N.O.	**Theoretical Propositions**
1	To achieve supply chain integration the **IMLA** needs to be deployed at the strategic, tactical and operational management levels, with due consideration of each SC actor contextual conditions, so as to establish and implement the right **strategies** for the **business, manufacturing** and **SC**, within the focal firm and in-conjunction with all SC actors, based on a **holistic SCI management approach**, which is enabled by **technology**, so as to achieve **competitive capabilities**.
2	The **IMLA** needs to adopt a strategic leadership approach to build on the collective effort of all people based on four types of leadership traits to achieve both intra and inter-SCI, where: the transformational leadership style, needs to meet the change and innovation through people; the servant leadership style, needs to be sensitive for people's requirements and at the same time meets the business objectives; the situational leadership style, needs to meet contingent situations of all actors; and the transactional leadership style, needs to meet the routine flow of transactions in line with the established performance measures.
3	The **business strategy** through both the **manufacturing strategy** with its make or buy decision and the **SC strategy** collaborative initiatives with either an arm's length or close relationships determined by the role of each SC actor, need to apply the **IMLA** with the involvement of all SC actors, so as to jointly establish, from a **holistic SCI management approach**, the most effective and efficient operations set-up so as to promote **competitive capabilities**.
4	All SMEs through an **IMLA**, need to assess and revise on an ongoing basis and with a

	continuous improvement approach, their manufacturing and SC operations, both internally and externally with all the SC stakeholders, to achieve a **holistic SCI management approach**, enabled by **technology**, through lean, high quality, sustainable (3BL or Triple Ps) and HVM processes, with a dedicated focus on both managing change/innovation and SC flexibility/responsiveness respectively, so as to improve on the overall SC **competitive capabilities**.
5	The overall SC, through its **IMLA**, holistically needs to involve the human element in building up all the SC up to the end customer, through all the necessary collaborative initiatives, to achieve **competitive capabilities**. Such a **holistic SCI management** approach with its 16 sub-categories (Figure 7.2), through the involvement of all the key stakeholders, which is enabled by **technology**, needs to build on trust and to jointly-derive, through a common mindset, the necessary **business, SC** and **manufacturing strategies** across all management levels, which are all needed to achieve the SC **competitive capabilities**.
6	**Technology deployment** in IT applications and automation needs to adapt to all information and manufacturing processes requirements and needs to be an enabler of the **holistic SCI management** approach, to promote operational and knowledge sharing initiatives together with streamlined and optimised workflows, both within the focal firm and across the SC, to achieve **competitive capabilities**.
7	The **IMLA** together with its **business, manufacturing** and **SC strategies** with the **holistic SCI management approach** enabled by **technology** promote **competitive capabilities**, which consist of: SC flexibility and visibility; business continuity; continuous improvement; optimised and lean operations; effective and efficient performance; sustainability and effective customer service. All such capabilities are antecedents to both **operational** and **business indicators** (Figure 7.2).

Table 8.1: Theoretical Propositions from the emerged substantive theory (Author)

8.5.2 Methodological contributions

This research has used a grounded theory approach to generate a substantive theory that explains SCI initiatives within the Maltese manufacturing SMEs. As a result such a study extends the applicability of grounded theory based research within SCM and related OM disciplines since it was found as the 'best-fit' methodology since the research objective is after theory verification and generation (Suddaby, 2006; Binder & Edwards, 2010), where the emerged theory was verified and validated by the iterative constant comparison process (Section 3.9).

Furthermore, such a study answers the call for such a GTM methodology usage, since 'it is not very widespread and rigorously applied in operations management (OM) research' (Binder & Edwards, 2010, p.232).

Finally, although the researcher has clearly indicated the systematic approach taken by the GTM approach (Strauss & Corbin, 1998), the overall theorising process was not a continuous sequential process, but there were instances, that the researcher needed to conceptualise at different stages to assist the theorising process, through theoretical abstractions, so as to reach a higher level of understanding of what the data were saying to arrive at the emerged theory.

8.5.3 Contributions to practice and to policy

The substantial part of the research is focused on the role of practitioners within manufacturing and SC operations, since the primary data constituted a key part of the research commitment with its collection and analysis. Various secondary data sources were also retrieved to understand the implications of policies and practices. In general, the Maltese manufacturing sector has always been considered one of the pillar stones of the Maltese economy, due to its substantial contribution to the economy GDP. Furthermore, such outstanding performance has currently captured the attention of the EU community since 2004, with Malta's EU membership and also within world-wide reports and indicators, such as those published by the WEF (2014a) (Appendix 1), among other rating companies, such as Eurostat, Standards and Poor's and Fitch Ratings respectively.

The Maltese manufacturing has been classified by the WEF within an innovative-driven phase (WEF, 2014a), which is the final stage in the three development stages of global competitiveness. As a result, the Maltese economy is considered as a country with substantial potential and economic prosperity, especially in business sophistication and innovation, such as manufacturing. In fact, Malta's SMEs, currently are undertaking substantial investment in specialised manufacturing, which in turn are increasing the commitment to training and development of all employees (Ernst & Young, 2013). In the global scenario, SMEs have always been considered to have a pivotal role within the economy of most emerging countries in the generation of employment and economic growth (Demirbag et al., 2006). Furthermore, SMEs play a key role within SC set-ups by taking various roles, such as suppliers, distributors, producers and customers (Hong & Jeong, 2006). Though, one cannot exclude the challenging reality subjected to the Maltese SMEs within its specific contextual conditions, vis a vis the small local market, the geographic isolation and the lack of economies of scales. Such contextual conditions are contributing to the negative repercussions to all local SMEs, especially in their negotiations of transactions with the global suppliers and SC actors, due to the relatively low order levels, which are sometimes well below their acceptable minimum orders. Such a small economy is also contributing to the relative high fixed cost attributed to logistics in all supply chain transportation requirements due to the low order volumes.

As a result, considering such issues and challenges, it is of pivotal importance for policy makers to serve as a supporting platform for all SCI initiatives to be adopted by SMEs by listening to all stakeholders' requirements, which are both directly and indirectly related to the manufacturing and supply chain operations. Such an approach will establish the overall and specific needs of the industry and the public community, which also needs the direct and active involvement of representatives from the key academic communities to bridge the gap between the practitioners and the academics. The interaction process of all stakeholders shall not be based on one-off solutions, through say launch of white papers, but the process need to entail and establish an on-going dialogue, through various sources of communication with all involved actors. Such an approach could be achieved by: organising face to face meetings and events; establishing committees made up from the key industry's stakeholders with the relevant Government officials to set-up public and private partnerships; and deploying on line forums to encourage participation of key stakeholders, based on various communities, such as local, EU and worldwide representatives, since nowadays the industry is borderless and runs all across the globe. Such a stance is needed so that all policies and innovative development programmes (e.g. FP 7) should be developed with the right and professional approach and with the full collaboration between the industry practitioners, the policy makers and the academic communities, so as to meet all societal challenges with a sustainable approach, in line with the social, economic and environmental measures to promote SMEs competitiveness.

In a nutshell, the SCI initiatives, from the practitioners' perspective may lead to various improvements, where the key ones are: synergy in all collaborative initiatives between SC actors to achieve outstanding competitive performance across the SC; lead time effective management with more dedicated effort with all SC members to meet or exceed competitive performance benchmarks; employ an effective waste management approach in all resources usage, such as actions at source and a dedicated commitment for the reduction of tasks' duplication to promote efficiencies; improved and proactive customer support in all interactions to promote an effective customer service; ownership of ideas and responsibilities to enhance a motivated workforce with improvements in productivity to achieve best practices and innovation; supply management cost-savings measures through better negotiation of purchasing by gaining both better prices and credit terms to achieve economic sustainability; and implementing sustainable processes across all the SC tiers to create a positive social climate at the workplace and to achieve a sustainable product to the end customer.

8.6 Research limitations

The research offered a credible, valid and trustworthy substantive theory based on a GTM, as already referred in the methodology Chapter 3, which is attributed to the several precautionary measures to promote such research rigour in line with the scientific research agenda. Though, this research work is subjected to different sources of limitations, which in some way or another, could not be avoided, as referred by the salient issues below:

First, the research focuses on the Maltese SMEs manufacturing sector. Hence all generalisations to the theory may not be applicable outside this manufacturing sector environment, such as services and not even within other contexts, such as in other countries, even within other Small Island States.

Second, the sample is limited, since not all SC members could be included for every focal firm understudy so as to cover the whole SC. If they were included, more rich data could have been available, so as to refine or validate further the theorising process. Such a shortcoming could not be completely solved, since one of the reasons was attributed to the fact that some SC actors forming up part of the focal firm's SC (e.g. suppliers, upstream and downstream distributors and customers) were not accessible, being located in a foreign country. Another reason was attributable to the limited available research time-span, since the data collection was not based on a one-off exercise period from a number of participants, but consisted from an iterative process of almost two years of data collection and analysis, consisting from face-to-face meetings, where the good rapport with the participant was considered pivotal to capture rich data.

Third, the research did not identify the theoretical effect of each particular leadership style from the four established traits and neither developed further theory on the effectiveness of each trait individual leadership elements (e.g. inspirational, charisma) that contributed to each competitive capability, but considered the overall competitive capabilities from a holistic perspective.

Fifth, in some cases data collection was limited due to the controlled and limited access given, since for some firms, the data obtained had to rely on a single informant, who may have added a level of subjectivity and bias to the research response, since a single person could have a limited oversight of all the SC operations, which are complex and span several functional areas. Other limitations for capturing data from the firms, was attributed to the fact that some firms declined my request for participation, stating that they were not interested to participate at all. The latter approach is part of the ethical research process.

Sixth, this study theoretical richness may have been limited by the use of a cross-sectional research design, which only captured a snapshot of what the data were saying at one moment in time. Because SCI is a long-term strategic commitment and not a quick fix approach between all customers, suppliers and manufacturers, such a SCI is developed over time and is also function of different product lifecycle stages. As a result a longitudinal study would have captured different levels of SCI across a timeline and would have rendered more rich data based on more variations in the integrative capabilities and the type of integration adopted approach between SC actors. Such a shortcoming to overcome would have been very challenging since it would have entailed a much longer research data collection period, which is very limited in such studies.

Eight, the research has produced a parsimonious model of a set of antecedents and outcomes of inter-organizational conceptual elements that constitute a SC made up from the focal firm and a number of stakeholders, embedded within the contextual conditions of the focal firm. Such a holistic model comprises various concepts which include a theory based on substantial breadth but the in-depth explanations were mainly focused on the six main categories (i.e. the main constructs) and not on the sixteen sub-categories, within the holistic SCI management approach, due to the research limitation of word count.

Ninth, the research dedicated limited depth regarding the servitization of manufacturing (Lightfoot et al., 2013) or integrated solutions of manufacturing (Davies et al., 2006) since within the emerged theory, the customer service emerged as one of the sub-themes, although currently such a concept is considered pivotal in the literature, due to the current customer focused initiatives being undertaken by SMEs for improved and value-added customer services.

Tenth, the research with the deployment of the systematic approach, in line with the GTM techniques and procedures (Strauss & Corbin, 1998; Corbin & Strauss, 2008), may have stifled the theory emerging process. In fact the process, in several instances, needed an iterative analytic stance, to shift bi-directionally, from one stage to another. Though, such a methodological and organised approach was found very useful and practical due to researcher's embedded approach on how he treats all his challenges and issues, both when he was a practitioner for fifteen years, as a Senior Engineer and currently, as an academic, as a Senior Lecturer for last nine years.

8.7 Suggestions for future research

The substantive theory with its theoretical model is very comprehensive and consists from a multiplicity of factors, which have a varying degree of impact on SCI, which were not quantified. Hence future research may study such concepts, to derive their receptive weighted significance to the SCI initiatives to achieve competitive capabilities.

The proposed framework, together with the seven propositions (Table 8.1), shall be used to direct future researchers to investigate the role of all conceptual elements relationship, through a large scale study from a quantitative approach, to enhance its validity and generalizability and also to sustain or invalidate such a substantive theory with its theoretical framework. The sample under such research shall incorporate other contexts or adopt a cross-cultural study within EU or across different worldwide countries. Furthermore, such research may be also focused on a set of Small Island States to derive the commonalities and differences in such homogenous type of countries, such as Malta.

Future research may determine the particular leadership style (e.g. transformational) and/or leadership elements (e.g. inspirational and participative) needed to achieve SCI with each respective competitive capability.

It will be fruitful for future research to examine the evolution of SCI patterns across time by undertaking a longitudinal type of research design.

Future research may focus more on the individual emerged sub-categories in relation to the inductively derived holistic SCI management approach within this study, since due to the research limitations of word count, there was lack of space to include such an analytic depth in such sub-themes.

Future research needs to explore the customer service approach within the context of research focused on the servitization of manufacturing (Lightfoot et al., 2013) or integrated solutions of manufacturing (Davies et al., 2006).

8.8 Summary of the conclusion

This chapter highlighted the generated substantive theory, the research significance and the roadmap for implementing such an emerged theory in practice (Appendix 12).

The theoretical contribution is based on the identification of the SCI theory with its key factors, which are required to achieve competitive capabilities for the Maltese SMEs within manufacturing. Such contributions are supported by seven propositions for furthering the theory within SCI through future quantitative positivistic research approach, thus making the research even more robust. It is to be noted, that in reality a perfect inter-firm integrated environment with equitable sharing of mutual benefits, between all SC actors, to achieve all competitive capabilities, does not exist. Such theoretical contributions mainly provided: an original contribution, through the IMLA and the emerged theory with its theoretical framework; a unique research focused on the SCI within the Maltese manufacturing sector; an answer to the literature gaps associated with both the holistic SCI models and also to the management and leadership concepts within the SCM literature; and an added conversation to the extant literature vis a vis sustainable SCM, technology, lean management and competitive capabilities.

The methodological contribution is based on the fact that it extends the applicability of grounded theory based research within SCM and related OM disciplines by answering to the call for such a GTM methodology usage within operations management research and also highlights the need that the

GTM systematic process also needs a level of flexibility to conceptualise and promote theoretical abstraction.

The practical contribution is based on the fact that the Maltese SMEs have a substantial number of opportunities, in both the local and global scenario, since Malta is competing with both EU and other World-wide countries, having an innovative-driven economy within manufacturing. This scenario shall encourage all local SMEs to implement SCI initiatives to exploit from all the competitive advantages offered by such integrated efforts with all SC actors. Such SCI initiatives in-conjunction with the high-value manufacturing investments, shall promote both higher revenues and also an improvement on the manufacturing sector contribution to Malta's GDP. This cannot be achieved without the support and involvement of the local Government and EU through incentives and investment schemes.

This chapter also examined the limitations of the research, which highlighted the key shortcomings which were the research relative small sample size, the nature of the cross-sectional research design, the restricted access to multiple participants and to a wider set of SC actors. Finally, it was also outlined the opportunities to conduct future research to extend this thesis study and also to refine the contemporary extant literature on the SCI phenomenon, in particular to: undertake in-depth research in certain concepts, that could not be unpacked by this research so as to understand the underpinning theory behind them, such as servitization of manufacturing; conduct cross-cultural studies within EU or across different worldwide countries, with the inclusion of Small Island States to promote further research generalizability; to examine the evolution of SCI patterns across time by undertaking a longitudinal research approach; and to establish from the comprehensive and complex set of dimensions, within the holistic SCI management approach, the weighted significance to the SCI substantive theory by distinguishing the level of importance of each factor to achieve competitive capabilities.

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Appendix 1: Overview of the Maltese manufacturing scenario

A1.1 The Maltese Business Scenario vis a vis the EU and Global Economy

The impact of the global financial and economic crisis on the industrial activities and the subsequent recovery, within manufacturing, can be clearly seen for the last seven years timeline by Eurostat (2014) for EU member states and a small selection of other world-wide countries, as referred in Figure A1.1 together with a detailed outline of their GDP and their GDP per capita for four different years in Table A1.1. The GDP of various countries contracted due to the 2009 economic global recession, which followed a recovery in 2010. In the year 2012, Brazil and the EU-28 were the only G20 members to record falling industrial output (Eurostat, 2014).

The Maltese wealth performance statistics with its track record in positive performance can be seen in the GDP per Capita, due its relatively high level of standard of living, when compared to other large EU countries, such as UK and Germany, being 86 relative to 104 and 126 as their respective position, with reference to the year 2012, but on the other hand Malta's GDP is then considered very low due its small economies of scale and its small market size, as referred in Table A1.1.

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Figure A1.1: Industrial Production Index for EU and G-20 members (Source: Eurostat, 2014, p.101)

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Table A1.1: GDP at current market prices, 2002–03 and 2011–13 (Source: Eurostat, 2014)

From a global perspective, both within and outside the EU-member states, the World Economic Forum (WEF, 2014a), in its Global Competitiveness Report (2014–2015), analyzed the competitiveness performance of 144 economies with their microeconomic and macroeconomic foundations of national competitiveness based on 12 pillars of competitiveness. Such a report listed all economies ranking according to their performance to derive each Global Competitiveness Index (GCI), as referred in Figure A1.2. The WEF report outlined that policymakers need to integrate the public sector together with the private sector, by even employing public-private partnerships, who need to work together to promote a more robust economic growth by adopting more-inclusive economies to gain from synergies of the two sectors for improvement not only in productivity but also in social development and environmental stewardship.

The 12 competitive pillars, referred in WEF report, are not independent, since they tend to reinforce each other and as a result a weakness in one area may have a negative impact in others. The World Economic Forum (WEF, 2014a, p.55) defines sustainable competitiveness as: ‘the set of institutions, policies, and factors that make a nation productive over the longer term while ensuring social and environmental sustainability’. Furthermore it defines social sustainability as: ‘the institutions, policies, and factors that enable all members of society to experience the best possible health, participation, and security; and that maximize their potential to contribute to and benefit from the economic prosperity of the country in which they live’ (Ibid). Finally, it defines, ‘environmental sustainability as the institutions, policies, and factors that ensure an efficient management of resources to enable prosperity for present and future generations’ (Ibid).

From the above, the WEF report clearly outlined the importance that for the economy of any country to be competitive, in line with the competitive benchmarks, must also respect both the social and environmental sustainable factors, since such factors may have a domino negative effect if such actions are not implemented with due diligence (e.g. scarcity of resources, such as water and agricultural products, extreme weather conditions, due to drastic climate changes, unhealthy environment, due to extreme pollution levels with more labour sickness, higher prices due to lack of resources, lack of sales due to customer green-expectations products, lack of workplace safety, etc) .

Most of the businesses nowadays are hence focussing on measures and actions based on more efficient use of resources by using renewable sources of energy and investments in more green friendly products and processes in production and services, to remain competitive through innovative and avante-garde business solutions.

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Figure A1.2: Global Competitive Index pillars of competitiveness (Source: WEF, 2014a, p.9)

Malta has been classified in stage 3 in its GCI, being located in the 'innovative-driven' phase within the world economy and with a ranking position of 41 in the year 2013-14, as referred in Figures A1.3 and A1.4, where all the pillars, from 1 to 10, as referred in Figures A1.2 and A1.4, result that the Maltese economy has a substantial competitive level of economic prosperity in view of its relative small domestic market size and its SIS economy. As a result, the Maltese wages have reached above the EU established minimum wage level, with a relatively low level of unemployment rate and with salaries which are adaptable to the position or role of employees. The economy has also reached a relative high level of improvement in the standard of living and in healthcare from a social perspective. The country has also enforced environmental regulations and is engaged in several environmental initiatives as part of the Government and private sector agendas, with a wide programme in renewable energy investments in photovoltaic systems across the Island, waste water treatment, fisheries investments, such as fish-farms and with several other investments, from an environmental perspective, to control and reduce carbon emissions in various sectors. Such an economy, with such measures, is investing not only to achieve an industry with sustainable economic performance but also to reap the benefits from both environmental and social sustainability, with businesses who are able to compete with new and unique products and using sophisticated production processes (pillar 11) and by innovating new ones (pillar 12) and a the same time with dedicated training and educational programmes to all relevant people.

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Figure A1.3: Maltese GDP (Source: WEF, 2014a, p.264)

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Figure A1.4: Radar plot of Malta's GCI and Stages of development (Source: WEF, 2014a, p.264)

A1.2 The Economic Statistics of the Maltese Manufacturing SMEs

The Maltese economy over the last decade underwent a gradual shift from the manufacturing towards the services sector, but still manufacturing has still a pivotal role but with a declining contribution to the economy. Such a shift within manufacturing is explained by the fact that the industrial development began in the second half of the 1960s, and by the early 21st century the manufacturing sector was contributing to about 20% of the gross domestic product (GDP). Since the 1980s the manufacture of computer parts, instruments, and electronics, as well as a large variety of consumer products (toys, cosmetics, detergents, and foodstuffs), has been important. In the early 2000s, light manufacturing (e.g. pharmaceuticals, semiconductors, automotive, airplane parts and software) replaced much of the low-cost labour-intensive production that had earlier played a more important role in Maltese manufacturing. Pharmaceutical production in particular has grown rapidly, as a result of the patent law advantages that Malta gained upon EU membership.

For the last ten years, since Malta's EU membership, in every political legislation to-date, there has always been the allocation of substantial EU funds for the manufacturing sector, as part of good governance. Such initiatives are being used to continue to strengthen the local industry through incentives that assist in the development of new technologies and e-business, the sustainability of the energy sector, start-ups, the identification of new markets, research and innovation, international competitiveness and the environment, in line with the climate change EU policies. Further focused incentives are being dedicated to the private sector to attract further new FDI with fast processing of permits to launch the businesses with minimal bureaucracy and by establishing tax credits in all expenses incurred on internationalisation efforts.

This type of support is further enhanced through more grants in tax credits to incentivise and to trigger investment in line with the European Regional Development Fund (ERDF) Grant Schemes. The manufacturing industry investments and commercialisation are also enhanced by creating a common infrastructure, through a private-public partnership, for products design and prototyping of new innovative products and to adapt to the competitive pressures in the global market.

The average full-time employment in the manufacturing sector was 20,803 in 2010, with an industry sectors' segmentation of retail (40%), manufacturing (10%) and general services (50%), such as real estate, hospitality and financial services, as the key GDP sectors which contribute most to the Maltese economy. The local manufacturing industry continues to be characterised by a large number of small firms (those with less than 10 employees), which are referred as micro enterprises, which together with SMEs, are contributing to the nation's economy, job creation and innovation. The larger firms, however, account for over 90 percent of total manufacturing output. The portion of micro, small and medium enterprises in Malta represents 99,9% of the total number of enterprises, showing the relative few amount of large classified firms. SMEs are classified by 'less or equal' values in size, with respect to employee count and turnover, in million of Euros, where small sized firms are classified as (50, 10) and medium sized firms as (250, 50) respectively (European Commission, 2003).

Over 200 export-oriented foreign companies operate profitable manufacturing subsidiaries in Malta, within the micro, SMEs and large classifications respectively, which are also benefiting from attractive incentives. In May 2004, with Malta's accession to the EU, goods produced in the EU, or goods that were already in free circulation in the EU, were exempted from the payment of customs duties, and only goods exported to non-EU countries are subject to the payment of export duties. From an SME perspective in all sectors, they employ about two-thirds of the private sector workforce, and contribute to more than half of the country's value added (Ernst & Young, 2013).

The distribution of the manufacturing industry in Malta is governed by a large number of indigenous SMEs which includes also a substantial larger number of micro business units of less than 10 employees with less or equal 2 million of Euros of revenue (European Commission, 2003), which exceed the count for both all SMEs and large firms. In fact, the industry overall sectors (not only manufacturing) is mainly dependent on the micro sized firms since they amount to 68,743 units whereas the small, medium and large amount to 1572, 384 and 83 units respectively (NSO, 2012), as illustrated in Figure A1.5, which only excludes the micro-sized statistics. It is to be noted that these statistics need to be seen from the perspective of the contribution to the GDP, which is function of a complex set of variables, where the large-sized firms, although they are relatively few, contribute to the largest amount of revenue to the GDP. Malta has a strong economy with an overall manufacturing industry export revenue greater than 38% on the overall import in the year 2013, as referred in Table A1.2. The previous Table also shows the comprehensive list and different types of manufacturing sectors located in Malta, which are referred by the standard NACE coding system.

Figure: A1.5 Types of firms by size distribution in Malta with number of units (Left) and employment size (Right) (Source: NSO, 2012)

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Table A1.2: Manufacturing by NACE code with imports and exports levels in Euros (Source: NSO, 2014)

The Maltese manufacturing sector, as it happens in most countries in the World, has a substantial contribution to the GDP. The GDP contribution and its GDP growth for a period of three years are referred in Table A1.3, where the contribution is increasing but the rate of growth is decreasing.

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Table A1.3: Gross domestic product at market prices (Source: NSO, 2013)

A1.3 Malta's infrastructure within the manufacturing SC

Malta boasts some of the finest natural harbours in the world, although it is subjected to the insularity and peripherality challenges relative to various other EU member states. Extensive conventional and roll-on/roll-off services by national and international shipping lines carry freight and cargo from Malta directly to Mediterranean, North European, Middle Eastern and Asian ports. All factories are located within 30 minutes of the two harbours and the airport. For all local based SC actors, Malta is an ideal candidate that gains from local sourcing advantages and close-relationships, due to the proximity issues, as a small island, which promotes better teamwork and can exploit the enhanced collaborative environment with all stakeholders, through trust building, as a result of all the face-to-face interactions. Such close proximity characteristic, apart from an improved social climate also adds to more sustainable operations, with improvements in both economic and environmental targets.

The key infrastructural advantages attributed to Malta as a Small Island State are:

The Freeport: The Malta Freeport Corporation embraces three prime activities namely, container handling, industrial storage and oil products handling. The Freeport is recognised as a high profile transhipment hub and presently enjoys third place amongst all Mediterranean transhipment ports. It handles over one million TEUs per annum (twenty-foot equivalent units) and has network connections to over 95 ports world-wide.

Air transport: Air connections with major European destinations are efficient and frequent. Twelve legacy carriers operate scheduled air services to 37 destinations. The national airline, Air Malta, operates regular scheduled flights to the major European cities—a total of over 45 direct destinations with 200 flights a week. Low-cost carriers are gaining in popularity, accounting for over 25 per cent of all departures. The Malta International Airport, which handles some 2.5 million passengers annually, is a modern, spacious and efficient terminal.

Postal services: Postal services are efficient and reliable. Letters to Europe normally take two days to reach their destination. For faster service the major international courier service companies operate to and from Malta (e.g. UPS and DHL). The Malta Post Office operates an Expedited Mail Service (EMS Datapost) with guaranteed delivery times.

Telecommunications systems: Malta has one of the leading telecoms network backbone, with four mobile and broadband operators, which were upgraded according to plans drawn up by the International Telecommunications Union (ITU). International connections have been significantly expanded through satellite technology and a high-capacity fibre-optic cable links between Malta with Europe. Internet usage by enterprises stood at 94 per cent in 2010, while 70 per cent of households had access to internet at home.

Human resources: Malta is reaping the fruit of the massive investment in the educational sector in the past years so much so that 83 per cent of students were continuing with post secondary education (NSO, 2010). The government invested massively to improve educational standards and introduced major reforms including the college system, whereby students were getting a more holistic education. The labour force in Malta is a very productive one, highly educated, multi-lingual and extremely flexible with an excellent work ethic. The people are the greatest natural resource and the country has good availability of professional, managerial and technical staff as well as a ready supply of top graduates most of whom are technology-experienced.

The Research and Innovation Strategy (Vision, 2015) for Malta seeks to focus the national investments in Research and Innovation (R&I) for economic growth in the following priority areas: Energy and Environment; ICT; Health and Biotech; and Value Added Manufacturing.

Appendix 2: A Priori Literature Review Significant Concepts

Item N.o.	Dimension	Dimension variables	Specific Authors
1	Information integration (includes information associated with physical flow)	Information sharing with customers/suppliers (such as orders levels, involvement in design etc)	Bagchi et al. (2005); Cagliano et al. (2006); Das et al. (2006); Frohlich and Westbrook (2001); Devaraj et al. (2007); Koufteros et al. (2007); Lambert & Cooper (2000); Power (2005); Rosenzweig et al., (2003); Stank et al., (2001) ; Swink et al., (2007); Cassivi (2006).
		Information technology/e-business/information systems capabilities	Bagchi et al., (2005);Chen et al. (2004); Cagliano et al. (2006); Devaraj et al. (2007); Power (2005); Vickery et al. (2003); Stank et al. (2001); Droge et al. (2004); Kim (2009).
		SC visibility	Bagchi et al. (2005); Devaraj et al. (2007);Kim (2009); Koufteros et al. (2007); Lambert & Cooper (2000).
		Strategic and Planning information access by various functional areas within (e.g. purchasing) and outside the focal firm	Bagchi et al., (2005); Cagliano et al. (2006).
		Information sharing risks (e.g. propriety information)	Bagchi et al. (2005).
		Forward and reverse information flow	Cagliano et al. (2006).
		Leverage information from others (suppliers, customers etc)	Cagliano et al. (2006); Koufteros et al. (2007).
		Align and streamline processes within and across the SC tiers	Cagliano et al. (2006); Kim (2009); Lambert & Cooper (2000).
2	Strategic integration (with suppliers, customers, internal and product-process integration)	Manufacturing through lean/agile (technical initiatives)	Cagliano et al. (2006); Gunasekaran et al., (2004c); Kim (2009);Yusuf et al. (2002); Kros et al. (2006); Green & Inman (2005).
		Manufacturing through ERP system	Cagliano et al. (2006); Power (2005).
		Computer aided manufacture (CAD, CAM, CIM etc)	Droge et al. (2004); Gunasekaran et al. (2004c); Vickery et al. (2003); Gunasekaran et al. (2002).
		Standardized practices	Droge et al. (2004).
		Knowledge and learning (culture)	Das et al.,(2006); Gunasekaran et al., (2004c); Koufteros et al. (2007); Pagell (2004).
		Strategic planning	Gunasekaran et al. (2004c); Power (2005).
		Virtual enterprise organisation structure (virtual integration or virtual organisation) as a form of partnerships, alliances and cooperation	Gunasekaran et al. (2004c);Kim (2009); Pagell (2004); Power (2005); Gunasekaran et al. (2008).
		Intra- and inter-managed organisational processes (forward and reverse information and physical flows)	Flynn et al. (2010); Gunasekaran et al. (2004c); Frohlich & Westbrook (2001); Kim (2009); Koufteros et al. (2007); Lambert & Cooper (2000); Rosenzweig et al. (2003); Vickery et al. (2003); Swink et al. (2007); Malhotra et al.(2005); Simchi-Levi et al. (2004).
		Competitive capabilities (cost leadership, differentiation and innovation)	Bagchi et al., (2005); Chen et al. (2004);Kim (2009); Lee (2000); Power (2005); Rosenzweig et al. (2003); Swink et al., (2007); Gunasekaran et al. (2008); Gunasekaran et al. (2004b); Koh et al. (2004); Flynn & Flynn (2004).
3	Strategic	Customer focus/close customer	Chen et al. (2004); Frohlich and Westbrook

	Collaboration (including tactical and operational)	Relationships (e.g. sales administration)	(2001); Bagchi et al., (2005); Narasimhan & Kim (2001); Droge et al. (2004); Rosenzweig et al. (2003); Stank et al. (2001).
		Strategic purchasing	Chen et al., (2004); Gunasekaran et al., (2004c); Vickery et al., (2003); Giunipero et al., (2005).
		Top management support	Chen et al., (2004); Stank et al., (2001).
		Information technology (e.g SC software)	Chen et al., (2004); Cagliano et al., (2006); Frohlich and Westbrook (2001); Power (2005); Vickery et al., (2003); Bagchi et al., (2005); Sanders (2007); Frohlich and Westbrook (2002); Harland et al., (2007); Devaraj et al., (2003).
		Supply network structure (close suppliers relationships)	Chen et al., (2004); Rosenzweig et al., (2003); Vickery et al., (2003); Giunipero et al., (2005)
		Long-term relationship with suppliers and buyers (risk and reward management)	Chen et al., (2004); Koufteros et al., (2007); Stank et al. (2001); Zhao et al. (2008).
		Supply base reduction	Chen et al. (2004); Koufteros et al. (2007)
		Communication	Chen et al. (2004); Cagliano et al. (2006);Das et al. (2006); Gunasekaran et al. (2004c); Koufteros et al. (2007); Pagell (2004); Power (2005).
		Inter and intra cross-functional teams/resource sharing	Chen et al. (2004); Cagliano et al. (2006); Das et al., (2006); Koufteros et al., (2007);Lambert & Cooper (2000); Lee (2000); Rosenzweig et al., (2003); Stank et al., (2001); Vickery et al. (2003); Gunasekaran et al. (2004c); Ajmera et al. (2009); Pagell (2004); Zhao et al. (2008).
		Logistics integration (e.g. distributors/retailers)	Chen et al. (2004); Kim (2009); Rosenzweig et al. (2003); Stank et al. (2001); Cambra-Fierro & Ruiz-Benite (2009).
		Information sharing (e.g. production information with both customers/suppliers)	Cagliano et al. (2006); Das et al., (2006).
		Collaborative planning and/or forecasting	Devaraj et al. (2007); Lee (2000); Stank et al. (2001).
		Inventory management (suppliers-side)	Bagchi et al. (2005).
		Joint decision-making and problem solving	Bagchi et al. (2005); Lee (2000); Stank et al. (2001); Narasimhan & Kim (2001); Das et al. (2006); Ajmera et al. (2009).
		Risk management from shared Information systems	Bagchi et al. (2005).
		Performance measurements (operational and business) and rewards (includes both forward and reverse logistics across the focal firm functional boundaries and across the overall SC tiers)	Pagell (2004); Rosenzweig et al. (2003); Stank et al. (2001) ;Vickery et al. (2003);Chen et al. (2004); Das et al. (2006); Deveraj et al. (2007); Droge et al. (2004); Flynn et al. (2010); Kim (2009); Swink et al. (2007); Neely et al. (2005); Gunasekaran et al. (2001); Boone & Ganeshan (2007).
4	SC/IT technology	ERP-based system/e-business (using XML on-line access on the internet or virtual private network)	Bagchi et al. (2005); Cagliano et al., (2006);Deveraj et al. (2007); Power (2005); Vickery et al. (2003); Nurmilaakso (2008); Power (2005); Cassivi (2006); Laudon &

			Laudon (2000); Huang & Gangopadhyay (2004)
		Direct access IT infrastructure both intra and inter-organisational	Bagchi et al., (2005)
5	Operational performance measures	Customer satisfaction/responsiveness (support and speed of service)	Chen et al., (2004); Droge et al. (2004); Flynn et al. (2010); Gunasekaran et al. (2004c); Frohlich and Westbrook (2001); Kim (2009); Rosenzweig et al. (2003); Swink et al. (2007); Vickery et al. (2003)
		Cost (manufacture)	Chen et al., (2004); Das et al. (2006); Frohlich and Westbrook (2001); Rosenzweig et al. (2003) ; Stank et al. (2001); Swink et al. (2007)
		Quality	Chen et al., (2004); Das et al. (2006); Frohlich and Westbrook (2001); Rosenzweig et al. (2003); Swink et al. (2007)
		Delivery (speed)	Chen et al., (2004); Das et al. (2006); Droge et al. (2004); Flynn et al. (2010); Frohlich and Westbrook (2001); Rosenzweig et al. (2003); Swink et al. (2007); Vickery et al. (2003)
		Flexibility (process and product)	Chen et al., (2004); Das et al. (2006); Flynn et al. (2010); Gunasekaran et al. (2004c); Frohlich and Westbrook (2001); Rosenzweig et al. (2003); Swink et al. (2007)
6	Financial performance measures	Market share (performance)	Chen et al., (2004); Das et al. (2006); Droge et al. (2004); Flynn et al. (2010); Frohlich and Westbrook (2001); Swink et al. (2007)
		Return on investment	Chen et al., (2004); Das et al. (2006); Droge et al. (2004); Flynn et al. (2010); Frohlich and Westbrook (2001); Rosenzweig et al. (2003); Vickery et al. (2003)
		After sales profit	Chen et al., (2004); Das et al. (2006); Droge et al. (2004); Flynn et al. (2010); Frohlich and Westbrook (2001).
		Sales growth	Das et al. (2006); Droge et al. (2004); Flynn et al. (2010); Rosenzweig et al. (2003)

Appendix 3: Interview guide for convenient/open sampling

1. What is your position (CEO, Senior manager etc); experience in the industry and also on the particular job; education level; firm industry type; headquarters location; company number of employees and company revenue?
2. What do you understand by Supply Chain Integration (SCI)?
3. What is your experience on SCI initiatives within the organisation (intra perspective) and with other parties (inter perspective) for example with suppliers, firms, customers etc?
4. At which management level/s within the business does SCI takes place (for example within strategic, tactical and operational)?
5. How do you define the level (depth), if any, of SCI being employed with other firms/suppliers/customers?
6. What are the results/outcomes of SCI?
7. Are there any special circumstances when SCI is being implemented?
8. What type of investment, if any, has been done to promote and build SCI within and across the firms?
9. Which are the factors that are promoting/inhibiting SCI?
10. SCI is being considered locally (with Maltese firms) and/or internationally?
11. How do you consider SCI improvements with time (years of experience) of engagement with each firm/supplier/customer forming up each relationship with your firm?
12. How is SCI being achieved with others, considering the variation in: (a) standards (due to different organisational structures and processes); (b) policies (various perspectives and regulations); and (c) cultures (social elements such as behaviour, beliefs and values) held by the other firms engaged in the SC relationship?
13. Does the Maltese context (political, economical etc) contribute to the set-up or running of SCI with other firms/suppliers/customers engaged in the SC relationship?

Initial Letter to Executive Directors

(DATE)
Name
Address of Executive Director

Dear Executive Director,

My name is Ronald Cuschieri and I am conducting research for my Ph. D. dissertation which I am doing with Aston University, UK, at the Operations and Information Management Group, Business School. The objective of my dissertation is "To establish a framework that promotes Supply Chain Integration (SCI) for competitive performance within the Maltese Manufacturing."

I require some volunteers who would be prepared to participate in a research project designed to address the relevance of SCI, in adopting and implementing the criteria to derive the SCI theoretical framework.

Therefore, I am soliciting persons who have experience and expertise and are currently engaged in SCI within the business either/both internally (within their firm itself) or/and externally (with other firms, suppliers and customers) and who are located within any of the three management levels (strategic, tactical and operational). A minimum of a single participant (and a maximum of three participants), wherever applicable, from every management level will be preferably required to participate in the research.

This study requires the involvement and collaboration of a number of participants for a 45 minute interview (as per Interview Guide attached), which is preferably audio recorded. The participants should be knowledgeable of any part of the SCI mechanism and be willing to confidentially share the knowledge they have acquired via their experiences.

It would also be appreciated if access is given to all related documents to the SCI operations such as policies, procedures, etc. All material will of course be treated with confidentiality and will only be used as part of a wider research which does not reveal the identity of individual collaboration. All material given by the participant together with the information and audio recording will respect all data protection requirements and will be safely kept in a secure and private place against malpractice by third parties.

It would be further appreciated if after the completion of the set of interviews, a focus group session/s on SCI, based on the same interview guide, of around two hours duration is set-up, with the same participants or other nominees who had not already participated in the interviews, to create a brainstorming and interactive session. Preferably two to six persons per focus group would be required. This request is optional and no commitment is enforced on the participant who participates in the interview referred above.

Please forward the names of prospective interviewees and the focus group coordinator to me on the email [redacted] or [redacted] and I will contact your nominees directly for this research exercise, or feel free to have your nominees contact me directly. [redacted]

It is hoped that together we will all gain from the intellectual exchange provided by this research effort. All the participants may be debriefed after the research is completed to gain from the participation to this qualitative based survey. Again, thank you so much for your time and consideration in this research project. My supervisor is Dr. Prasanta Dey, Aston University, Business School, UK, phone (44) 121 204 4011 and p.k.dey@aston.ac.uk. If you have any questions about this research, you may also contact Dr. Prasanta directly.

Sincerely,

Ing. Ronald Cuschieri (MBA, Henley, UK)
Senior Lecturer,
University of Malta

Consent Form Letter

(DATE)
Name
Address of Participant

Dear Participant,

My name is Ronald Cuschieri, Ph.D. candidate working on my dissertation which I am doing with Aston University, UK. I am soliciting some volunteer participants who would desire to be a part of a research project designed to establish a framework based on Supply Chain Integration (SCI). I am therefore seeking individuals who have experience and expertise and are currently engaged in SCI within the business either/both internally (within their firm itself) or/and externally (with other firms, suppliers and customers) within all the three management levels (strategic, tactical and operational). The title of the research project is “To establish a framework that promotes Supply Chain Integration for competitive performance within the Maltese manufacturing.”

Participants should preferably respond to all the questions being asked but the interview will also be of value if a participant responds to only a part of the interview guide (as attached). The respondents’ replies should preferably be audio recorded due to the nature of the research method for effective analysis and to promote research rigour and validity.

The participant may be a supplier, or a firm or a customer of a firm or a third party who is engaged in the whole Supply Chain activity related to the firm under research. Such a wide range of participants are being included to get a variety of perspectives across the entire Supply Chain network.

A follow-up interview may be required for the researcher to converse with you telephonically or face-to-face (depending on the preference of the respondent) to clarify and/or edit the data gathered.

This researcher is aware of the necessity of keeping information discussed strictly confidential. It may need to be noted that the survey questions are not of a personal nature but do ask the participants to address their experiences in a general nature. Anonymity and confidentiality are guaranteed and no real names will be used in any part of the research and no information will be disclosed to any other participant that may lead to the identification of the possible source of information. There would be no attempts at deceiving any of the participants at any time, although positive and negative responses would be reported accurately. For this research, all participants would be asked to volunteer, be free from deception, be confident of privacy and confidentiality, and be allowed to check accuracy throughout the research.

Please acknowledge your consent to participate in this research, by confirming the information below:

I, ________________________, do agree to participate in this confidential research and may be contacted on/at __________________ concerning this research.

Your participation is done on a voluntary basis and you may withdraw from this study at any time of the process, without any repercussions or concerns that your lack of participation will alter the outcome of this study.

My personal email is [redacted]

It is hoped that together we will all gain from the intellectual exchange generated by this research effort. All the participants may be debriefed after the research is completed to gain from the participation to this qualitative based survey. Again, thank you so much for your time and consideration in this research project. My supervisor is Dr. Prasanta Dey, Aston University, Business School, UK, phone (44) 121 204 4011 and p.k.dey@aston.ac.uk. If you have any questions about this research, you may also contact Dr. Prasanta directly.

Sincerely,

Ing. Ronald Cuschieri (MBA, Henley, UK)
Senior Lecturer,
University of Malta

Appendix 4: Holistic SCI management theme with its 16 sub-themes

A4.1 The sixteen sub-themes within the holistic SCI management approach

A4.1.1 Lean Management theme

Lean management theme is concerned about all techniques that need to be used to eliminate and/or reduce all types of waste associated in all manufacturing SC processes including all areas of the business (Womack & Jones, 1996; Cox, 1999; Juttner et al., 2007). Bayraktar et al. (2009, p.133), clearly state the importance of a lean management approach for the elimination of waste and to adopt low inventory strategies, since ‘Lean practices have long dominated companies to accomplish excellence in their business operations’ (Bayraktar et al., 2009, p.133). The lean management approach is function of the contextual conditions of the firm, since both the type of product and production volume, are the ideal candidates that determine the lean approach in operations.

The scope of the SC holistic process is to minimise waste in all operations within all the process by doing more with less (Juttner et al., 2007). The waste concept has been referred by the seminal works of Dr Shigeo Shingo with his works associated with the Toyota Production System (TPS) with the objective to eliminate the non-value-adding activities for more efficient operations from internal and external production processes, referred as the seven classic wastes of Shigeo Shingo: overproduction, waiting, transportation, unnecessary processing steps, stocks, motion and defects (Hall, 1987).

The quality management standard ISO 9000 is being adopted by lean manufacturing firms and in turn are also adopting ISO 14000, since lean is complementary to pollution and waste reduction (King et al., 2001), where they refer that ‘green is lean’. Such an action will improve the environmental performance of the firm (Hart, 1997), especially in today’s current triple bottom line perspective of doing business based on GSCM (Sarkis, 2012; Wu et al., 2012; Caniels et al., 2013; Glover et al., 2014; Hsueh, 2015). Lean manufacturing enables less reactive measures to treat waste (i.e. end-of-pipe treatment is avoided whenever possible) due to its proactive measures, but in practice this may lead to a paradoxical situation since it does not always lead to green activities, due to increased efficiencies (i.e. faster operations may generate more waste), less inventory (i.e. less economical use of stock due to higher costs for small orders) and small batch sizes (i.e. more changeovers in production) (King & Lenox, 2001) which all contribute to more waste of resources.

A4.1.2 Managing Sustainability theme

Sustainable development concept was first referred by the Brundtland Report (Brundtland Commission, 1987, p.16), which was defined by the ‘. . . development that meets the needs of the present, without compromising the ability of future generations to meet their own needs’. Furthermore, such environmental sustainable awareness and preoccupation was also highlighted at that time by Frosch & Gallopoulos (1989, p.144) where they stated that: ‘An ideal industrial ecosystem may never be attained in practice, but both manufacturers and consumers must change their habits to approach it more closely if the industrialized world is to maintain its standard of living and the developing nations are to raise theirs to a similar level without adversely affecting the environment’. Such sustainability critical perspective was also referred in the United Nations 2005 World Summit. Furthermore, ISO standards, such as ISO 14001 (ISO14040, 1997), have been issued, based on a life cycle assessment (LCA), to serve as guidelines for environmental management processes for both the SC design and its operations (Bojarski et al., 2009). Additionally, various countries have already started to enforce and issue various legislations for controlling all the processes related to the industry, so as to protect the environment (Lee et al., 2009).

A more contemporary definition, which includes the triple bottom line perspective, is advocated by Carter and Rogers (2008, p. 368), where they define SSCM as: ‘the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systematic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains'.

Such a sustainable approach has been nowadays in-built in all scientific paradigms in various disciplines, such as SCM, so as to promote sustainable practices in all processes within the context where the resources and capacities are limited (Srivastava, 2007; Bojarski et al., 2009; Buyukozkan & Berkol, 2011). As a result, currently all societies worldwide, including all G-20 major economies, EU members, Governments all across the world, Educational Institutions and industries, have been engaged in such environmental conscious practices to promote a sense of ethical commitment for environmental responsibility around the globe down to all society members (Elkington, 2002; Manderson, 2006; Bojarski et al., 2009). In fact, the literature is replete with various academic work and practitioners' reports, which recommend strategies on how to promote environmental sustainability. The words such as SSCM; GSCM; green operations, triple bottom line, etc has now been integrated in various management literature (Elkington, 2002; Seuring & Müller, 2008; Buyukozkan & Berkol, 2011; Sarkis, 2012; Wu et al., 2012; Caniels et al., 2013; Glover et al., 2014; Hsueh, 2015). Integrated chain management (ICM), is also being used in various countries, such as Germany and Holland, where it defines supply chain management that also takes the environmental and social issues into account, which is leading to the conceptual development of the sustainable SCM concept (Wolters et al., 1997; Seuring, 2004; Seurring & Muller 2007), in line with the previous concepts (i.e. GSCM, SSCM etc). ICM highlights two dimensions, that is those of material and information flow and those of strategy and partnerships in the supply chain (Seurring & Muller 2007).

When customers procure products and goods, they are also expecting, due to their embedded culture of sustainability, that all their purchases originate from sustainable sources based on sustainable design and sustainable manufacturing practices with sustainable deliveries, such as green packaging (Vachon & Klassen, 2006; Zhu et al., 2008; Caniels et al., 2013). Otherwise, such customers are uncomfortable to proceed with the purchase of goods and services. Such a stance is a cyclical process, since the industry needs the customers and as a result all firms are putting all their efforts to meet all the customers' expectations to enhance their green reputation and not to avoid taxation measurements and intense scrutiny by Governments (Caniels et al., 2013).

The Organisations through the effective management of the SC need to comply with all environmental sustainable practices, such as buying practices and environmental impacts of various processes (Mentzer et al., 2001, Perotti *et al*., 2012; Sarkis et al., 2010; Wolf, 2011; Carter & Easton, 2011; Ageron et al., 2012; Caniels et al., 2013). Such an environmental friendly stance must not only be adopted to build on an appropriate image and/or meet minimum requirements and/or by avoiding any reputational risk, but to remain in business (Caniels et al., 2013). This is referred by Suchman (1995) as legitimate practice, even if it does not give an economic return (Meyer & Rowan, 1977; DiMaggio and Powell, 1983; Berrone et al., 2010). Environmental sustainability is related to waste, emissions and pollution reduction respectively, energy efficiency and a decrease in the consumption of hazardous materials (Darnall et al., 2008; Gimenez et al., 2012). Currently Governments are enforcing regulations and legislations to promote environmental protection within industrial specific sector requirements (Caniels et al., 2013). The organisations need to fit their environmental sustainability requirements within their business strategy and across the whole SC, including suppliers' selection and logistics (Vachon & Klassen, 2006; Hsu et al., 2013; Caniels et al., 2013) and ensure less waste in materials, energy consumption and labour respectively and adopt better use of technology (Berrone et al., 2010; Buyukozkan & Berkol, 2011; Glover et al., 2014). Such environmental practices may be more challenging to achieve in small firms relative to large firms, since the latter higher purchasing power, gives them an edge in undertaking all the necessary investments in implementing such sustainable measures (Caniels et al., 2013; Glover et al., 2014).

Sustainability within the SC 'provides competitive advantages to the companies as it offers the opportunity to differentiate from other companies by being equitable in the fair utilization of natural resources, prudent enough not to harm the environment, being socially responsible in terms of equal human development, ensuring health and safety of employees and contributing to humanity and the environment' (Buyukozkan & Berkol, 2011, p.13731). It is currently pivotal that organisations need to undertake the necessary investments in all human resources for sustainable practices, through training, performance evaluation and rewards (Jabbour et al., 2010; Wagner, 2013). The role of the human element all across the SC, including the end-users, is playing a key role, since such actors are being informed and made aware of all the initiatives of sustainability in all operations of the overall process and it has become a business necessity to employ such environmental friendly initiatives (Gonzales-Benito, 2005; Tsoulfas & Pappis, 2006; Vachon & Klassen, 2006; Zhu et al., 2008; Schuler and Jackson, 2014), which are directly or indirectly supporting such sustainable perspective (e.g. customers expect green-friendly products and to dispose such products appropriately with the intervention of the manufacturer).

The roadmap for the future 2020 in manufacturing research (ManuFuture Platform, 2006) is to transform the European manufacturing industry through a Strategic Research Agenda to derive a knowledge-base sector through five pillars and their associated new enabling technologies for the industrial transformation, with in-built sustainable measures, refer:

- new, added-value products and services;
- new business models;
- new advanced industrial engineering;
- new emerging manufacturing science and technologies; and
- transformation of existing R&D and education infrastructure to support world-class Manufacturing.

The International Energy Agency (EEA) is also promoting to deploy sustainable, reliable, affordable and clean energy both within and outside EU to deploy efficient technologies and systems optimisation in the energy consumption especially within the manufacturing sector (EEA, 2012), such as with the use of 'efficient compressors, sharing of resources across the SC and the deployment of integrated systems in the plants' (EEA, 2012, p.357).

The role of ICT in all communication and collaborative initiatives across the SC and the investment in manufacturing technology, based in automation of processes, are both enabling and integrating all the SC and manufacturing processes to promote a sustainable holistic integrated SC. Such a stance covers all the processes from a lifecycle management approach, with all the necessary information management capabilities, from the product design to the delivery, including the end-of-life of the product to ensure sustainable operations even within the product disposal phase, to ensure, that whenever possible, to reuse, remanufacture and recycle, so as to undergo annual savings (Hervani et al., 2005; Srivastava, 2007; Bojarski et al., 2009; Sarkis et al., 2011; Buyukozkan & Berkol, 2011). Examples for such provisions refer to technology assisted energy savings manufacturing mechanisms and tracing of all products with bar-coding systems to promote easily recovery of defects with less waste due to rework.

It cannot be excluded that the viability of taking green initiatives have been questioned regarding economic feasibility, since performance may subjected in a negative way due to the investments costs and time to undertake (Walley & Whitehead, 1994; Cordeiro & Sarkis, 1997). This negative view is debatable since other authors' views have supported its implementation, since it leads to sustainable competitive edge and profitability (Defee & Fugate, 2010). Such a balanced perspective was substantiated by others by advocating that environmental commitment is contingent since it may once be profitable and at other times it is not profitable at all (Zhu et al., 2007).

In a nutshell, the term sustainability today integrates social, environmental and economic responsibilities (Elkington, 2002; Bojarski et al., 2009; Buyukozkan & Berkol, 2011; Gimenez etal., 2012; Lee et al., 2012; Caniels et al., 2013; Glover et al., 2014) and hence environmental sustainability need to be backed by the other two objectives for any organisation to achieve overall sustainability. Such a theoretical perspective has brought at par the environmental sustainability with the already well established operational competitive objectives. The SCM well established operational objectives consist from cost, quality, flexibility and delivery (Hayes & Wheelwright, 1979b; Frohlich & Westbrook, 2001; Chen & Paulraj, 2004; Swink, et al., 2007; Ketchen & Hult 2007; Ketchen, et al., 2008; Kim, 2009; Richey et al., 2010; White et al., 2010), but with such environmental awareness, other objectives have come into play, such as reputation and branding (Yoon et al., 2006; Meehan & Wright, 2012; Caniels et al., 2013). For the focal in-conjunction with all of its stakeholders, to meet the social, environmental and economic challenges so as to promote sustainable operations, must have a broad spectrum of competence to perform effectively and efficiently in line with sustainable manufacturing 'Horizon 2020', under the EU FP 8 programme (EU Commission, 2008). Such an EU framework is promoting the industry and academics institutions to undertake research initiatives for scientific excellence in innovation and industrial developments; technologies innovation; and societal challenges solutions within the sustainability platform.

A4.1.3 Managing Performance Measurement theme

The measuring of performance is pivotal to be in place, for both the focal firm and the performance of all SC actors across the SC, especially with all its partners to disseminate best practices (Fawcett & Magnan, 2004; Kim et al., 2010). To implement an effective performance measurement system with a set of selected measures is a challenging process, since 'selecting the appropriate performance measures is challenging, due to the inherent complexity and interdependence of supply chains' (Flynn et al., 2010, p.60). Furthermore, the lack of availability of the right metrics (i.e. inconsistent and inadequate measures) have a direct influence on SCM competency which also restricts how SC can optimize their operations (van Hoek, 1998; Stock et al., 2010) and also act as a barrier to collaborative and effective SCM initiatives (Fawcett et al., 2008).

There are difficulties on what to measure (i.e. number of metrics) and how to measure performance to achieve a fully integrated SC, with a clear direction for improvement and achievements of goals and at the same time to adopt a balanced framework, which includes both financial and non-financial performance measures (Gunasekaran et al., 2001). Such a challenging perspective was substantiated by Sharma & Bhagwat (2007), where they declared that many companies failed to develop effective performance measures.

The focal firm needs to adopt a set of performance measures to address all the management levels within the organisation command chain (i.e. strategic, tactical and operational), and to assist the effective decision making process at each level (Gunasekaran et al., 2001). Such a measurement approach needs to extend beyond the focal firm and include all SC tiers up to the customers (Storey et al., 2006; Kim et al., 2010), so that the focal firm is in a position to follow its strategies and action plans effectively and to monitor improvements through an ongoing assessment (Cousins & Menguc, 2006; Kim et al., 2010). As Sroufe & Curkovic (2008, p.516), declared 'Without a proper performance measurement system it is difficult to measure, manage, and hold people accountable for their actions. The importance of performance measurement cannot be stressed enough, as good performance measurement systems facilitate a better understanding of processes and products both internally and externally'. Furthermore, the performance measures are also needed to implement the auditing practices of the overall SC (Mondragon et al., 2011).

The pivotal role of performance measures, to serve as a monitoring tool, through a set of established benchmarks, is clearly declared by Fawcett and Magnan (2004, p.72), that 'When performance is measured, performance improves'. Benchmarking objective is to employ a comparison of performance either internally, within one's own organisation or externally to employ competitive performance with other firms in the same sector (i.e. functional benchmarking) (Estampe et al., 2010). The deployment of the external performance measurement approach also enables a source of comparison through the established sector benchmarks between other SCs peers and/or competitors, so as to lead to an assessment of the firm performance, through its KPIs, and also to promote continuous improvement approach (Gunasekaran et al., 2008; Bayraktar et al., 2009). Mondragon et al. (2011) also sustains such a perspective on the need for an integrated set of measurement tools to take into account both the forward and reverse directions of the SC, so as to establish the SC performance and take all the necessary measures to overcome all limitations in all activities across the SC (such as forecasting and sourcing).

A tool which also assists to measure performance across the manufacturing organisation, which is being used within the SCM concept, is referred as the value stream mapping (VSM) (Mondragon et al., 2011), which is also in line with Porter's (1985) value-chain primary activities. Gunasekaran et al. (2008, p.550) outlined that the five necessary basic functional activities in a value stream for a responsive SC based on a continuous improvement approach, include: '(1) procurement (e.g. maximum purchasing discounts), (2) inbound logistics (e.g. low transportation costs), (3) operations (e.g. low production costs), (4) marketing and sales (e.g. wide product range/high availability), and (5) outbound logistics (e.g. low transportation costs)'. Another tool is the balanced scorecard (Kaplan and Norton, 1992), which has also been applied in SCM to create such a balanced performance measurement approach (Bhagwat & Sharma, 2007).

'When performance is measured and reported, the rate of improvement accelerates' (Fawcett & Magnan, 2004, p.72). Additionally, Kaplan and Norton, (1992, p.71) declared that 'What you measure is what you get'. The performance measures need to include measures associated with both financial, such as profitability, return of assets (ROA) and cash to cash cycle) (Chen & Paulraj, 2004; Wisner 2003) and operational indicators, such as cost, time, quality, delivery and flexibility (Hayes & Wheelwright, 1979b; Neely et al., 1995; Ketchen, et al., 2008; Kim, 2009; Richey et al., 2010; White et al., 2010). Other useful operational indicators are adaptability to change and customer service (Flynn et al., 2010, p.60) and logistics performance (Germain & Iyer, 2006).

It cannot be excluded that performance measurement is even a pivotal tool to achieve performance excellence across the SC or between SC partners, as referred by Kim et al., (2010). They deployed the European Foundation for Quality Management (EFQM, 2003) excellence model, with its five enablers, four results criteria and eight concepts of excellence. Such an EFQM tool was used to evaluate the dyad or overall SC activities, efforts and performance, through a balanced performance assessment approach, so as to serve as a source of performance improvement (Kim et al., 2010). It cannot be excluded the importance of the SCOR model, as already referred in Section 2.6.6. and by the Balanced Scorecard role in performance measurements, as referred above. The ISO 9000:2000 based metrics also provide a very comprehensive measurement approach which is useful in both finding and solving problems (Sroufe & Curkovic, 2008).

A4.1.4 Managing Auditing Operations

Auditing within the SC context is needed to capture the dynamic performance of: materials forward and reverse flow with their logistics; the bi-directional information flow across the SC networks; and the level of integration between SC actors, to provide an overall picture of the closed-loop SC performance (Mondragon et al., 2011). With today's current economic turmoil and the adoption of sustainable legislations there is the need of robust auditing tools to identify the performance across the SC (Ibid). Undertaking auditing of upstream and downstream SC actors provides the ability to evaluate the risks associated with the revenue and purchasing cycles and the sustainability of the profit margin (Huang et al., 2014). Operating within a SC context, the audit mechanisms are beneficial for the focal firm to identify any best practices associated transfer problems to other SC actors and/or establish kaizen improvements (Chong et al., 2012).

A4.1.5 Managing Supply Management theme

With the current SC dynamic and competitive environment across different manufacturing sectors, it has become a normal praxis for the focal firm to focus on a few and critical suppliers (Chandra & Kumar, 2000; Chen & Paulraj, 2004; Fawcett et al., 2008; Cousins et al., 2008; Lamming et al., 2013). Such relationships with few suppliers need to be based on a partnership approach based on a long term relationship (Matopoulos et al., 2007; Baraktar et al., 2009) relative to the rest of the other suppliers, which are kept at an arm's-length, due to the non-critical nature of the procured items (Cadden et al., 2013). Supply management is concerned about an extended SC approach beyond the first-tier SC member/s, to have access to all SC actors, so as to build on the overall focal firm strategy by selecting suppliers on their strategic contribution capabilities (Carter et al., 2000).

The partner type of suppliers need to meet the basic characteristics such as cost, service and quality but also need to meet added criteria such as innovative approach, knowledge and capabilities and cultural fit (e.g. Cadden et al., 2010). Furthermore, such a partnership approach with such suppliers promotes value-added operations, with both lower transaction and production costs respectively (Baraktar et al., 2009). The optimized relationship management between the suppliers and the focal firm, as the buyer, from a TCE perspective (Coase, 1937; Williamson, 1975), promotes optimized transaction costs (i.e. less interaction costs to locate supplies from the market) (Krapfel et al., 1991). The scope of such a supply management approach is to exploit and leverage the power of suppliers (e.g. knowledge and expertise) through building of relationships to promote competitive advantage (Ketchen & Giunipero, 2004; Kahkonen et al., 2015).

The supplier and the buyer relationship is a dynamic concept and undertake improvement, once the buyer increases its attractiveness to the supplier for the mutual benefit (Ramsay & Wagner, 2009). The relationship quality consists from three dimensions: trust, commitment and satisfaction (Walter et al., 2003). Such a relational approach is based on the relationship quality dimensions and not on the contractual obligations (Heide & John, 1992).

The effectiveness of the purchasing and supply management approach is based on the implementation of SCI across the SC to provide value for the SC downstream side customers (Van Weele, 2010). On the other hand, the efficiency of the purchasing and supply management approach is based on the employment of accounting principles, such as overall purchase expenses, low inventory costs and high inventory turnover (Miocevic, 2011). Such an efficiency is pivotal in the purchasing and supply management, since it is well established the relative high costs associated with such a role (Ramsay & Croom, 2008), where every effort need to be done from both the business side (e.g. cost cutting through resources' sharing and lean approach) (Narasimhan & Das, 2001) and supply side (e.g. negotiate attractive prices and improved payment terms) (Chen et al., 2004) of the dyadic relationship.

Purchasing and supply management promotes operational capabilities, such as quality and innovation and technological capabilities developments in products and processes, in-conjunction with suppliers (Das & Narasimhan, 2000) and subsequently it contributes to the financial success of the firm (Saranga & Moser, 2010). The suppliers' quality of service in all supplies is a pivotal strategic concern for the focal firm and as a result the suppliers' performance is closely monitored as a source of quality assurance (Lysons & Farrington, 2006). Such a strategic significance through effective supply management adds value for the customers (Hayes & Wheelwright, 1984; McIvor et al., 1997; Chen et al., 2004; Lindgreen & Wynstra, 2005) and promotes a sustainable competitive advantage (Mol, 2003; Paulraj et al., 2006).

A4.1.6 Managing cash-flow

Cash-flow takes into account the inflows and outflows of cash based on the purchasing of raw materials and utilities and the sales of products to customers (Guillen et al., 2007). Guillen et al. (2007, p.288) further stated that:

> *'Traditional SC models focus solely on determining the profit or revenue-maximizing, or cost-minimizing production schedule in a SC that runs from suppliers to manufacturing plants to distribution facilities and finally to retail outlets. These models neglect the cash-flow consequences …'*

As a result, nowadays SCM competency needs to manage effectively the working capital efficiency as one of the major drivers to financial performance together with revenue growth and operating costs (Camerinelli, 2009). SCM competency depends on the level of integration across the SC (Chen et al., 2009; Fawcett et al., 2008). The supply chain finance is associated with the optimization of the financial structure and the cash-flow within the supply chain (Gomm, 2010) by the speed up of cash-flow between the focal firm and all other SC actors, through the settlement of all the necessary payments, to improve on the cash-flow performance (Carmichael & Balatbat, 2010; Cho et al., 2012).

Cash-flow is a dynamic payment process, where payments terms are based on a time-schedule, function of the performance within the dyad contractual agreements (Ellram et al., 2004). Firms need to predict and plan cash-flows in such a way to slow cash outflows and speed-up cash inflows to achieve improved return on investment (Chen, 2012). The ability to leverage information technology and process innovation to sustain cash-flow is regarded as a significant source of competitive advantage (Ellinger et al., 2012).

A4.1.7 Managing change and innovation

The change management approach has been defined as a shift from traditional values to new ideas and beliefs (Lewins, 1947) whilst the continuous improvement is defined as an iterative process of planning, changing and evaluating with the involvement of all SC actors to meet improvement (Choi, 1995). Goswami and Mathew (2005) infer that innovation is a very complex and a multi-dimensional concept related to a product or a process or a market and it can bring about a new change or introduce a new process or product or else adopting something new that has been successfully tried earlier. They further add that innovation is considered similar to organisational change and is a major source of competitive advantage. Kadar et al. (2014) sustain Goswami & Mathew's (2005) view but includes organisational change as an added dimension with the product or process or market and does not treat innovation as synonymous to organisational change.

Organisations nowadays need to adopt a change management approach to meet the current dynamic environment made up from changing markets with unpredictable demands, increasing global competition and ever changing customers' demands (Sharp et al., 1999). For survival and prosperity a firm needs to decide on the investments and competitive strategies (March, 1991). Within the organisation learning literature, for a firm to avoid suboptimal performance, there is the need to undergo improvements or a change management approach through a trade-off between two initiatives of exploitation (e.g. gains from efficiencies in production and implemented processes) and exploration (e.g. gains from innovation and risk taking measures, such as to adopt new approaches in products or processes) based actions (Ibid). It is to be noted that results from exploitation measures are more quick and precise relative to exploration measures, due to the different nature of the actions needed to be implemented (Ibid).

All processes need to have an acceptable level of quality but at the same time must adopt a continuous improvement approach so as to reduce costs (Parmigiani et al., 2011) and promote change (Prajogo &

Sohal, 2003). Quality standards, such as ISO 9000, when used in a proactive way and through an advanced implementation approach, (i.e. not just basic compliance), they become a catalyst of change (Prajogo et al., 2012; Huo et al., 2014). In fact, innovative companies create cutting edge products and services through various options, such as technological innovation, quality, efficiency or style (Miller, 1988). Furthermore, there exist a significant relationship between quality, from a TQM perspective, and innovative performance, especially with respect to process innovation, which is more pronounced than product innovation (Prajogo & Sohal, 2003). The product innovation refers to the level of new products; the speed of new product development; the number of products introduced in the market and the products that are first-to-market (Ibid). The process innovation refers to the technological competitiveness; updateness of technology used in products; speed of adoption of latest technological innovations; and the rate of change in processes, techniques and technology (Ibid). Such an innovative perspective must also be seen from a wider consideration of environmental sustainable practices, where innovative practices for low carbon technologies and clean energies is an international challenge to be part and parcel of all work practices and processes for manufacturers (Suzuki, 2014). Furthermore, GSCM initiatives have a significant impact on technological innovation (Lee et al., 2014).

Seo et al. (2014, p.733) argue that for manufacturers, engaged within the value-chain activities in various supply chains, state that: 'Increasingly, organisations are realising that their level of innovativeness in supply chains is integral to strategic success and long-term survival [and]… achievement of sustainable competitive advantage'. They further added that innovativeness is enhanced with more integration between SC actors and with the result of improved efficiencies and effectiveness in both physical and information flows. Innovativeness is about trying to capture new opportunities and ideas and not to build on the current strengths (Panayides & Lun, 2009; Rhee et al., 2010). Calantone (2002, p. 113) defined innovativeness as 'the capacity of a new innovation to influence the firm's existing marketing resources, technological resources, skills, knowledge, capabilities, or strategy'. A SC environment based on a concrete foundation of technology, knowledge and relationships facilitate innovation (Chapman et al., 2003). To achieve innovation-oriented processes there is the need for all SC actors involved to undertake major organisational changes (Tracey & Neuhaus, 2013).

Innovativeness has an indirect impact on SC performance through the mediation of internal and external SCI initiatives, as a catalyst for such performance improvements (Rhee et al., 2010; Seo et al., 2014). In fact, the importance of SCI was already asserted by Yusuf et al. (1999) by advocating that an integrated agile supply chain is the twenty-first century's enterprise paradigm with a winning strategy to meet the dynamic customers' requirements efficiently and effectively. Meeting the customers' needs and expectations with the right products, through organisational innovation, is the principle behind the customer focus approach (Juran, 1988). The change and risk management together with the continuous improvement are two from the ten key enablers of agility within manufacturing (Sharp et al., 1999). Change and innovation key enablers are culture (Prajogo & McDermott, 2011), organisational values (Khazanchi et al., 2007; Richey et al., 2010) and operational intellectual capital (Menor et al., 2007). The intellectual capital is defined as all the resources and capabilities that drive organisational performance and value (Bontis, 2000).

Furthermore, Klein and Sorra (1996) contend that organisational values need to fit the innovative practices to achieve the expected benefits. Hong et al. (2009) argue that motivation of people plays a key role in the commitment for any organisational change which is triggered by any distinct and challenging opportunity. Furthermore, Tracey et al. (2013, p.102) reinforce on the importance of the management commitment for change to meet innovation-oriented processes, by advocating that such processes need a 'call for managers willing to challenge entrenched bureaucratic and cultural barriers to make their firms more competitive given the existing global marketplace'. Kadar et al. (2014, p.1083) reinforce the need for the right management approach, by inferring that 'Management of innovation is a complex task of leadership that aims at a systemic process of change throughout strategic and operational approaches'.

Agility is needed for all SC actors to have the capabilities to align all SC operations (Ismail & Sharifi, 2006) so as to adapt to the changes needed by the customers' demand (Narasimhan et al., 2006; Jain et al., 2008). Such a change management approach is met either proactively or reactively and in a flexible and timely manner (Li et al., 2008) to synchronise the supply and the demand (Swafford et al., 2008). Cases exist where agility within the SC is needed to meet effectively even unforeseen changes (Lee, 2004). The role of the upstream SC actors is accentuated by Johnsen (2009) by contending that the focal firm interacts and exploits the suppliers' innovative competencies to achieve product developments and innovative practices. Although an innovative approach, through upstream integrated synergies, has no direct lever for financial performance, it is a source of competitive edge for sustainable success (Hartmann et al., 2012). Such a firm's innovativeness orientation, for both suppliers and buyers, within the electronics SC context, is also advocated Bryan et al. (2010), by inferring that the innovative culture promotes relationship learning as a leverage mechanism by developing the learning capabilities with the result of improved products and services that creates competitiveness with such cross-cultural relationships and also leads to a higher level of performance.

A4.1.8 Managing collaboration

Hartono and Holsapple (2004, p.20) defined collaboration as 'an interactive, constructive, and knowledge-based process, involving multiple autonomous and voluntary participants employing complementary skills and assets, with a collective objective of achieving an outcome beyond what the participants' capacity and willingness would allow them individually to accomplish'. They further added that the resources are complementary since they are needed to complete the whole task in-conjunction with other participants, and that resources may take the form of a participant's skill, who no other participant possess (e.g. diagnosing manufacturing problems) or an asset, that promotes joint-work (e.g. knowledge of financial planning). Collaborative initiatives also include joint planning and knowledge sharing on greener product design, environmental process updates and reduction on logistics waste (Vachon & Klassen 2006). A cooperative environment builds on trust, where both cooperation and trust conceptual elements, influence the SC members to implement GSCM initiatives and long term relationships (Caniels et al., 2013).

The collaborative paradigm within the SC context refers to organizations that operate within a network of inter-dependent relationships developed and fostered through strategic integration (Vachon & Klassen, 2006). Early SCI efforts ended up to a **vertical integration** approach, but with the advent of a more competitive environment, the SCs were being set-up on a relationship between different SC entities to promote greater flexibility, but without ownership of the SC entity, through dedicated collaborative arrangements, such as **partnerships** with contractual obligations (Stonebraker & Afifi, 2004). The term partnership was defined by Ellram (1995, p.41), as 'an ongoing relationship between two organisations which involves a commitment over an extended time period and a mutual sharing of risks and rewards of the relationship'. Partnering may create several benefits (Fisher, 1996; Barringer & Harrison, 2000; Cadden et al., 2013) and reference is made to Chicksand's (2015) comprehensive list: lower transaction costs; improved management of complex purchases; dealing with contractual uncertainty; the acquisition of scarce resources; cost reduction and functional stability; improved business stability; and increased organisational legitimacy. Such a paradigm shift from vertical integration to an enterprise management approach consists of several collaborative strategies, referred as vertical integration (VIE), or an extended (EE) or a virtual (VE) or a defunct (DE) enterprise respectively (Binder & Clegg, 2006, 2007; Clegg et al., 2012; Clegg & Wan, 2013). The inter-firm collaboration typical methods are Collaborative, Forecasting, Planning and Replenishment (CPFR), Continuous Replenishment (CR), Efficient Customer Response (ECR) and Vendor Management Inventory (VMI) (Co & Barro, 2008; Ajmera & Cook, 2009; Richey et al., 2010).

Supply Chain collaboration has emerged as one of the most promising paradigm for creating long term competitiveness, since together with IT, they provide a robust foundation to the integration of a set of independent firms (Ajmera & Cook, 2009; Clegg & Wan, 2013). Collaboration can increase its competitive edge by extending from an information sharing stance to a joint decision-making and sharing of resources approach, such as in product development and strategic planning (Choi & Hartley, 1996; Ajmera & Cook, 2009; Cadden et al., 2013). Collaboration streamlines all operations by replacing inventory and excess capacity with information (Taylor, 2004).

Nowadays, there is the need for an effective SC performance to focus on relationship mechanisms based on a mix of EE or VE or DE collaborative relationships with various SC actors rather than relying on vertical integration or VIE (Board & Clegg, 2001; Binder & Clegg, 2006, 2007; Wang & Wei, 2007; Clegg et al., 2012). Relationship governance within the SC context, is based on relational norms and joint actions for common goals (Josi & Campbell, 2003), which has caused a shift from a transactional to a collaborative approach, based on mutual trust, information visibility, less duplication, lean management and agility of operations to achieve SC flexibility (Wang & Wei, 2007).

The inter-organizational systems (IOS) within the SC context represent the dual role of IT as 'a control mechanism as well as a relationship building mechanism' (Grover et al., 2002, p. 223). IOS promotes **SCI** (Clegg & Wan, 2013), where an IOS is an IT based process approach to facilitate common operations across the various SC operations to enable collaborative decision making and performance control (Morash & Clinton, 1998) with a reduction in transaction costs, decease in opportunism and increase in monitoring mechanisms (Wang & Wei, 2007). Though, IT still remains as a tool that enables SC visibility, since the relationship building is a more important driver for SC adaptability/flexibility (Wang & Wei, 2007). The human relational element importance is substantiated by Sanders (2007, p.1343), where it was declared that: 'Collaboration is a result of human interactions which can only be supported by IT, one of which are e-business technologies, but not replaced'.

The technology driver is enabling the possibility for a high level of integrated information systems between all SC tiers to enhance all dynamic collaborative efforts (e.g. CPFR and VMI) (Baratt, 2004; Maccoby, 2006), which together with the internet based applications are recognised as the foundations of the future of e-manufacturing with the optimisation of all SC actors operations (Shi & Gregory, 2005).

This collaborative theme leads to today's current theory that the manufacturing SC must be managed, through integration, collaboration and coordination, as a single entity (Chan et al., 2003; Sanders, 2007). The role of the SCI, within all collaborative initiatives, remains pivotal, since successful organizations must now integrate and collaborate with supply chain partners to maintain competitive advantage (Koh et al., 2007) and also achieve operational efficiency (Co & Barro, 2008).

A4.1.9 Managing culture

Hofstede and Bond (1988, p.6) define culture as 'the collective programming of the mind that distinguishes the members of one category of people from those of another' and they added that the cultural traits are 'rather sticky and difficult to change in any basic fashion, although they can often be modified'.

Based on a scholarly paper of fifty-three cultures across the world, within the IBM subsidiaries, Hofstede and Bond (1988) empirically derived the four dimensions attributed to the culture's consequences on the management practices within such organisations: power distance (i.e. power differences between two persons or organisations); individualism/collectivism (i.e. variation from an individual to a collective attitude); masculinity/femininity (i.e. roles assigned function of sex); and uncertainty avoidance (i.e. the search for truth based on established rules and measures). Such cultural values have a crucial influence on: the organisational structures, such as centralisation of resources when power distance is high and shifts to democratic leadership style when the power distance is low; the integration of groups, where the collectivist cultures are in a position to establish better synergies between people since they promote better group loyalties, than the individualistic approach; the distribution of roles, where men are more assertive and women are more nurturing; and the situations conditions, since with low uncertainty avoidance, people feel more tolerant to accept the cultural differences between people/organisations to work together (Ibid).

Hofstede and Bond (1988) four dimensions represent the key cultural values and beliefs foundations that determine the nature of collaborative initiatives across the SC, since although there may exist cultural differences, they need to be considered as complementary and not based on any member's superior cultural power (Ibid), so as to promote effective management practices across different organisations within the global SC. Later on, Hofstede (1991) added the fifth dimension, which refers to the long-term versus short-term orientation, which constitutes the principle of long-term based relationships vis a vis short term relationships which are function of the type of collaborative relationships engaged between SC members.

A collaborative culture within the SC context is an approach based on the shared values, beliefs and behaviours (Cadden et al., 2013). The term cultural fit, which refers to the compatibility between two parties, was originally associated with mergers and acquisitions Cartwright and Cooper (1993) but currently is being used within the SC context to denote the critical importance of such a concept, by outlining that it is a key requirement for the inter-organisational relationships between SC members to promote successful performance (Whitfield & Landeros, 2006; Fawcett et al., 2008; Braunscheidel et al., 2010). Furthermore, with the current competitive global scenario with the diversities of social cultures (Kale, 1984), based on continuous innovative developments, with the contribution of all SC actors, culture plays a crucial part within the SC strategy, since it is also an enabler of innovation in products or processes (Prajogo & McDermott, 2011). The diversity of social cultures was further explored by Rosenbloom and Larsen (2003), based on Hall's (1976) scholarly work on communication culture, to classify culture into high and low context cultural value. Such a dichotomy was used to categorize the two types of cultures that influence the approach adopted to the relationships between international distributors and exporters. The different approach to the norm was attributed to the high context cultures type of people, since to interact effectively, they rely more on frequent verbal communication mode (e.g. phone calls) than through IT-based text-based communication mode (e.g. e-mails), which is the current and well established approach used between low context based cultures such as in Western people (Ibid).

It has become a widely accepted view that organisational culture has a significant impact on both business and operational firm performance (Cadden et al., 2013). They further added that SC members, as a supplier to buyer dyadic relationship, may either adopt an adversarial or a collaborative culture respectively, which in turn will have a direct negative or positive effect on the overall SC performance respectively, ranging from ideally maximum, to moderate and to poor performance, within a cultural context which is classified as 'best cultural fit'; 'moderate cultural fit'; 'cultural mismatch'; and 'cultural misfit' (Cadden et al., 2013, p.96). Typical SC associated cultures are outcome focus, open exchange of ideas and information and goodwill, which all contribute to positive performance outcomes (Cadden et al., 2013). Such cultural values, within best-performing SCs, consist of suppliers who exploit their collaborative cultural values with the buyers, to strengthen their relationships, where at the same time the buyers shift their adversarial relationship to a more collaborative culture (Ibid). Such a stance causes an iterative strengthening of values between the dyad to improve on the SC performance (Ibid).

The cultural values of people within the organisation determine the teamwork initiatives commitment, within and outside the focal firm to meet all stakeholders' requirements. This is referred as the person-culture fit drawn from the interactional psychology literature (Chatman, 1989; O'Reilly et al., 1991).

The person and culture varies from one person to another and also from one firm to another respectively, which henceforth determine the attitudes and behaviour in all interactions within different organisational climates (Lawrence & Lorsch, 1967; McKinnon et al., 2003). This is why there must be a collective effort to understand each other values and established procedures through an integrated approach to cultivate the necessary synergies for a win-win situation. Such a SCI approach is enhanced through training initiatives, such as supporting programmes, to promote the necessary skills and knowledge on how to manage such interactions across the SC (Hammer, 2004; Kwon & Suh, 2005). In fact it is considered that the human behaviour is the root of all cultural associated barriers (e.g. resistance to change) and are very challenging to solve, since cultural issues are intangible and more difficult to manage, being based on judgment and not as other organisational tangible problems, having well established solutions (Fawcett et al., 2008).

Kaynak and Hartley (2008, p.472) infer the crucial role for managing effectively, within and outside the focal firm, in both manufacturing and servicing firms, by stating that 'Management leadership is essential in ensuring that a culture of continuous improvement, open communication, and cooperation is developed throughout the supply chain'. They also added that there is the need to adopt the right policies and structures to 'create a work environment in which employees' attention is focused on serving the customer'. This challenging management approach is pivotal to be effectively implemented, since the differences in the SC members' organizational culture create difficulties to achieve effective communication, collaboration and integration across the SC (McCarter et al., 2005). Such cultural differences also influences the negotiation process between buyers and sellers, since different negotiation styles needs to be adopted to suit the different cultural values embedded within each SC actor (Buttery & Leung, 1998). Furthermore, it was outlined that the cultural aspects takes a lower profile in Western negotiations relative to the Chinese negotiations, where the latter take a high context cultural value (Ibid).

Cowan et al. (2015) infer that the cultural values may play a crucial part in the broken relationships between partners within the globalised SC networks due to the cultural differences, as referred by Hofstede and Bond (1988).

A4.1.10 Managing knowledge

Knowledge management deals with how people acquire, exchange and disseminate knowledge to promote learning (Armstrong, 2006). Knowledge is a key resource (Blome et al., 2014) and may consist from either explicit or tacit knowledge (Armstrong, 2006). The explicit knowledge can be codified (e.g. stored digitally) whereas tacit knowledge is found in the people's mind and is acquired from people's experience (e.g. on the job expertise) (Ibid). Technology role is central to the explicit knowledge but it is used as a supporting tool for tacit knowledge (Ibid). Organisations build and accumulate on knowledge over time and such knowledge is embedded in all procedures and rules (March, 1991). The learning occurs by the organisation together with its individuals, so that the individuals build a social belief of the organisation (Ibid).

Within the SC context, tacit knowledge sharing occurs between buyers and suppliers at strategic level, such as in process reengineering and product development (Vachon & Klassen, 2006), where the focal firm, as the buyer, gets access to the supplier's invaluable knowledge based resources to promote product improvements (Tan, 2001), to enhance the customers' value proposition (Kaufman et al., 2000). Tacit knowledge is generated through the cross-functional teamwork approach adopted within the focal firm and joint problem-solving and relationship building outside the focal firm, which at the same time enables SCI build-up with the capabilities of flexibility and adaptability to change (Das et al., 2006). Blome et al. (2014) further sustain that the transfer of knowledge, both internally and externally to the focal firm, is also a key enabler of SC flexibility and is being regarded as pivotal in today's highly dynamic and vulnerable business environment (Blome et al., 2014). Though, it is to be noted, that as part of the integrated approach between SC actors, all interactions consist from both explicit and tacit knowledge, which both facilitate learning to all participants (Das et al., 2006).

Such tacit knowledge within and across the SC, since it is more difficult to imitate and is a valuable intangible resource, contributes to the firm's competitive advantage (Peteraf, 1993), which is in line with the resource based view of the firm (Wernerfelt, 1984; Barney, 1991) and also in line with the extended resource-based view of a network of firms (Matthews, 2003). On the other hand attention needs to be given to ensure that external SCI, due to its dedicated integrated approach with the established set of few SC actors, may limit its exposure to the external environment, by hindering the assimilation of external knowledge from other sources (Sorenson, 2003) or else may be subjected to knowledge loss through leakages to competitors (Norman, 2004).

Within the context of SC relationships, the social and collaborative interactions between firms across the SC, transfer knowledge between each other. Such knowledge becomes a source of value creation and creates a learning environment, to foster new processes and products innovation (Cavusgil et al., 2003; Goh, 2006; Koufteros et al., 2007; Kahkonen et al., 2015) and may even generate new knowledge (Almuiet & Salim, 2013) to promote a competitive advantage (Dyer & Singh,1998; Cheng et al., 2008; Blome et al., 2014). There can be suppliers that go beyond the provision of knowledge to the focal firm, but develop the products needed by the focal firm themselves and on their own initiatives (Petersen et al., 2005). Such an innovative climate, through knowledge management, across the SC also improves on other operational capabilities, such as quality and costs, as sustained by Tracey et al. (2013, p.103), by stating that: '… the team approach across organizations enabled a broad-based sharing of contextual knowledge that facilitated high levels of innovation and quality while simultaneously reducing costs and development time'.

The SC needs knowledge and not only information, although it is assumed that there will be no knowledge without information. Hence one needs to go an extra mile to get knowledge out of information by employing the right information management systems (e.g. using DSS, EIS, ERP, etc). Such a stance is advocated by Cheung et al. (2012), where it was highlighted the pivotal role of knowledge-based systems, based on automatic identification technologies (e.g. RFID and EPC information systems), network infrastructures (e.g. internet) and electronic data exchange technologies (e.g. ERP/EDI) within the supply chain landscape. They added that such a stance guides management with efficient and effective information sharing through SC visibility, so as to promote a holistic approach to all the SC activities for an overall performance optimisation and improvements. They further emphasised the importance for such information to be interpreted correctly to contribute to the strategy formulation. Gunasekaran et al. (2008), further contend such knowledge management thinking based on the deployment of technology, by arguing that within the context of an agile manufacturing based SC, one of the three major determinants of a responsive SC, is knowledge management and information technology management initiative (e.g. ERPs, groupware and internet based applications to automate and/or support all the human element based tasks, such as decision-making, to derive knowledge from information).

Purchasing and Supply management professionals need to have the right skills and knowledge so as to contribute to both top and bottom line management levels and promote value to the firm (Chen et al., 2004; Ogden et al., 2007) and to enhance cooperation and collaboration across the focal firm functional areas (van Echtelt et al., 2007) with the resultant improvements in both operational and financial performance (Rozemeijer et al., 2003).

The SMEs which are adopting a HVM stance are considered to incorporate the servitization approach to meet the customer service effectively. Such servitization approach also needs knowledge sharing initiatives, to support all collaborative activities associated with the design and service activities performed by the focal firm, even with the customers, apart from the suppliers (MacBryde et al., 2013) and also to capture detailed knowledge on each customer (Leidner, 2010). With today's embedded culture on sustainability awareness, knowledge is also needed to build internal capabilities to participate even in GSCM initiatives both within and across the SC (Lee, 2008; Caniels et al., 2013).

A4.1.11 Managing customer service

In this current competitive environment, to manage the customer service effectively, the manufacturing firms within the SC need to meet the customers' demand with high quality and low cost products and with an agile response to adapt to all customers' dedicated and dynamic changing needs (Gunasekaran et al., 2008).

Ellinger et al. (2012, p.250) within the SC context advocate that: 'The ability to generate higher levels of customer satisfaction is regarded as an important differentiator and has therefore become a key element of many firms' business strategies'. This means that an effective customer service is becoming a source of competitive advantage (Gebauer & Fleisch, 2007; Smith et al., 2007). Such an effective customer service meets and may even exceed the customers' expectations (Olsen & Johnson, 2003) and contributes to higher returns (Anderson et al., 1994). Integrating the customer, such as by using JIT within the SC (e.g. JIT-selling and JIT-information), promotes improved organisational performance (Green & Inman, 2005). SCI from the literature has positive impacts on the customer service quality (Vickery et al., 2003; Green et al., 2014) and creates value in the customer experience (Esper et al., 2010). Rosenzweig et al. (2003) updated the extant literature on the relationship of the effect of SCI on both sales growth and customer satisfaction, from a direct to an indirect relationship through operational capabilities. SCI also promotes SC visibility, which is pivotal for all firms across the SC, to be informed with the right and timely information to meet the customers' demand in a synchronised approach and at the same time effectively manage all inventories across the SC (Stevens, 1989).

SCM has a pivotal role in the customer service strategy with the objective to serve the customers and build an effective relationship so as to match or customise the customers' expectations and with an overall improved customer service (Wisner, 2003). Such an approach may also deploy effective logistics to speed up the delivery process to the customer, such as through cross-docking and direct deliveries to the door (Wisner, 2003). The collaborative relationships between all SC actors, including suppliers and customers, need to solve problems and manage all complexities (Flynn & Flynn, 1999) and build on the knowledge and expertise of each other to reduce the concept-to-customer cycle time and costs and also improve the overall design effort (Ragatz et al., 1997) from product design through manufacturing to distribution (Frohlich & Westbrook, 2001). The customer relationship includes work practices related to complaint handling, customer satisfaction and long-term relationship establishment (Bayraktar et al., 2009). The customer relationship management (CRM) approach is deployed to develop and lever out the market intelligence for profit maximisation portfolio from customer relationships (Zablah et al., 2004).

Manufacturing firms from the extant literature needs to establish a service culture to increase their revenue by exploiting the value derived from the services given from the products manufactured to their customers (Gebauer et al., 2006). The manufacturing firms to transform themselves into service providers need to revamp both the internal set-up and the external relationships with all SC actors, so as to strengthen the customer's confidence and the supplier's credibility (He & Lai, 2012). Such a paradigm shift to improve on the customer service value proposition consists from a shift from product selling to an integrated product and service offering (Baines et al., 2007). Such an approach is referred as servitization of manufacturing (Lightfoot et al., 2013) or integrated solutions of manufacturing (Davies et al., 2006).

Furthermore, He and Lai (2012) outlined that competing on customer services, although the total offering are more intangible and difficult to evaluate, will render strategic benefits as result of higher barriers to entry and improved revenues, in line with Porter's (1985) competitive forces model.

Within the extant literature, it is repleted with manufacturing performance measures (Neely et al., 2002), but this is not the same for the service performance measures, due to their intangible properties (Doney et al., 2007). Though it cannot be excluded that there exist service performance measures and most commonly applied measures are based on either Parasuraman et al. (1988) or Fitzgerald et al. (1991).

The general used classification for services within manufacturing, which was based on an equipment-based manufacturers research, is the product-based and customer action-based services (Gebauer, 2008; He & Lai, 2012), where the former refers to the product operations itself, such as after sales service and training and the latter refers to the support in the sales experience to enrich the customer value of the service, such as provision of integrated solutions from an in-depth relationship (He & Lai, 2012). Though, there is a key difference between the two services orientations, since the customer action-based service builds on the product-based service and needs more trust and engagement to share all the information and knowledge so as establish all the customised requirements and to optimise the value-proposition, for the dyad relationship to be a success (He & Lai, 2012). SCI through both operational and strategic integration initiatives, within and outside the focal firm, contribute to both product- and service- action based services, which in turn lead to competitive performance (He & Lai, 2012). Such an approach is also substantiated by Macbryde et al. (2013) where it was argued the importance that, within the manufacturing SMEs SC, in their practice to achieve HVM, need to implement the integration of the design, production and service activities at all management levels and across all functional areas across the SC to achieve a competitive advantage.

A4.1.12 Managing information

Effective communication fosters the flow of information and the focal firm must recognise the importance to share information, by being communicative, with both suppliers and customers to counteract the negative impacts of information safeguarding (Richey et al., 2010). The quality of information depends on the accuracy, adequacy and timeliness (Bayraktar et al., 2009).

All collaborative efforts need to be supported with the right information sharing initiatives to coordinate and improve on the procurement management and material flow through the necessary joint production planning, inventory and production scheduling (Vachon & Klassen, 2006). Information sharing is crucial in SCI (Kahn & Mentzer, 1998; Rai et al., 2006) which promotes SC visibility (Chopra & Meindl, 2001; Francis, 2008) to capture all data to promote improvements in all SC processes, effective decision-making and reduction of risks (Tohamy, 2003). Such a SC visibility promotes transparency of information across the SC which is pivotal for an agile SC (Yusuf et al., 2004). Cheung et al. (2012, p. 3923) defined supply chain visibility by outlining that it ‘entails having a holistic aggregation of detailed information for the supply chain interactions, allowing macroscopic detailed view from one end of the supply chain to the other’.

Information gives value-added information by improving coordination across the SC (Hult et al., 2004), promotes learning (Grant, 1996) and breeds trust (Gulati, 1995). Flynn et al. (2010, p.61), also claimed that ‘supplier and internal integration help manufacturers reduce mistakes and waste, through information sharing and joint planning and the internal integration provides the link between the suppliers and the customers’. This argument is also reinforced by (Dell, 1999, p.33) where, from the perspective of the company, it is considered that ‘new eBusiness technologies facilitate quick information sharing between downstream and upstream partners and enable companies like Dell Computer to trade inventory for information’. On the other hand, from a supplier perspective, the supplier strategic benefits are function of the type and quality of the information passed by the buyer to the supplier (Sanders, 2008).

ICT applications strengthen SCI through the established technologies and systems, that enable access to real-time information and which promotes better customer and supplier integration and also lead to an interactive effect between the two or more SC tiers (Frohlich & Westbrook, 2001; Devaraj et al., 2007; Fawcett et al., 2007). With timely information sharing, the interaction with suppliers is enhanced by faster decision making, which results in shorter lead times and smaller batch sizes (Cachon & Fisher, 2000). The customer interface, with web technologies, is provided with easier and faster access to information and improved flexibility to all requests and furthermore, speeds up the overall transaction experience (Lederer et al., 2001; Devaraj 2007). Such an improved customer's interface experience, through customers' on-line orders or suppliers' on-line information exchange, is giving the lead to the 'negotiating power of customers' (Cokins, 2003, p.23). As a result, the deployment of technologies and the value added benefits, depend on the extent of such information sharing which SC actors are willing to share (Lee et al., 2000; Patnay et al., 2006; Fawcett et al., 2007) otherwise all investment in technologies is useless (Fawcett et al., 2007).

Such information sharing, within and outside the focal firm with all SC actors, with their distinct way of information sharing mechanisms, transpires into a competitive competence (Handfield & Nichols, 1999), in line with both the resource based view of the focal firm (Barney, 1991) and extended resource based view from all the SC actors perspective (Matthews, 2003). Furthermore, it is also considered as a relational competency, from the relational based theory (Dyer & Singh, 1998), since through information sharing across the SC, the collaborative environment between all SC actors is enhanced (Paulraj et al., 2008) and at the same time reduces transactional costs with an improved customer service (Fawcett et al., 2007), where all these factors also promote a competitive advantage.

In spite of the importance and value added stance through information sharing initiatives, Kemppainen and Vepsalainen (2003, p.716) declare that 'visibility is still limited' across the SC and research indicates that firms consider 'a realistic view on the advantages and risks of information sharing', and as a result 'planning information is shared only selectively'….'relations [are] with selected partners' and 'companies hesitate to expand their coordination efforts beyond order processing and operational scheduling within the dyadic supplier-buyer relationships'. Furthermore, the lack of trust and fear from information leakages to other SC actors inhibits the sharing of certain information (Kuk, 2004). On the other hand due attention needs to be given to manage all information effectively to foresee situations against information overload (Mendelson, 2000).

A4.1.13 Managing logistics

Bowersox (1997, p.124) defined that: 'Logistics is that part of the supply chain process that monitors and implements the flow of goods and information from the point-of-origin to the point-of-consumption in order to meet customers' requirements'. Intermodal platforms requires efficient and flexible integration with the right consideration of technical, legal and commercial aspects and an integrated management throughout the SC to decrease logistics costs and improve on the service levels (Cambra-Fierro & Ruiz-Benite, 2009). Effective logistics management enables the integration and management of key business processes across the supply chain (Cooper et al, 1997; Markley & Davis, 2007; Stank et al., 2005) to remain competitive (Ragatz et al., 1997; Zhao et al., 2001; Giunipero et al., 2005). The competitive capabilities through effective logistics management are focused on both time and quality objectives and are based on four conceptual capabilities: demand-management, supply-management, information-management and coordination (Mentzer et al., 2004).

The concept of logistics integration refers to managing information and material flows (Frohlich & Westbrook, 2001). Unforeseen events require such a logistical integration to meet the flexibility needed in transportation of supplies (Cachon & Fisher, 2000). On the other hand, low logistical integration requires detailed contracts and provides limited flexibility in the transaction details and where information sharing is dedicated only to order monitoring (Vachon & Klassen 2006).

Nowadays, with the opening of markets and increased internationalisation, there is the need for logistics to guarantee deliveries in the right place and at the right time (La Londe, 1983; McKinnon et al., 2010) and also to provide a customised service approach (Mentzer, 2004). Logistics has consequently become a decisive factor in the success of a supply chain (Solvang & Hakam, 2010). With the current focus on SC sustainability, Wolf & Seuring (2010) assert that logistics service providers nowadays are expected to meet environmentally friendly transportation. Such an environmental scenario need to be seen within the context where an estimate of 8 percent of CO2 emissions are attributed to freight transportation and a 3 percent to warehousing and goods handling (McKinnon, 2010). As a result, logistics, being an integral part of the supply chain, needs to be given its due concern for its environmental impact to promote sustainability (Aronsson & Brodin, 2006; Wolf & Seuring, 2010).

Seong-Tae and Sang-Yoon (2012) used the term environmental logistics practice (ELP) to define all the environmental activities related to logistics and supply chain management by manufacturers as well by logistics service providers, retailers, and wholesalers, which focus on minimizing negative environmental impacts while maximizing logistics efficiency in handling and distributing cargoes. They further defined ELPs as three interconnecting components, namely internal environmental management (IEM), environmental sourcing and packaging (ESP), and environmental process design (EPD). As a result Seong-Tae and Sang-Yoon (2012) inferred that the stakeholder pressure directly influence the adoption of ELP to build an eco-oriented culture across the SC so as to respond to all environmental challenges effectively and promote firm survival. Such a contextual scenario, demands that all manufacturing and logistics processes need to implement environmental-friendly based practices to enable an eco-oriented culture system wide across the SC to achieve an environmental based competitive capability (Ibid).

A4.1.14 Planning and forecasting

Strategic planning is about the focus, alignment and synchronization of all SC processes across all functional areas, such as manufacturing, marketing, technology and finance (Bayraktar et al., 2009). Such a strategic planning approach is based on a long term perspective and requires the set-up of all the necessary business and operational policies to promote performance improvement and a responsive SC (Gunasekaran et al., 2008). There is also the need to consider both economical and environmental issues within the planning process to promote a sustainable SC (Bojarski et al., 2009). The purchasing and supply management also forms a pivotal part of the strategic planning process (Cavinato, 1999) where an ongoing planning approach is deployed to identify inefficiencies (Neely et al., 1997).

The planning process needs the right information about both the demand and the supply sides of the SC, so that the focal firm will be in a position to establish or forecast all the information associated with the customers (e.g. a customer orders, point-of sales data, forecasts, planned orders and available customer stock) and supplies (e.g. availability of supplier stock, lead times, deliveries expected to be delayed, and advanced shipment notices respectively) (Jonsson & Mattsson, 2013). Such SC planning information, with its sales and operations planning, is enabled by the deployment of an integrated IT application, such as an advanced planning and scheduling (APS) tool (Jonsson et al., 2007; Marcotte et al., 2009) to promote SC visibility and synchronisation of all processes (Dreyer et al., 2009).

The Collaborative Planning Forecast and Replenishment (CPFR) is an established business process model used to enhance the customer visibility and to match the supply with the demand, with the necessary flow of all required raw materials, production goods and customers' deliveries (Thome et al., 2014). The CPFR has been defined by Thome et al. (2014, p.949) as 'a cohesive bundle of business processes whereby supply chain (SC) trading partners share information, synchronized forecasts, risks, costs and benefits with the intent of improving overall SC performance through joint planning and decision making'. The CPFR is one of the SC collaborative models, such as VMI, EDI and CR (Ajmera & Cook, 2009), to promote information sharing across the SC, since the collaboration needs to be planned and maintained effectively between SC actors (Cassivi, 2006). Such collaborative effort needs to be built on a common culture of collaboration based on trust (Chen et al., 2007;

Fawcett et al., 2008b) and not only based on front-end agreements on all plans and forecasts (Thome et al., 2014).

A4.1.15 Managing quality

Managing quality within the SC context is crucial so as to exploit both all internal focal firm management practices together with all the external SC actors' practices and capabilities to derive a system wide quality plan (Robinson & Malhotra, 2005; Kaynak & Hartley, 2008; Sroufe & Curkovic, 2008; Lin et al., 2013). Furthermore, Kaynak and Hartley's (2008) model also outlined that quality management, within the SC context, is pivotal in the integrated system approach of all upstream and downstream process with the focal firm.

Managing quality has been defined by Lin et al. (2013, p.348) as: 'Supply chain quality management (SCQM) is concerned with designing, linking, and managing strategic and tactical activities of a supply chain system to prevent unwanted deviations, ensure accountability of channel partners, create system-level optimization, and build competent supply networks'. Quality is associated with SCI as declared by Robinson and Malhotra (2005, p. 319) who define SCQM as 'the formal coordination and integration of business processes involving all partner organizations in the supply chain channel'. Quality is pivotal in the product and service delivery (Bowersox et al., 2000; Bayraktar et al., 2009; Trkman & McCormack, 2009). Quality is one of the operational SC performance measures for competitive capabilities (Hayes & Wheelwright, 1979b; Schmenner & Swink, 1998; Ho et al., 2002; Swink et al., 2007).

QM (quality management) is considered synonymous to total quality management (TQM) (e.g. Singh & Smith, 2004; Kim et al., 2012). Furthermore, similarities of roadmaps and core values in quality management (i.e. TQM), is also compared to lean production and six sigma quality (Dahlgaard & Dahlgaard-Park, 2006).

Quality is one of the six world class manufacturing practices, as outlined by Hayes and Wheelwright (1984) and also as one of for manufacturing strategy infrastructure decision areas referred by Flynn et al. (1999). Quality has also been considered as part and parcel of all manufacturing and SC processes to perform effectively and efficiently as declared by Kim et al. (2010), where they defined that there exists three models to achieve corporate quality and business excellence: the European Foundation for Quality Management (EFQM) Excellence model, ISO 9000, and the Malcolm Baldrige National Quality Award (MBNQA).

With reference to Kim et al. (2010) the ISO 9000:2000 standard, it is also considered a prevalent quality management system approach which several organisations have obtained its registration and implemented it, both within the organisation and across its SC to promote significant benefits also in quality assurance (Sroufe & Curkovic, 2008). The ISO 9000:2000 standard, with its quality assurance characteristics, promotes better understanding of processes and achieves both lower costs and improved performance (Ibid). ISO implementation is needed not only to have the registration or the established procedures in place within the firm, but to serve as a measure for operations improvements, proactive commitment to implement quality standards integration across the SC and as a catalyst for change (Sroufe & Curkovic, 2008; Prajogo et al., 2012). To achieve such an innovative culture, the focal firm needs to go beyond the 'basic' implementation quality standard and shift to the 'advanced' and 'supportive' implementation stages, by taking new initiatives to operations and business with the full support of top management levels (Prajogo et al., 2012; Huo et al., 2014) so as to lead to a competitive advantage. From the extant literature ISO based established quality procedures are the core of all operations within manufacturing but they also need to integrate with them green initiatives across the SC with all SC members, to promote quality and meet the goals of environmental sustainability (e.g. ISO14001) in all processes (Sarkis, 2003; Feretti et al., 2007; De Brito & Van Der Laan, 2008; Caniels et al., 2013; Blome et al., 2014).

From the above, quality is also considered as a multidimensional concept, which refers to other perspectives such as supplier, management and information quality respectively. The dimension of quality data and reporting are considered an important asset in information quality, which is based on the accuracy, adequacy and timeliness of information, to promote a quality management approach (Li et al., 2005; Kaynak & Hartley 2008). The dimension of supplier quality management has also been substantiated by (Nyaga et al., 2013) by declaring that the quality of the relationships determines the willingness and type of collaborative initiatives. The dimension of management/leadership quality has also been substantiated by Robinson and Malhotra (2005), by declaring that both internal and external quality leadership approaches are necessary to promote sustainable competitive advantages.

Quality has also been considered as a paradox by the expression 'better quality-low cost', which has decreased its importance with the advent of sustainable SCs, where the competitive capabilities focus shifted on the social and environmental issues and challenges, than on quality and cost (Buyukozkan & Berkol, 2011, p.13731). Though, quality problems associated with manufacturing remains attributed to rework, scrap, machine and interrupted workflows (Clark, 1996; Flynn et al., 1999; Schemnner & Swink, 1998). Though, it is important to view quality from a holistic SC responsibility perspective, since every SC member, such as suppliers and all the processes within the focal firm with all other stakeholders, need to be accountable for any failure, even if the source of the problem originates from a quality issue in the suppliers' components quality (Trent & Monczka, 1999).

A4.1.16 Managing risks

Risks within the context of the SC has been defined by Juttner et al. (2003, p. 7) as: 'Supply chain risks comprise any risks for the information, material and product flows from original supplier to the delivery of the final product for the end user'. Risk management is considered as pivotal in SCI initiatives (Kahn & Mentzer, 1998). In fact Lambert and Cooper (2000) considered the risk and reward structure as one of the management component needed to promote SCI, since it affects the long-term commitment of all the SC actors within the SC.

There exists a SC risk associated with all the interactions of the focal firm with all other SC actors in the procurement of all needed resources to promote business continuity (Kahkonen et al., 2015). The SC operations are also subjected to a level of risk due to the nature of their complexities, if they are not managed and addressed effectively, such as in production and in view of the demand uncertainties (Craighead et al., 2007). In fact there is the need that businesses must exploit cross firms activities to improve in all operations and to 'share risks and rewards' to secure higher performance than would be achieved by operating alone (Lambert et al., 1999, p.166). Within the manufacturing SC the key attributed risks are associated with machines which perform below the scheduled performance and as a result may cause low productivity, planning disruptions and escalating production costs (Chong et al., 2012).

An integrated IT network enhances transparency within the firm and across the SC, so that the manufacturer can promptly detect variations in its operations as well as in suppliers' changes in production and delivery (Jin et al., 2014) and at the same time decrease all transaction risks (Clemons et al., 1993). Though, it cannot be excluded that firms takes a prudent and pragmatic approach on the benefits and risks of sharing information, and as a result a selective approach is taken on the information content shared through such integrated initiatives.

Due to the current global access to various stakeholders, the SC includes many actors with complex and different cultures and various political problems and characteristics, which may sometimes serve both as an advantage but at the same time may create great uncertainties and risks (Costantino & Pellegrino, 2010). For the focal firm to identify the appropriate strategy, needs to mitigate such risks and cope with such uncertainties, to promote success (Ibid). Such a mitigation of risks needs joint agreements with all SC actors to improve on the SC visibility and create a level of understanding to share all information on all associated risks sources, so as to prepare the necessary joint business continuity plans (Juttner et al., 2003).

SC risks have been classified in different ways, and the most basic classification adopted hereby is based on two scenarios, whether the risk is generated internally or externally (Klimov & Merkuryev, 2008). The SC risk is also considered as a function of external environment of all SC actors which is said to be situated in either a stable or dynamic environment (Hou et al., 2014). They further added that within such a complex dynamic environment, the overall SC network financial status not only depends on the focal firm's management skills but also from all SC actors' operational decisions.

A4.1.17 Managing trust

Nooteboom (2000, p. 53) defines that 'organizational trust is a constellation of behavioural trust, with organizational structure and culture acting as institutions that limit and guide behaviour of staff'. The effectiveness of all the SC actors engaged in a partnership relationship, within a SC, depends on their mutual trust, so as to meet the end customers' requirements (Vlachos & Bourlakis, 2006). Furthermore, trust with both upstream and downstream SC actors promote SCI initiatives for performance improvement (Zhang & Huo, 2013).

Trust in-conjunction with commitment among the SC actors, promote efficiency, effectiveness and productivity and also reduce conflicts and uncertainties across the SC (Dechurch et al., 2007; Cousins et al., 2008), otherwise there is the need to apply a coercive power approach to win cooperation from each other (French & Raven, 1968; Morgan & Hunt, 1994; Yeung et al., 2009).

Although trust-based SC collaboration is regarded as a risky approach (Carson et al., 2006) it is the way forward for leveraging resources from each SC actor for achieving a competitive edge (McEvily et al., 2003; Bijlsma-Frankema & Costa, 2005). The outstanding effect of trust can also be seen on the SC responsiveness improvement, since it takes place even when suppliers are more powerful, due to the power asymmetry between the dyad-relationship (Handfield & Bechtel, 2002).

Trust is based on the overall values of the human relationships and on the partner's reliability and integrity, which both promote a collaborative approach and a long term relationship (Morgan & Hunt, 1994; Berasategi et al., 2011). Trust emerges from the commitment, time, effort and dedication dimensions of all engaged SC actors (Msanjila & Afsarmanesh, 2011). As a result trust is also based on past experience that establishes a common understanding and builds up on common knowledge for mutual commitment (Ring & Van deVen, 1994). Though, an established axiom, which is function of trust, states 'trust but verify' (Tracey et al., 2013, p.103), meaning that verification may be needed to promote assurance, since blind faith may leads to associated risks.

Trust is a key determinant for suppliers to engage in joint planning activities and flexible arrangements taken with the focal firm as the buyer (Johnston et al., 2004). Furthermore, trust lowers the transaction costs (Sako, 2006), improves the average cycle time and in-time order fulfilment rate (Lin et al., 2005), promotes innovation (Panayides & Lun, 2009) and serves as a key foundation for stimulating effective relationship learning (Bryan et al., 2010). Trust is also needed for SC members to engage in a commitment to meet each others' requirements, such as in GSCM initiatives (Caniels et al., 2013) and also to promote enhanced environmental innovation (Pagell & Wu, 2009; Alvarez et al., 2010).

Appendix 5: A breakdown of all the participants under the both open sampling and theoretical sampling phases

Firm	Sector	Type of Firm	Head-count	Product	Revenue	Participant role
1/INT1 & 1/INT2)	Medical devices	Part of a Global Company (Headquarters USA) Rank 17 in the Fortune 500 classification	104	Consumable medical devices at low cost	17 million US Dollars	**Participant 1**: Director with 15 years experience (Degree and MBA) **Participant 2**: Operations Manager with 15 years experience (Technical Certificate and MBA)
2/INT3	Electronics (CCTV and security systems)	Part of a Global Company (Headquarters UK)	150	High end customers relatively high cost	20 million Sterling	Director with 18 year experience (Degree in Engineering)
3/INT4	Automation products	Part of a Global Company (Headquarters Italy)	260	High to medium end customers relatively high to medium cost	18 million Euros	IT and Logistics Manager with 11 years experience (BSC Business and Computing degree, BA (Honours) and MBA.
4/INT5	Software development and systems integration	Local Firm & Contractor	5	Corporate and individual training and support	n/a	Director and CEO with 19 years of experience.
5/INT6	Heavy Industrial Equipment (AC Units)	Local Firm (Originated from Germany and shifted to Malta)	180	Air-Conditioning Industrial high value equipment manufacturing	14 million Euros	Senior Management Team (20 years experience in SC and Logistics)

6/INT7 & 6/INT8	Medical Devices	Part of a Global Company (Headquarters USA). Local firm uses high value manufacturing	400	Low cost medical products including high value units/sets	n/a	**Participant 1**: Senior Manager with 25 years experience specialised in logistics and warehousing (Diploma) **Participant 2**: Operations & HR Manager with 18 years experience (Mechanical Engineer)
7TS/INT1	Toys and toys-sets	Part of a Global Company (Headquarters Germany). Local firm uses high value manufacturing	800	Low cost toys as products including medium value units/sets	n/a	Purchasing Manager with post secondary level of education with 20 years of work experience in operations management and purchasing
5TS/INT2 (Same Firm 5)	Heavy Industrial Equipment (AC Units)	Local Firm (Originated from Germany and shifted to Malta)	180	Air-Conditioning Industrial high value equipment manufacturing	14 million Euros	Operations Manager and Engineer by Profession with 17 years of experience
2TS/INT3 (Same Firm 2)	(CCTV and security systems)	Part of a Global Company (Headquarters UK)	150	High to medium end customers relatively high to medium cost	20 million Sterling	Director with 18 year experience (Degree in Engineering)
8TS/INT4	Automotive products	Private Foundation based locally with founders in Germany (no shareholding)	120	Innovative products medium to high end	n/a	25 years Industry Experience with Degree in Electrical Power and Professor of the Electrical Engineering Department at University of

						Malta
1TS/INT5 (Same Firm 1)	Medical Devices	Part of a Global Company (Headquarters USA) Rank 17 in the Fortune 500 classification	104	Consumable medical devices at low cost	17 million US Dollars	Director with 15 years experience (Degree and MBA)
9TS/INT6	High Voltage Switchgear for heavy electrical applications	Part of a Global Company (HQ in Libya)	80	Industrial high value equipment manufacturing	n/a	30 years experience Senior Engineer in switchgear for electrical sub-stations
10TS/INT7	Printing on paper products	Private locally owned	100	Low cost to medium value products (e.g. books and toys & food packaging boxes)	12 million Euro	35 years experience in the printing industry Senior System Manager
11TS/INT8	Food Manufacturing (Dry and wet foods)	Private (Originally partnership with Unilever UK (1967-1990))	400	Low to medium cost products at high volume (e.g. dry power and liquid drinks and sauces)	70 million Euros	Senior Manager having an MBA and with 12 years experience in production and quality assurance. Supported by another Senior Manager having an MBA and with 15 years experience in supply chain and logistics.
12TS/INT9	Logistics	Private locally owned	160	Freight services	10 million Euros	Senior Manager with 30 years experience in freight forwarding
13TS/INT10	Pharmaceutical sector	Part of a Global Company	16	Medicinal products (Generic drugs)	10 million Euros	General Manager with 20 years experience

		(HQ in India)				
14TS/INT11	Pharmaceutical sector	Part of a Global Company (HQ in USA)	300	Medicinal products (Generic drugs)	5 million Euros	Head of IT Infrastructure with 13 years experience
15TS/INT12	Logistics	Local and Private ownership	18	Logistics Service provider	2 million Euros	General Manager with 40 years experience with a Graduate level of education
16TS/INT13	Automotive parts	Part of a Global Company (HQ in Sweden)	600	'O' Rings or sealing solutions	20 million Euros	Purchasing, logistics and IT support with 14 years experience
17TS/INT14	Systems Integration consultancy for manufacturing	Consultancy in IT based projects	8	ICT services in hardware and software	8 million Euros	Senior IT Consultant with 13 year experience in manufacturing and IT.

Note: **1/INT1** refers to firm 1 and interview 1 (i.e. INT1 means interview 1) under the open sampling phase and similarly **17TS/INT** 14 refers to firm 17 and interview 14 (i.e. INT14) under the theoretical sampling (**TS**) phase.

Appendix 6: Interview guide for theoretical sampling phase

(1) Kindly indicate your position and experience; the company manufacturing industry sector; number of employees; product/s and/or services provided; and approximate revenue (turnover).
(2) Can you tell me about the management practices and key drivers adopted that promote or inhibit, if any, to determine the company supply chain integration (SCI) strategy so as to promote effective SC integration within and outside the firm? It may help to answer this question by referring to the checklist below, unless you feel to add any other issue/s.

i. The link between the corporate strategy and the SC integration strategy;
ii. **Any decisions** taken on the SC set-up (e.g. number of SC tiers or entities);
iii. Which are the internal and external **SCI measures** or **initiatives** to get a holistic SC approach;
iv. About the use of other **SC members resources**;
v. The use of the **performance management** approach on the procedures and standards both internally and externally;
vi. The **leadership style** used in change management and daily workflow;
vii. The **assigned priorities**, if any, to meet various SC targets;
viii. What is the **level of IT adoption** to enable and/or transform all business processes; &
ix. Which are the initiatives taken on **information sharing.**

(3) How do you describe, through some examples or events, the overall SCI process foundations (within and outside the firm) in terms of the checklist below. It may help also to consider extreme events and even add any other ideas that you feel they have been omitted.

i. Teamwork/collaboration efforts for relationship building;
ii. Trust/relationship management;
iii. Human/social elements (e.g. soft and hard skills);
iv. Technology deployment (e.g. in machinery and ICT);
v. Information sharing (level (e.g. visibility level of SC tiers) and type of information (e.g. operational; technical; financial and strategic));
vi. Knowledge management and knowledge sharing across different cultures;
vii. Lean management (vis a vis quality and corporate social responsibility (CSR));
viii. Planning (forecasting);
ix. Supply management and inventory management;
x. Logistics management;
xi. Performance measurements;
xii. Risk management;
xiii. Customer service; and
xiv. Innovation/change management

(4) Which are the measures that you use to identify the success or failure of the overall SC performance.
(5) Given that the Maltese context, as a small island state, is distinct from other global SCs, how do you consider such similarities and differences.

Appendix 7: Interview guide for theoretical sampling for researcher with Probe List

(1) Kindly indicate your position and experience; the company manufacturing industry sector; number of employees; product/s and/or services provided; and approximate revenue (turnover).
(2) Can you tell me about the management practices and key drivers adopted, if any, to determine the company supply chain integration (SCI) strategy so as to promote effective SC integration within and outside the firm? You may answer this question by referring to the checklist below, unless you feel to add any other issue.

Probes List: (Emerged theory)

i. The link between the corporate strategy and the SCI integration strategy (Emerged theory: there is alignment between **the corporate strategy** to **SCI strategy)**;
ii. **Any decisions** taken on the SC set-up (Emerged theory: decisions are taken on the length of the SC to be adopted (i.e. what is the number of SC members (suppliers, 3rd parties etc) in the pipeline and whether to **integrate** with them or undergo vertical integration, to bypass them or work alone (e.g. suppliers, distributors, outsourced entities or sub-contractors));
iii. Which are the internal and external **SCI measures** or **initiatives** to get a holistic SC approach (Emerged theory: cross-functional approach, training, right leadership, no silos, audit, lean management, CSR, close customer contacts and others);
iv. About the use of other **SC members resources**. (Emerged theory: Action is taken to **exploit SC members** resources to promote an **innovative approach** to achieve a competitive SC (e.g. shared leaning initiatives, knowledge transfer, outsourcing, trust building, communication for information sharing and others);
v. The use of the **performance management** approach on the procedures and standards both internally and externally. (Emerged theory: A **performance management** approach (internal and external to the SC) is used which includes all procedures and standards (e.g. ISO for quality of processes; manufacturing (e.g. ISA 95) and social /environmental) to meet the company KPIs;
vi. The **leadership style** used in change management and daily workflow. (Emerged theory: the type of **Leadership style** used is to promote SCI (e.g. transformational leadership for innovation/change and transactional leadership for daily workflow or processes efficiency improvements or other);
vii. The **assigned priorities**, if any, to meet various SC targets. (Emerged theory: **priorities** are assigned to the allocation of resources, to meet all SC targets effectively such as speed, quality, flexibility and cost; and
viii. What is the **level of IT adoption** to enable and/or transform all business processes. (Emerged theory: use of ICT tools (e.g. ERP, databases etc) and automation technologies in manufacturing (e.g. CAD, CAM, smart and advanced manufacturing systems etc)); and
ix. Which are the initiatives taken **information sharing** (Emerged theory: information sharing enabled by ICT applications range from SC visibility and real-time updates to joint cross-cultural knowledge sharing).

(3) How do you describe, through some examples, the overall SCI process foundations (within and outside the firm) in terms of the checklist below. You may also consider extreme events and even add any other concept that you feel it has been omitted.

Probes: (Emerged theory)

i. **Teamwork/collaboration**: (decentralised or centralised structure, cross-functional approach level of implementation (within all management levels, across functional areas and across the SC members));

ii. **Trust/relationship management: (cultural values** such as shared values, commitment, effort, expectations and behavioural aspects);

iii. **Human/social elements:** employee skills (motivations, proactive/passive actions and aspirations for development); training (in-house and shared with SC members); (soft skills: values, empowerment, involvement and behaviour; and hard skills: compliance to established procedures and reporting in-line with ISO standards);

iv. **Technology deployment:** (technology is used both within the manufacturing process (such as robotics) and as an ICT tool/s within/across all SC members up to the customer for real time communication and to align resources (process re-engineering) so as to enhance and/or transform all SC operations through information management and automation (such as risk, supply, inventory and logistics management respectively and performance measurement etc) (e.g. of ICT tools: EDI, ERP (SC software, business intelligence applications and dash-board reporting, databases etc), internet information exchange (e-mails, XML data exchange, social media etc) legacy systems and e.g. of automation tools: CAD, CAM, advanced manufacturing systems and embedded systems etc);

v. **Information sharing:** (information is shared through information management; communication, SC visibility level used within and across (1st tier or all Sc tiers) to share with respect to level and type i.e. level (e.g. visibility level of SC tiers) and type of information (e.g. operational (delivery details, stock levels etc); technical (knowledge); financial and strategic)) or (operational; tactical and strategic);

vi. **Knowledge management:** (knowledge is needed to understand the cross-cultural SC members capabilities and sharing of knowledge occurs both explicit and/or implicit);

vii. **Lean management:** (standards and procedures are used to promote efficiencies such as in waste management, zero defects, maximise the use of resources for continuous improvement (six sigma) etc) and meet all CSR measures in-line with the firm KPIs);

viii. **Planning (forecasting):** (manage the right stock level to avoid stock-out or excess stock in-line with cashflow management);

ix. **Supply management and inventory management:** (supply management considers the lead time and stock guarantees to be respected by suppliers, VMI and/or consignment stock systems, multiple suppliers etc) and inventory management considers cashflow management, stock levels policies (minimum, buffer, EOQ or other);

x. **Logistics management:** (e.g. transportations and CSR measures to promote sustainability);

xi. **Performance measurements:** (audit tool and as a driver for action which includes performance measurement and audits with respect to social (e.g. voice of employee, customer services etc); environmental (e.g. waste management, emissions, carbon footprint, etc); manufacturing (e.g. standards such as ISA 95) and SC (lead-time, supply deliveries, logistics of finished products etc);

xii. **Risk management:** (vertical integration to reduce risks and improves supply management; delivery time/lead-time; process failure due to faults (business continuity); performance measures used to identify problems, supplier management against failure; investment in high-added manufacturing to improve on the machinery reliability etc); and

xiii. **Customer service** (pull or push SC, close to the customer through web site, phone calls and other connections, relationship/s, customer classification (allocated priorities due to customers' profiles or segmentation) and follow-ups)

xiv. **Innovation and Change management**

(4) Which are the measures that you use to identify the success or failure of the overall SC performance.

Probes: (Emerged theory)

i. Operational and business indicators (SC measures interlinked to corporate measures),
ii. Compromise/trade-off between targets and optimise capabilities (resources) to achieve a win-win SC,
iii. Low cost or differentiation strategy,
iv. Lean management and quality processes (e.g. standard processes (ISO), TQM, continuous improvement, low cost, flexibility (agility), speed, etc),
v. Customer service,
vi. Employee motivation (through involvement, empathy and respect),
vii. Flexibility to change/responsiveness,
viii. Innovative and sustainable approach and also the competitive edge over other SCs.

(5) How do you consider the similarities and differences of the Maltese context, as a small island state, which makes the SC distinct from other global SCs.

Probes: (Emerged theory)

Local Environment: transportation of physical products (logistics) costs (maritime and shipping services, with equipped ports); Government/EU support to SMEs (e.g. investment packages support; incentives to investment; grants; funds; capital guarantee support for all investments); Political, Legal and regulatory frameworks promote stability in the Banking sector and Financial institutions to aid further investment opportunities; Highly skilled workers availability and with a substantial variation of academic skills; Cultural values, motivations and expectations of staff; Corporate social responsibility awareness.

Global economy: Selection of SC member is function of particular competences (e.g. cost per unit of production; vicinity to the customer/market (market proximity); cost and quality of raw material; cheap labour; recession affected countries.

Appendix 8: Laundry list of all Open codes from MAXQDA 2007 code segment (Author)

Code System

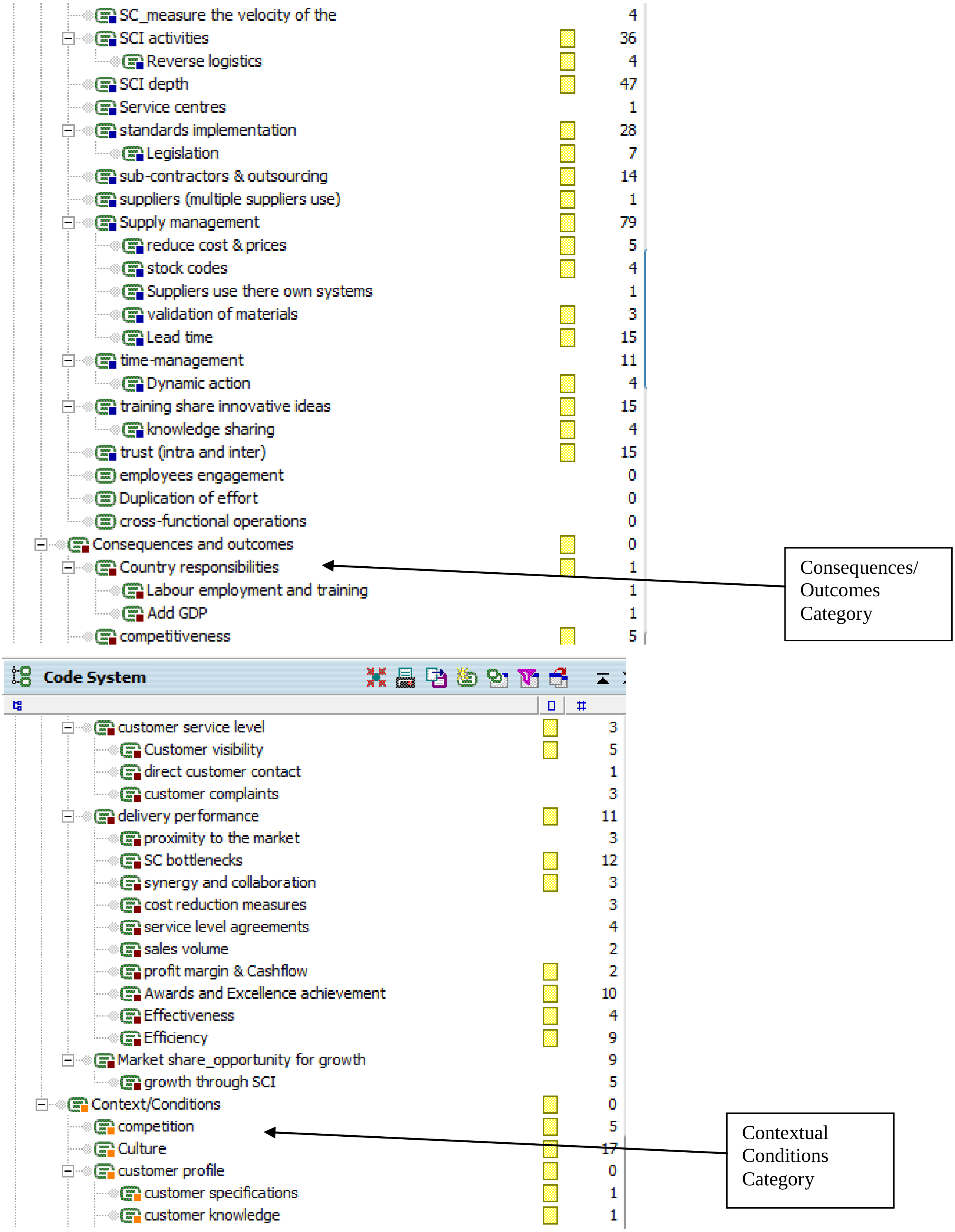
- Code System 1472
  - Actions and reactions 0
    - Auditing & traceability of operations 25
    - Change management 15
      - resistance to change 5
    - Collaboration 33
      - Teamwork 12
        - employees engagement 13
        - Duplication of effort 7
        - cross-functional operations 13
      - commitment 5
      - communication_being informed 31
      - concerns 1
      - contact person 2
      - contractual agreements 10
      - coordination 11
      - prompt feedback 2
      - Relationship management 9
    - cost management 4
      - cash flow management 4
    - customer relationship management 40
      - supported 6
      - direct contact with the customer 2
      - customisation and client needs 1
      - customer support 6
    - decision-making 10
      - problem solving 10
    - delivery actions 14

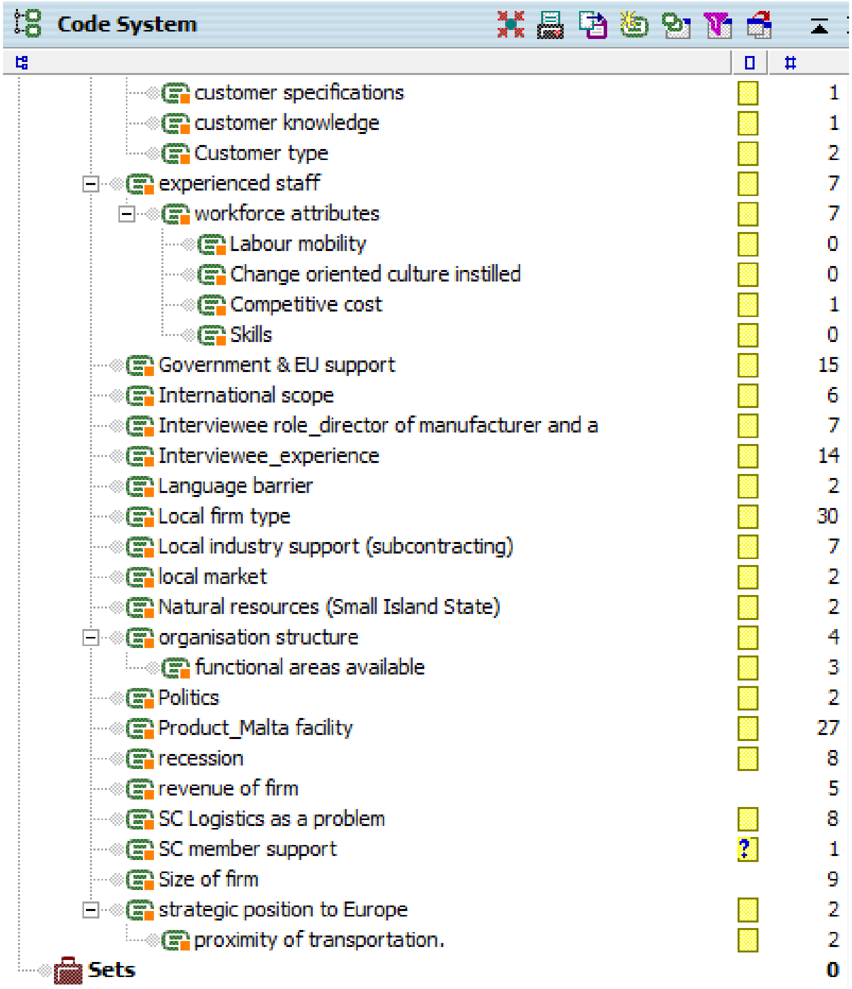
Action Category

Code Memo

Code System

- EHS (environmental, health and Safety) 16
  - material reduction 4
  - recycle/Waste management 4
- flexibility 18
- ICT applications 81
- improvement in processes 9
- information sharing 19
  - visibility 7
- Innovation_New products is the norm 18
  - R & D 6
- Inventory management 44
- leadership style 12
  - open style policy 3
  - management effectiveness 15
- lean management 26
- Logistics 17
  - transportation management 20
- manufacturing process 60
  - humans' intervention. 6
  - work in progress 7
  - added value manufacture 1
- ownership of operations 21
- performance measurement 30
  - KPIs 6
- plans and forecasts 21
- Priority of orders/work 12
- Quality of the processes 23
- risk management 28
- SC members support 32
- SC strategic action & growth 23


SC_measure the velocity of the 4
SCI activities 36
Reverse logistics 4
SCI depth 47
Service centres 1
standards implementation 28
Legislation 7
sub-contractors & outsourcing 14
suppliers (multiple suppliers use) 1
Supply management 79
reduce cost & prices 5
stock codes 4
Suppliers use there own systems 1
validation of materials 3
Lead time 15
time-management 11
Dynamic action 4
training share innovative ideas 15
knowledge sharing 4
trust (intra and inter) 15
employees engagement 0
Duplication of effort 0
cross-functional operations 0
Consequences and outcomes 0
Country responsibilities 1
Labour employment and training 1
Add GDP 1
competitiveness 5
Consequences/ Outcomes Category
Code System
customer service level 3
Customer visibility 5
direct customer contact 1
customer complaints 3
delivery performance 11
proximity to the market 3
SC bottlenecks 12
synergy and collaboration 3
cost reduction measures 3
service level agreements 4
sales volume 2
profit margin & Cashflow 2
Awards and Excellence achievement 10
Effectiveness 4
Efficiency 9
Market share_opportunity for growth 9
growth through SCI 5
Context/Conditions 0
competition 5
Culture 17
customer profile 0
customer specifications 1
customer knowledge 1
Contextual Conditions Category



Code System
customer specifications 1
customer knowledge 1
Customer type 2
experienced staff 7
workforce attributes 7
Labour mobility 0
Change oriented culture instilled 0
Competitive cost 1
Skills 0
Government & EU support 15
International scope 6
Interviewee role_director of manufacturer and a 7
Interviewee_experience 14
Language barrier 2
Local firm type 30
Local industry support (subcontracting) 7
local market 2
Natural resources (Small Island State) 2
organisation structure 4
functional areas available 3
Politics 2
Product_Malta facility 27
recession 8
revenue of firm 5
SC Logistics as a problem 8
SC member support 1
Size of firm 9
strategic position to Europe 2
proximity of transportation. 2
Sets 0

Appendix 9: CAQDAS Outcome of all Emerged Categories for all the Eight Interviews

Interviews

All Emerged Categories	1	2	3	4	5	6	7	8	Total Sum	Codes Count
Actions and reactions	0	0	0	0	0	0	0	0	0	0
Actions and reactions\Auditing & traceability of operations	5	4	0	3	2	4	3	4	25	1
Actions and reactions\Change management	2	7	1	1	1	2	0	1	15	1
Actions and reactions\Change management\resistance to change	0	3	0	0	2	0	0	0	5	1
Actions and reactions\Collaboration	4	2	10	8	2	1	4	2	33	1
Actions and reactions\Collaboration\Teamwork	4	2	0	2	0	0	0	4	12	1
Actions and reactions\Collaboration\Teamwork\employees engagement	0	8	1	1	0	0	1	2	13	1
Actions and reactions\Collaboration\Teamwork\Duplication of effort	3	0	0	2	2	0	0	0	7	1
Actions and reactions\Collaboration\Teamwork\cross-functional operations	2	2	0	1	0	0	5	3	13	1
Actions and reactions\Collaboration\commitment	1	3	0	0	0	0	1	0	5	1
Actions and reactions\Collaboration\communication_being informed	2	4	7	3	2	1	7	5	31	1
Actions and reactions\Collaboration\concerns	0	0	0	0	0	0	1	0	1	1
Actions and reactions\Collaboration\contact person	0	0	0	0	0	0	2	0	2	1
Actions and reactions\Collaboration\contractual agreements	1	2	2	2	1	0	1	1	10	1
Actions and reactions\Collaboration\coordination	2	2	1	3	0	0	1	2	11	1
Actions and reactions\Collaboration\prompt feedback	0	0	1	1	0	0	0	0	2	1
Actions and reactions\Collaboration\Relationship management	0	2	2	4	0	0	0	1	9	1
Actions and reactions\cost management	1	3	0	0	0	0	0	0	4	1
Actions and reactions\cost management\cash flow management	0	0	0	0	0	2	1	1	4	1

Actions and reactions\customer relationship management	0	3	7	7	5	6	7	5	40	1
Actions and reactions\customer relationship management\supported	0	3	3	0	0	0	0	0	6	1
Actions and reactions\customer relationship management\direct contact with the customer	2	0	0	0	0	0	0	0	2	1
Actions and reactions\customer relationship management\customisation and client needs	0	0	0	0	1	0	0	0	1	1
Actions and reactions\customer relationship management\customer support	0	4	1	0	0	1	0	0	6	1
Actions and reactions\decision-making	0	2	0	3	0	1	1	3	10	1
Actions and reactions\decision-making\problem solving	0	3	2	0	0	0	0	5	10	1
Actions and reactions\delivery actions	0	0	4	4	0	2	3	1	14	1
Actions and reactions\EHS (environmental, health and Safety)	2	12	0	0	0	1	1	0	16	1
Actions and reactions\EHS (environmental, health and Safety)\material reduction	1	2	0	0	1	0	0	0	4	1
Actions and reactions\EHS (environmental, health and Safety)\recycle/Waste management	0	0	0	0	3	1	0	0	4	1
Actions and reactions\flexibility	0	2	5	5	1	1	2	2	18	1
Actions and reactions\ICT applications	3	12	18	14	23	4	3	4	81	1
Actions and reactions\improvement in processes	1	2	0	0	0	1	3	2	9	1
Actions and reactions\information sharing	2	3	2	1	2	0	6	3	19	1
Actions and reactions\information sharing\visibility	0	1	1	0	2	0	1	2	7	1
Actions and reactions\Innovation_New products is the norm	5	3	4	0	0	1	4	1	18	1
Actions and reactions\Innovation_New products is the norm\R & D	0	0	1	3	0	1	1	0	6	1
Actions and reactions\Inventory management	3	4	6	6	6	5	9	5	44	1
Actions and reactions\leadership style	3	2	0	3	0	1	2	1	12	1

Actions and reactions\leadership style\open style policy	0	3	0	0	0	0	0	0	3	1
Actions and reactions\leadership style\management effectiveness	1	3	0	0	4	0	2	5	15	1
Actions and reactions\lean management	9	6	0	5	4	0	0	2	26	1
Actions and reactions\Logistics	0	1	2	5	1	2	6	0	17	1
Actions and reactions\Logistics\transportation management	0	6	1	2	2	1	4	4	20	1
Actions and reactions\manufacturing process	1	2	13	13	13	2	9	7	60	1
Actions and reactions\manufacturing process\humans' intervention.	0	0	0	1	4	1	0	0	6	1
Actions and reactions\manufacturing process\work in progress	0	0	0	0	0	1	1	5	7	1
Actions and reactions\manufacturing process\added value manufacture	1	0	0	0	0	0	0	0	1	1
Actions and reactions\ownership of operations	9	10	1	0	0	0	1	0	21	1
Actions and reactions\performance measurement	8	6	1	6	1	1	4	3	30	1
Actions and reactions\performance measurement\KPIs	2	0	1	0	0	0	2	1	6	1
Actions and reactions\plans and forecasts	0	2	5	3	1	3	1	6	21	1
Actions and reactions\Priority of orders/work	1	2	0	5	0	0	0	4	12	1
Actions and reactions\Quality of the processes	2	1	1	4	1	0	5	9	23	1
Actions and reactions\risk management	2	2	9	6	0	5	2	2	28	1
Actions and reactions\SC members support	6	19	2	1	0	0	2	2	32	1
Actions and reactions\SC strategic action & growth	8	2	4	2	0	2	2	3	23	1
Actions and reactions\SC_measure the velocity of the	2	0	0	0	0	1	0	1	4	1
Actions and reactions\SCI activities	3	6	4	1	4	8	4	6	36	1
Actions and reactions\SCI activities\Reverse logistics	0	0	0	3	0	0	0	1	4	1
Actions and reactions\SCI depth	10	4	5	8	7	4	5	4	47	1
Actions and reactions\Service centres	0	0	1	0	0	0	0	0	1	1

Actions and reactions\standards implementation	4	1	2	8	1	4	3	5	28	1
Actions and reactions\standards implementation\Legislation	0	0	3	0	0	2	1	1	7	1
Actions and reactions\sub-contractors & outsourcing	1	0	0	8	1	0	2	2	14	1
Actions and reactions\suppliers (multiple suppliers use)	1	0	0	0	0	0	0	0	1	1
Actions and reactions\Supply management	9	4	19	27	6	7	5	2	79	1
Actions and reactions\Supply management\reduce cost & prices	4	0	0	0	0	0	1	0	5	1
Actions and reactions\Supply management\stock codes	0	0	0	0	1	0	0	3	4	1
Actions and reactions\Supply management\Suppliers use there own systems	0	0	1	0	0	0	0	0	1	1
Actions and reactions\Supply management\validation of materials	3	0	0	0	0	0	0	0	3	1
Actions and reactions\Supply management\Lead time	4	0	4	3	0	3	1	0	15	1
Actions and reactions\time-management	0	1	2	3	4	0	1	0	11	1
Actions and reactions\time-management\Dynamic action	0	0	0	0	0	0	2	2	4	1
Actions and reactions\training share innovative ideas	4	4	2	1	1	0	2	1	15	1
Actions and reactions\training share innovative ideas\knowledge sharing	2	0	1	0	0	0	1	0	4	1
Actions and reactions\trust (intra and inter)	1	5	0	2	1	1	3	2	15	1
Actions and reactions\employees engagement	0	0	0	0	0	0	0	0	0	1
Actions and reactions\Duplication of effort	0	0	0	0	0	0	0	0	0	1
Actions and reactions\cross-functional operations	0	0	0	0	0	0	0	0	0	1
Consequences and outcomes	0	0	0	0	0	0	0	0	0	0
Consequences and outcomes\Country responsibilities	1	0	0	0	0	0	0	0	1	1
Consequences and outcomes\Country responsibilities\Labour employment and training	1	0	0	0	0	0	0	0	1	1
Consequences and outcomes\Country responsibilities\Add GDP	1	0	0	0	0	0	0	0	1	1

Consequences and outcomes\competitiveness	0	2	0	0	0	2	0	1	5	1
Consequences and outcomes\customer service level	1	0	0	0	0	0	0	2	3	1
Consequences and outcomes\customer service level\Customer visibility	0	4	1	0	0	0	0	0	5	1
Consequences and outcomes\customer service level\direct customer contact	1	0	0	0	0	0	0	0	1	1
Consequences and outcomes\customer service level\customer complaints	1	2	0	0	0	0	0	0	3	1
Consequences and outcomes\delivery performance	0	5	0	3	0	1	1	1	11	1
Consequences and outcomes\delivery performance\proximity to the market	0	3	0	0	0	0	0	0	3	1
Consequences and outcomes\delivery performance\SC bottlenecks	5	6	1	0	0	0	0	0	12	1
Consequences and outcomes\delivery performance\synergy and collaboration	2	0	1	0	0	0	0	0	3	1
Consequences and outcomes\delivery performance\cost reduction measures	2	0	0	1	0	0	0	0	3	1
Consequences and outcomes\delivery performance\service level agreements	1	2	0	0	0	0	0	1	4	1
Consequences and outcomes\delivery performance\sales volume	1	0	0	1	0	0	0	0	2	1
Consequences and outcomes\delivery performance\profit margin & Cashflow	0	1	0	0	0	1	0	0	2	1
Consequences and outcomes\delivery performance\Awards and Excellence achievement	2	6	0	0	0	0	0	2	10	1
Consequences and outcomes\delivery performance\Effectiveness	2	1	0	0	0	0	0	1	4	1
Consequences and outcomes\delivery performance\Efficiency	2	4	0	0	0	0	0	3	9	1
Consequences and outcomes\Market share_opportunity for growth	2	5	0	0	1	0	1	0	9	1
Consequences and outcomes\Market share_opportunity for growth\growth through SCI	1	3	0	0	0	0	1	0	5	1
Context/Conditions	0	0	0	0	0	0	0	0	0	0
Context/Conditions\competition	1	3	0	0	0	0	1	0	5	1
Context/Conditions\Culture	5	4	1	1	3	1	1	1	17	1

Context/Conditions\customer profile	0	0	0	0	0	0	0	0	0	1
Context/Conditions\customer profile\customer specifications	0	0	1	0	0	0	0	0	1	1
Context/Conditions\customer profile\customer knowledge	0	1	0	0	0	0	0	0	1	1
Context/Conditions\customer profile\Customer type	0	0	2	0	0	0	0	0	2	1
Context/Conditions\experienced staff	0	2	0	3	1	0	0	1	7	1
Context/Conditions\experienced staff\workforce attributes	0	1	0	0	4	0	2	0	7	1
Context/Conditions\experienced staff\workforce attributes\Labour mobility	0	0	0	0	0	0	0	0	0	1
Context/Conditions\experienced staff\workforce attributes\Change oriented culture instilled	0	0	0	0	0	0	0	0	0	1
Context/Conditions\experienced staff\workforce attributes\Competitive cost	1	0	0	0	0	0	0	0	1	1
Context/Conditions\experienced staff\workforce attributes\Skills	0	0	0	0	0	0	0	0	0	1
Context/Conditions\Government & EU support	3	2	1	1	1	5	1	1	15	1
Context/Conditions\International scope	1	3	0	1	0	0	1	0	6	1
Context/Conditions\Interviewee role_director of manufacturer and a	1	0	1	1	1	2	0	1	7	1
Context/Conditions\Interviewee_experience	2	2	3	3	1	1	1	1	14	1
Context/Conditions\Language barrier	0	0	0	0	1	0	0	1	2	1
Context/Conditions\Local firm type	11	2	4	6	1	2	1	3	30	1
Context/Conditions\Local industry support (subcontracting)	1	1	3	0	0	1	1	0	7	1
Context/Conditions\local market	0	0	1	1	0	0	0	0	2	1
Context/Conditions\Natural resources (Small Island State)	0	0	0	0	0	1	0	1	2	1
Context/Conditions\organisation structure	3	0	0	1	0	0	0	0	4	1
Context/Conditions\organisation structure\functional areas available	3	0	0	0	0	0	0	0	3	1
Context/Conditions\Politics	0	1	0	0	0	0	1	0	2	1

Context/Conditions\Product_Malta facility	7	2	11	3	0	1	2	1	27	1
Context/Conditions\recession	0	1	2	3	0	1	1	0	8	1
Context/Conditions\revenue of firm	1	1	1	1	0	1	0	0	5	1
Context/Conditions\SC Logistics as a problem	0	0	1	1	0	2	3	1	8	1
Context/Conditions\SC member support	0	1	0	0	0	0	0	0	1	1
Context/Conditions\Size of firm	1	1	1	1	2	1	1	1	9	1
Context/Conditions\strategic position to Europe	1	1	0	0	0	0	0	0	2	1
Context/Conditions\strategic position to Europe\proximity of transportation.	0	2	0	0	0	0	0	0	2	1
									1472	132
									Frequency	Count 132

Appendix 10: CAQDAS Outcome of a Filtered Set (based on a frequency count > 10) of Emerged Categories for all the Eight Interviews

	Interview numbers									
Filtered Emerged Categories (Based on frequency > 10)	1	2	3	4	5	6	7	8	Total Sum	Count
Actions and reactions\Auditing & traceability of operations	5	4	0	3	2	4	3	4	25	1
Actions and reactions\Change management	2	7	1	1	1	2	0	1	15	1
Actions and reactions\Collaboration	4	2	10	8	2	1	4	2	33	1
Actions and reactions\Collaboration\Teamwork	4	2	0	2	0	0	0	4	12	1
Actions and reactions\Collaboration\Teamwork\employees engagement	0	8	1	1	0	0	1	2	13	1
Actions and reactions\Collaboration\Teamwork\cross-functional operations	2	2	0	1	0	0	5	3	13	1
Actions and reactions\Collaboration\communication_being informed	2	4	7	3	2	1	7	5	31	1
Actions and reactions\Collaboration\coordination	2	2	1	3	0	0	1	2	11	1
Actions and reactions\customer relationship management	0	3	7	7	5	6	7	5	40	1
Actions and reactions\delivery actions	0	0	4	4	0	2	3	1	14	1
Actions and reactions\EHS (environmental, health and Safety)	2	12	0	0	0	1	1	0	16	1
Actions and reactions\flexibility	0	2	5	5	1	1	2	2	18	1
Actions and reactions\ICT applications	3	12	18	14	23	4	3	4	81	1

Actions and reactions\information sharing	2	3	2	1	2	0	6	3	19	1
Actions and reactions\Innovation_New products is the norm	5	3	4	0	0	1	4	1	18	1
Actions and reactions\Inventory management	3	4	6	6	6	5	9	5	44	1
Actions and reactions\leadership style	3	2	0	3	0	1	2	1	12	1
Actions and reactions\leadership style\management effectiveness	1	3	0	0	4	0	2	5	15	1
Actions and reactions\lean management	9	6	0	5	4	0	0	2	26	1
Actions and reactions\Logistics	0	1	2	5	1	2	6	0	17	1
Actions and reactions\Logistics\transportation management	0	6	1	2	2	1	4	4	20	1
Actions and reactions\manufacturing process	1	2	13	13	13	2	9	7	60	1
Actions and reactions\ownership of operations	9	10	1	0	0	0	1	0	21	1
Actions and reactions\performance measurement	8	6	1	6	1	1	4	3	30	1
Actions and reactions\plans and forecasts	0	2	5	3	1	3	1	6	21	1
Actions and reactions\Priority of orders/work	1	2	0	5	0	0	0	4	12	1
Actions and reactions\Quality of the processes	2	1	1	4	1	0	5	9	23	1
Actions and reactions\risk management	2	2	9	6	0	5	2	2	28	1
Actions and reactions\SC members support	6	19	2	1	0	0	2	2	32	1
Actions and reactions\SC strategic action & growth	8	2	4	2	0	2	2	3	23	1
Actions and reactions\SCI activities	3	6	4	1	4	8	4	6	36	1
Actions and reactions\SCI depth	10	4	5	8	7	4	5	4	47	1
Actions and reactions\standards implementation	4	1	2	8	1	4	3	5	28	1

Actions and reactions\sub-contractors & outsourcing	1	0	0	8	1	0	2	2	14	1
Actions and reactions\Supply management	9	4	19	27	6	7	5	2	79	1
Actions and reactions\Supply management\Lead time	4	0	4	3	0	3	1	0	15	1
Actions and reactions\time-management	0	1	2	3	4	0	1	0	11	1
Actions and reactions\training share innovative ideas	4	4	2	1	1	0	2	1	15	1
Actions and reactions\trust (intra and inter)	1	5	0	2	1	1	3	2	15	1
Consequences and outcomes\delivery performance	0	5	0	3	0	1	1	1	11	1
Consequences and outcomes\delivery performance\SC bottlenecks	5	6	1	0	0	0	0	0	12	1
Context/Conditions\Culture	5	4	1	1	3	1	1	1	17	1
Context/Conditions\Government & EU support	3	2	1	1	1	5	1	1	15	1
Context/Conditions\Interviewee_experience	2	2	3	3	1	1	1	1	14	1
Context/Conditions\Local firm type	11	2	4	6	1	2	1	3	30	1
Context/Conditions\Product_Malta facility	7	2	11	3	0	1	2	1	27	1
							frequency		1472	46
							key codes		46	

Note: Shaded parts show seven (7) consequences & Context codes. The remaining action codes amount to thirty-nine (39). A total of 46 codes.

Appendix 11: Axial Coding of the 15 non-key tentative categories

A11.1 Auditing Operations tentative category

Auditing operations theme is about a systematic evaluation of all SC operations, both within and outside the focal firm to meet all quality standards together with all sustainable and legal obligations, in an integrated approach, to promote effective and efficient performance.

To achieve an **integrated approach** within and across the SC, the focal firm needs to undergo internal and external **auditing of all operations**, to meet all **standards** in quality, **sustainable measures** together with **legal** compliance. The external auditing is carried either by the Corporate or by an established certified entity (e.g. BSI, UL), as indicated by four participants, by stating that:

> *'Corporate audits are more in depth and scrutinuous on quality'; '… audited and implemented such EHS programme'*; *'Audited every year, by BSI …'* (1/INT1); '*The products need to have all details according to that specified, to be UL certified'* (3/INT4); '… *suppliers, who have to stick to our standards and processes and we visit them and make audits…'* (6/INT7); and *'Clients we do credit checks on them, especially if they are new'* (10TS/INT7).

The corporate audits on the focal firm are easier to perform due to the **ingrained common KPIs and culture** between each other, since with other SC members, the focal firm needs to enforce the auditing measures. One participant confirmed this, by stating that:

> '*For inter-company the performance is more easy to be dealt with due to same values, culture …'; 'But with local suppliers and others external European suppliers… requires the validation and audit parameters/criteria as established with the corporate KPIs and its suppliers*' (1/INT1).

The aim of the audits is to assess the focal firm and also its SC members on a regular basis and with a proactive approach, to ensure **matching of all operations** in a timely manner and to promote compliance to all of its **standard operating procedures** to achieve an **overall effective and efficient performance.** Two participants declared that the focal firm needs to be: '*Audited every year, by BSI';* and '*… [audited] with respect to operations, management of inventory of suppliers, the lead times to match our lead time'* (1/INT1); and '*Corporate auditors has introduced such leading indicators to implement proactive actions …'* (1/INT2).

Such an auditing approach is used to remedy at source and in a timely manner any variance from the established performance levels, to ensure no returns, with their resultant negative effect on the firm capacity and with its associated risks of failure in the effective customer service. Such problematic issues may originate due to various sources, which may either be dependent or independent of the focal firm, as clearly narrated by a participant, by stating that:

> '*The products and/or customers are being tracked … due to front end delays due to material problems, causing risk not to be in time or due to quality issues originated from the incoming verification, such as raw material or from end customer complaints and hence instead of supplying the same product, we try to solve the problems such as quality issue …'* (6/INT 8).

Such an audit stance inspects the **quality of the products** and monitors the **inventory levels**, to ensure no stock-out, so that all **internal and external processes** are **managed effectively**, in line with the **lean management approach**, as referred by three participants, by stating that the:

> '*Quality manager monitors samples, to operate a lean process with the right quality, defects identification …'* (3/INT4); '*Stock audits are done to detect such kitting errors'* (5/INT 6); and '*Lean and six-sigma are used in quality assessment … to help the investigation process in a systematic process'* (6/INT8).

ICT is a tool, which through bar-coding, provides **real time tracking of information and an audit trail** on all products to promote **SC visibility** and at the same time enable the effective **management of manufacturing** and **sales** to **manage** all **risks** effectively and efficiently, by detecting in real time all disconformities, as outlined by three participants, by stating that:

> '*Every stock has a barcode label to indicate the order number, date of purchase and description'; 'The logistics centre has to cater for the job order records and if not done the scope of the audit trail is lost ….*' (3/INT4).

Logic Diagram of the Auditing Operations tentative category

Table A11.1 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Auditing operations tentative category properties	**Positive extreme dimensional variation**	**Negative extreme dimensional variation**
Auditing to establish conformity	Full conformity to the established performance criteria (e.g. KPIs), both within and outside the focal firm, to be in line with the systematic approach of lean management	Lack of conformity to the established performance criteria (e.g. KPIs) and without a systematic approach
Approach to audits	Proactive to remedy all variances in a timely manner	Reactive with delayed remedial actions
Regularity of audits	Frequent/regular	Not frequent
Source of auditing	Internal/External (e.g. focal firm and certified bodies)	No audit at all
Type of remedial actions for all shortcomings	Taking the necessary actions in real-time or at the earliest, to manage risks effectively within and across the SC	Delayed action with the resultant risk of failure both within and outside the SC
Conditions	Standards (quality and triple bottom line) and legal compliance adopted by certified bodies either locally and/or abroad; Corporate role in Multinational firms; legal and other requirements stipulated by the local Government and foreign country of the products' destination; SC members culture; technology deployment level; risk management approach to promote business continuity; and SC visibility adopted for traceability of all defects.	

Table A11.1: Auditing operations tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the auditing operations tentative category, since it establishes an environment where all SC members together with the focal firm, from a holistic perspective, manage their operations effectively by matching all their performance to promote standard operating practices and also adopts a lean management approach and manages all risks to achieve competitive performance for a win-win situation. Such practices need to respect all quality standards and the triple bottom line and also comply to all legal requirements. To achieve effective auditing operations it needs technology deployment to promote real time SC visibility for a systematic evaluation of all SC operations and for the immediate detection of all problematic sources so as to take all the necessary remedial actions in a timely manner to promote business continuity.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The auditing operations conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as quality standards and legal compliance, effective and efficient performance, business continuity, competitive edge and SC visibility. The moderating variables are the deployment of information technology through ICT applications and by a lean management and an effective risk management approach. The relationship of the auditing operations tentative category with all other categories is represented by the conceptual framework in Figure A11.1.

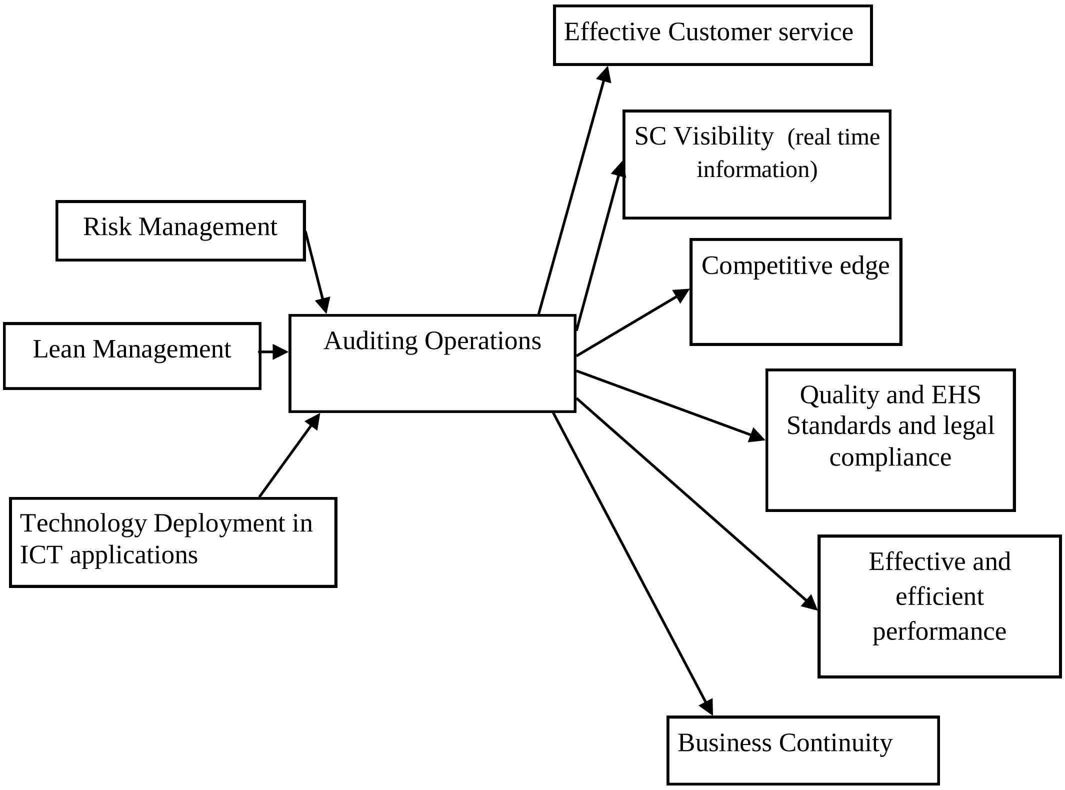


Figure A11.1: Auditing operations tentative category (Author)

A11.2 Managing Cash Flow tentative category

The cash flow management theme is focused on the effective management of the incoming and outgoing of cash associated with the managing of supplies and sales of products not to run into liquidity problems and at the same time ensure no stock-out or excess stock situations.

The cash flow management describes all the necessary cost management actions needed to ensure sustainable operations in all activities, especially in situations of economic recessions, as one participant clearly expressed that importance of: *'cost savings to make up for future situations that are negative such as recessions'* (1/INT2) and furthermore one participant added that all operations need to be managed with a pull-SC approach to promote less running costs by using the:

> *'End of month budget [which] is done to ensure improvement in processes, cost savings in purchasing, [and] operations efficiencies'*; and *'... we are approaching a case of built to order type of company, considering the cash-flow management, economic recession and the wide business portfolio'* (2TS/INT3).

The cash flow management is based on the collaborative initiatives of both the focal firm and all the engaged SC members to promote a win-win situation, where focal firm needs to retain the right and minimum level of stock to manage **cash flow** effectively, since *'there is a guarantee that we will buy it but pay when we use it'* (2/INT3); and '*The stock needs to be made available [but] without ending up into cash flow problems*' (5/INT6).

The focal firm may need to incur additional unforeseen expenses due to the bottlenecks generated by upstream SC members which have a domino effect on the focal firm logistics up to the customers, to make up for such shortcomings, as indicated by a participant, by stating that:

> *'.. we have bottlenecks with regards to suppliers' delivery times, due to breakdown in their machinery, ... So instead ... we need to have more shipments per week ..., which is a more costly shipment. This ... has a knock-on-effect right down on the SC, since the production cannot meet this month output'* (6/INT7).

The focal firm adopts a lean management approach, through vertical integration initiatives, to promote better cash flow management, by having all inputs locally at the firm, using a JIT approach and with a lower operating cost with less stock tied in idle capital, as indicated by a participant, by stating that it was crucial to:

> *'Shift equipment to Malta, to do the components in Malta and not order to store which was leading to idle stock. Malta inventory may be kept low ... and just-in-time may be used'* (1/INT2). He further added that lean management is maintained through local sourcing with its proximity advantages, since *'In Malta subcontracting is cheaper, stock is kept low,… customer's market is closer, port is closer and work more efficiently';* and he closed the matter by stating that '*We are operating lean and this helps, since business base on cost per unit'.*

Adopting a consignment stock approach at both the upstream and downstream sides of the SC, through an **information sharing** mechanism between all parties, through ICT applications, is fundamental, as clearly referred by a participant by stating that: *'The IT is also **driving the process of the SC**, since suppliers and clients are requesting that all the members of the SC are to use their software applications to place the order or to see the orders'* (5/INT6). Such an approach promotes improved cash flow management and better **flexibility** in manufacturing operations due to the stock availability with no tied-up cost until usage and with improved credit terms. Such an approach was clearly indicated by two participants, by stating that a:

> *'A balance need to be made for the stock levels, ... with clients for a consignment stock and also with the suppliers, to balance out cash flow'; '...[suppliers] payment terms with an agreement with a longer period'* (5/INT6); and *'... we use consignment stock by getting the material and we do not pay until we use it*' (6/INT7).

At the downstream side, some sales are provided on demand, by using warehouses near the customers, where the focal firm gains from immediate or faster cash flow recovery and also with an improved and effective customer service, due to faster product delivery. The participant explained such a SC downstream set-up by stating that: '*… we hired a warehouse in Germany, adjacent to the customer premises'*; '*Although we deliver before being paid, the payment is faster …*' (5/INT6).

Only when suppliers impose stock limits, may cause cash-flow problems, due to forced **purchasing** of excess stock with the result of idle capital tied in stock. The participant explained, by stating that what happens is that: *'The supplier force a minimum order quantity per item, this leads to a problem of over stock'* (INT4).

Logic Diagram of Managing Cash Flow tentative category

Table A11.2 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Cash Flow tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Supply management inventory levels	Minimal level of stock as required by the focal firm	Imposed minimum levels of stock by suppliers resulting in excess stock levels
Liquidity level	Favourable	Negative
Efficiency in operations (Competitive and lean operations)	High efficiency (e.g. cost savings measures such as less running costs, faster deliveries through local sourcing and negotiate better supply management prices)	Low efficiency (e.g. sourcing from overseas SC members suffers from lack of proximity costs associated with logistics and due to higher levels of inventory requirements)
Supply management transactions type	Consignment stock or Vendor Management Inventory for stock supplies	Purchasing of stock without any concessions
Sales deliveries	Supply products on demand with fast deliveries through warehousing close to the customers	Supply products on order with the stipulated lead time for manufacturing
Collaborative initiatives	Close collaboration	Lack of collaboration
Managing logistics expenses	Orders' levels supplied as requested with one shipment or from local sourcing to gain from proximity advantages	Frequent shipping arrangements to make up for suppliers' shortcomings to meet the complete orders
Conditions	Economic recession; technology deployment in ICT applications; vertical integration by the focal firm; and proximity of the customers and suppliers due to the demanding logistics management needed due to Malta's Small Island State characteristics.	

Table A11.2: Managing Cash Flow tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the managing cash flow tentative category, since it establishes an environment where all SC members together with the focal firm, from a holistic approach, **collaborate** effectively with each other with the minimal level of stock tied in capital not to run into liquidity problems. Managing of cash flow needs to be **sustainable** by operating efficiently and has to implement the necessary measures to make up for periods of recessions. The focal firm adopts a **lean management** approach in all operations by undergoing **vertical integration** and manufacture in-house, whenever possible, to promote more efficient processes. Consignment stock is used to improve on managing cash flow effectively by settling payments only on stock usage. The focal firm, whenever possible, needs to provide a faster supply of finished products and retrieve payments at the earliest, through say dedicated warehousing closer to the customer. With such an improvement in both upstream and downstream SC sides, the focal firm being both a buyer and a supplier, promotes a proactive process to achieve improved SC flexibility at both sides of the SC leading to a competitive edge and a win-win outcome. The deployment of technology based information systems is crucial to enable real-time information sharing for SC visibility.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing cash flow conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promote several consequences, such as the level of firm competitiveness in the market sector (e.g. efficiency), win-win situation for all SC members, effective customer service and flexibility across the SC. The moderating variables are collaborative actions adopted with all SC members, shared information initiatives, through technology deployment to promote real time information sharing mechanism and a lean management approach. The relationship of the managing cash flow tentative category with all other categories is represented by the conceptual framework in Figure A11.2.

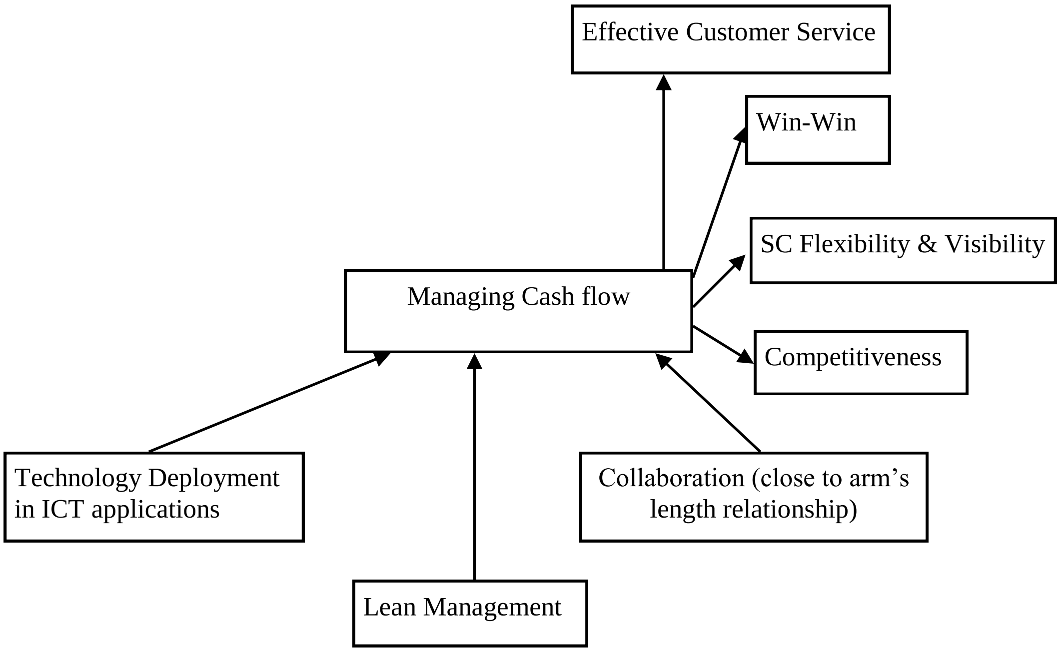


Figure A11.2: Managing cash flow tentative category (Author)

A11.3 Managing Collaboration tentative category

The managing collaboration theme is about sharing activities and assigning responsibilities to teams, both within and outside the SC, to build strong relationships between people and to incorporate a **level flexibility** to meet effectively and efficiently all the established **performance targets**.

To achieve SCI all the entities making part of the SC, need to undertake **collaborative** initiatives to promote **relationship building** between people and to perform effectively, as clearly outlined by three participants, by stating that:

> *'[Departments] are assessed on ... collaborative effort ...'; 'Teams are formed to support and report'* (1/INT 1); '*Suppliers and buyers are well related between us'; 'Good relationship [exist] between us'* (2/INT 3); '*Integration and collaboration is needed to promote flexibility to build the relationship'* (3/INT4); and '… the daily interactions are more based on hands on and face to face' (10TS/INT7).

The SCI depth may vary from a **close** to an **arm's length integration**, which both need to be supported by **contractual agreements**. Such an approach was substantiated by various participants, by stating that:

> *'local staff work closely with US staff in collaboration'* (1/INT 1); *'... we do contractual agreements'* (2/INT3). *'Contracts exist with suppliers'* (3/INT4); and *'.... our product builds on their product and hence these suppliers are partners and have an in-depth relationship ..., but others are referred as suppliers ...'* (5/INT6). Though, such contractual agreements with SC members may restrict the focal firm to engage with any other contractor, as one participant added, by stating that: *'contracts with certain suppliers and contractors are not possible and we cannot use'* (2/INT1).

An arm's length collaborative effort, may consists from opportunism and lack of engagement, feedback and cooperation both within and outside the focal firm respectively, which may drive the focal firm to undergo duplicated activities and take special measures, to make up for such shortcomings, as clearly referred by three participants, by stating that:

> *'Sales and marketing are duplicated …'; 'The business model is working but can operate more effectively and efficiently if taken ownership of this missing part, … but with [this downstream sales intermediary], this is a bottleneck'* (1/INT1)*; '… there is always rivalry at work between departments'; 'We still have internally silos thinking within departments'* (6/INT7); *and 'The various stakeholders are after the same criteria but these may be in conflict with their individual targets/criteria'* (6/INT8).

A close collaborative effort refers to a situation where SC members work closely as a **team** or as partners, who are **flexible** and well **trained** to **negotiate** together to meet the expected performance and **change**, as confirmed by three participants: *'… [to use] a decentralised approach'* (1/INT1)*;* '*Integration and collaboration is needed to promote flexibility to build the relationship'* (3/INT4); and *'… [to deploy effective] negotiating skills [across the SC] …'* (5/INT6).

With a close collaborative environment the focal firm and all the SC members, promote staff commitment, empowerment, involvement and synergy so as to engage collectively in a **trustful** environment to tackle all challenges in a **holistic perspective**, with a **cross-functional approach** for a **win-win** situation. This approach is clearly expressed by three participants, by stating that:

> '… *voice of employee in heard* …' (1/INT1); *'Workers are involved in all decisions'* (1/INT2); and *'Synergy and coordination is the order of the day …'; 'Production planner works in-conjunction with the purchasers in the same office'; 'The product sales support (PSS) in Malta coordinates/integrates with the overseas sales office and the end-user. PSS goes abroad to the end customer … to listen and monitor our products …'* ; '… *collaboration, which if not done, it will work against the relationship building'* (3/INT4).

With such a trustful environment, the focal firm will not be subjected to inflated requirements by Corporate's staff or other SC members, which may result in the disruption of the SC performance from the bullwhip effect, as indicated by one participant, by stating that: *'… some of the requests may have a hidden agenda such as exploded needs and urgency'* (3/INT4).

The focal firm, within and with all SC members, needs to integrate all operations effectively. The external SCI is more challenging to achieve, due to the different cultural values and performance objectives, as clearly indicated by one participant, by stating that: *'The intra was achieved and the inter needs more challenges to overcome'*; and *'For inter-company the performance is more easy to be dealt with due to same values, culture and language with same MBOs'* (1/INT 1).

SCI needs to adopt a level of trust to perform effectively between each other as partners, by building on their experiences, joint activities and track record. Such a trustful relationship has to be the daily norm and goes beyond the established contractual agreements, as highlighted by three participants, by stating that:

> '*Even when problems exist, I try to coordinate in a positive approach not to demolish relationship, like a give and take situation'* (3/INT4); '*When a client engages with a manufacturer, both engage in a trustful environment which promotes open communication apart from the formal contracts'* (4/INT5); and *'…. our product builds on their product and hence these suppliers are partners and have an in-depth relationship, based on years of experience and history record based on problems solved and opportunities we passed together'* (5/INT6).

Suppliers with a substantial level of trust with the focal firm, need to engage in various **value-added measures** (e.g. consignment stock), to promote both **synergy** and a **win-win** situation, since suppliers have guaranteed sales and the focal firm gains from improved cash flow management, as indicated by two participants, by stating that:

> *'The principle is a win-win situation through the SC …'* ; and *'… we also use consignment stock, where the supplier having a good relationship …'* (2/INT3).

The firm also needs to build trust with the customers, for managing collaboration effectively with the right customer priority, based on the type of service/product given, to promote further sales. Such an effective customer relationship has been declared by three participants, by stating that:

> *'In the selling side, we have close contact with distributors and end customers themselves, we sell to both of these entities'* (2/INT3); *'… all orders are managed according to the priority agreed within the logistics';* (3/INT4) and '*… we hired a warehouse in Germany, adjacent to the customer premises'* (5/INT6).

ICT tools need to be used for **information sharing**, so as to provide **SC visibility** and to facilitate such a collaborative process, so as to strengthen the relationships. Typical ICT tools, may be either mobile devices (e.g. tablets and smart phones apps) or any computer (e.g. desktop or workstation), which may need to be connected to the internet (e.g. web portals and social media) or networks connected to common databases (e.g. intranet with ERPs and EDIs). Such ICT tools were clearly emphasised by one participant stating that: '*We have the tools today (ERP), and we can see where the work state is. This is IT based'; and 'This helps collaboration between us all as a key issue'* (5/INT 6).

Logic Diagram of Managing Collaboration tentative category

Table A11.3 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Collaboration tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Relationship type	Close relationship (i.e. cooperation such as consignment stock for supply management and customised fast delivery approach using dedicated warehousing near the customer)	Arms' length relationship (i.e. opportunism with forced minimum stock order levels)
Contractual agreements	Promotes more commitment	Cannot engage with some suppliers being inhibited by the established contractual agreements with certain SC members
Culture	Common culture	Culture differences
Trust	Trustful relationship promotes real requirements	Lack of trust may cause inflated requirements
Teamwork	Proactive; decentralised; involvement; and cross-functional	Reactive (i.e. silo thinking)
Training	Knowledgeable	Lack of knowledge
Internal and external SC members' flexibility	Adaptable changes	Rigid to changes
Communication	Open communications (i.e. information sharing)	Closed communications (i.e. limited access to information)
Problem solving	Constructive approach to problems with a holistic perspective for a win-win situation	Destructive relationship approach to problems with silo thinking
Priority	Customised priority	Priority based on scheduled dates
Conditions	Level of trust between people; cultural differences among SC members; inflated requirements submission by SC members to focal firm; manufactured product type; SC member role (e.g. partner or supplier); and technology deployment level.	

Table A11.3: Managing Collaboration tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through dedicated collaborative efforts since such a collaborative environment contributes to an improved effective and efficient **performance**, such as lower cost of **inventory** and better **customer service quality**. The collaborative environment is made up from sharing of activities and assigning responsibilities between people, within and across the SC, with either close or arm's length integrated efforts, which are supported by **contractual agreements** to promote a formal commitment to all requirements. A **level of trust** is needed to tackle all challenges from a **holistic perspective** for a win-win situation which goes beyond the commitments stipulated in the contractual agreements. The collaborative efforts need to incorporate dedicated engagements based on strong relationships, such as consignment stock and deliveries of products on demand, in both upstream and downstream sides of the SC respectively. **Technology deployment** enables SC visibility, through established information sharing mechanisms, across the SC. Such a **collaborative** approach facilitates the **manufacturing management of all operations**, the **change management** approach and the **leadership power of control and empowerment** of all people in all scheduled work and in their proactive actions.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing collaboration conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as collaborative action determine the level of the management and leadership effectiveness, holistic approach across the SC for a win-win situation, SC visibility and flexibility, change management and effective and efficient performance approach to achieve a competitive edge over other SCs. The moderating variables are the level of trust and the information sharing initiatives between all SC members. The information sharing is enabled by the technology deployment to promote real-time information exchange. The relationship of the managing collaboration tentative category with all other categories is represented by the conceptual framework in Figure A11.3.

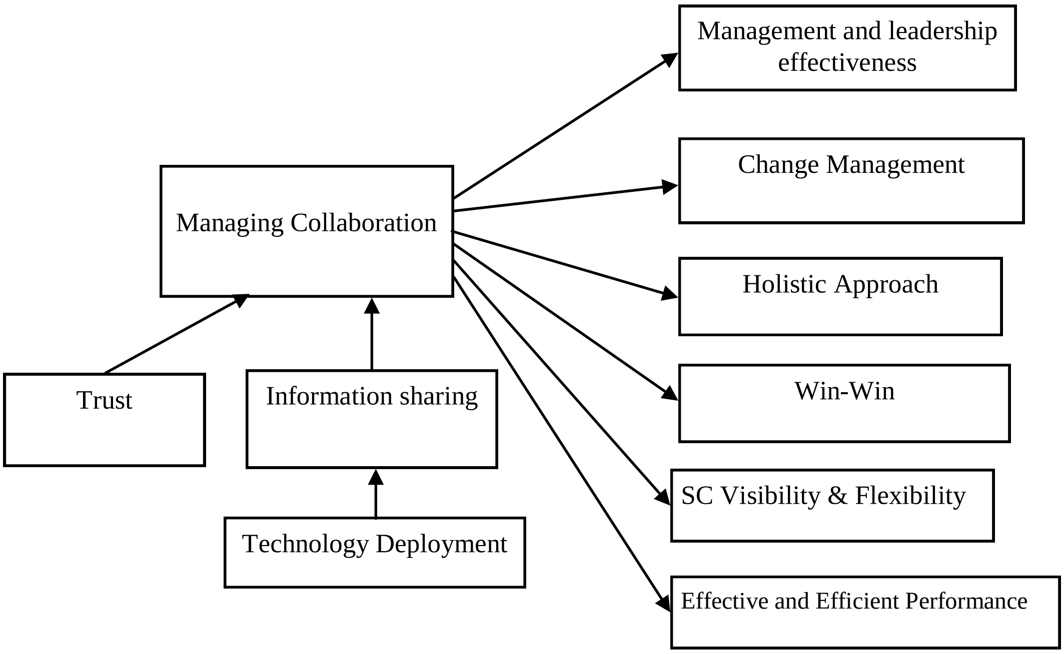


Figure A11.3: Managing Collaboration tentative category (Author)

A11.4 Managing Change tentative category

The managing change theme is about mastering the complex and dynamic changes from both upstream and downstream SC sides and at the same time to be flexible and innovative in all manufacturing and SC operations within the focal firm to promote competitive edge.

To achieve SCI the focal firm needs the **employees' commitment**, together with the **management commitment and support**, to manage change effectively, as two participants clearly emphasized, by stating that:

> *'Full support to all staff in Malta and my CEO is appreciated [by the Corporate]'* (1/INT2); '*Management sometimes has no time to analyse the current situations'; 'The management sometimes has reluctance to change*'; and *'[in other circumstances tries] to improve by implementing change'* (4/INT 5).

Change is driven by **technology** and needs a favourable embedded **culture** of all people within the organisation to adopt a **flexible** and **proactive approach** (e.g. restructuring, improvements and cost savings). The change management approach needs an ingrained culture of a **continuous improvement** with the least resistance to change from all people, since one participant clearly indicated that: '*One of the main problems is the resistance to change from certain people such as fear*'; *'Certain cultural barriers are difficult to overcome, since you give them the technology but still they do not use it'* (4/INT5). Three other participants adopted a more positive approach to managing change and outlined that:

> '*Continuous change is the firm policy'; '... there is always room for improvement'; '... we need to go back to the drawing board ... to [use] new components'* (5/INT 6); '*The [strategic] decisions are also flexible to discuss [and] to promote improvements on ... some processes'*

(3/INT 4); and *'Continuous change is the need to survive'; '…changing the systems as needed'* (17TS/INT 14).

Such flexibility can be also achieved through dedicated collaborative initiatives with certain suppliers, by deploying a consignment stock arrangement, by having all the necessary materials in hand, so as to effectively meet any new orders or changes in the manufacturing process, as explained by one participant, by stating that:

> '*From the suppliers at the input as raw material, we use consignment stock, … we have more supplies and assist to be more flexible to change plans, having more material in hand'* (6/INT 8).

Change promotes **innovation** within and across the overall SC to meet new customers' requirements or replace obsolete stock with a new product design or introduce new processes design in the overall manufacturing stages, so as to improve on the **risk management** approach to promote **business continuity**, as explained by three participants, by stating that: '*We are flexible to meet changes, to meet new customers' specs'* (1/INT 2); '*The design may be changed due to the bottlenecks of lack availability in the market of parts'* (2/INT 3); and *'Innovation refers to process improvement (Kaizen approach)*' (6/INT7).

Logic Diagram of Managing Change tentative category

Table A11.4 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Change tentative category properties	**Positive extreme dimensional variation**	**Negative extreme dimensional variation**
Change management cultural values	Continuous improvement culture	Resistance to change
Commitment to change	Proactive	Reactive
Technology deployment	Enables and supports through automated systems	Manual approach
Flexibility	Adaptable processes	Rigid approach
SC members collaborative initiatives	Dedicated consignment stock by suppliers improves on change management in manufacturing of orders	Orders are given by suppliers only on demand by the focal firm
Innovative approach	New products and/or new operating processes	Same products and/or same processes
Risk management	Measures taken to promote business continuity (e.g. new processes and design of products)	Risks of stock-out due to lack of business continuity measures (e.g. indifference to changes in the supply of components)
Conditions	Government and private institutions support to the investment for change (e.g. local commercial banks and Government/EU funds for investment); economic recessions; management and staff culture on support and training initiatives.	

Table A11.4: Managing Change tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the managing change tentative category, as it establishes an environment where all SC members, together with the focal firm, from a holistic perspective, manage change through a proactive approach with the commitment of all people involved. Change management requires an embedded culture to be flexible and adopt a continuous improvement approach to all challenges, with an effective risk management approach, to perform effectively and efficiently and to promote business continuity. Change management improves on the risks by adopting close relationships with suppliers, for more effective stock deliveries, such as with the implementation of a consignment stock approach. Technology investment in automation and in ICT based applications enable the change management approach of the focal firm to become more agile in meeting changes due to the automated processes and due to the availability of real time information. Such improvements refer to changes in manufacturing processes and in product re-design to promote innovation.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The change management conceptual element is considered as part of the SCI phenomenon, where with the support of various moderating variables, promotes several consequences, such as customer services improvements, processes improvements and products re-design to promote innovation, business continuity and a competitive edge. The moderating variables

are the collaborative initiatives by all stakeholders, risk management approach, the human element flexible and proactive approach and the investment in technology. The relationship of the managing change tentative category with all other categories is represented by the conceptual framework in Figure A11.4.

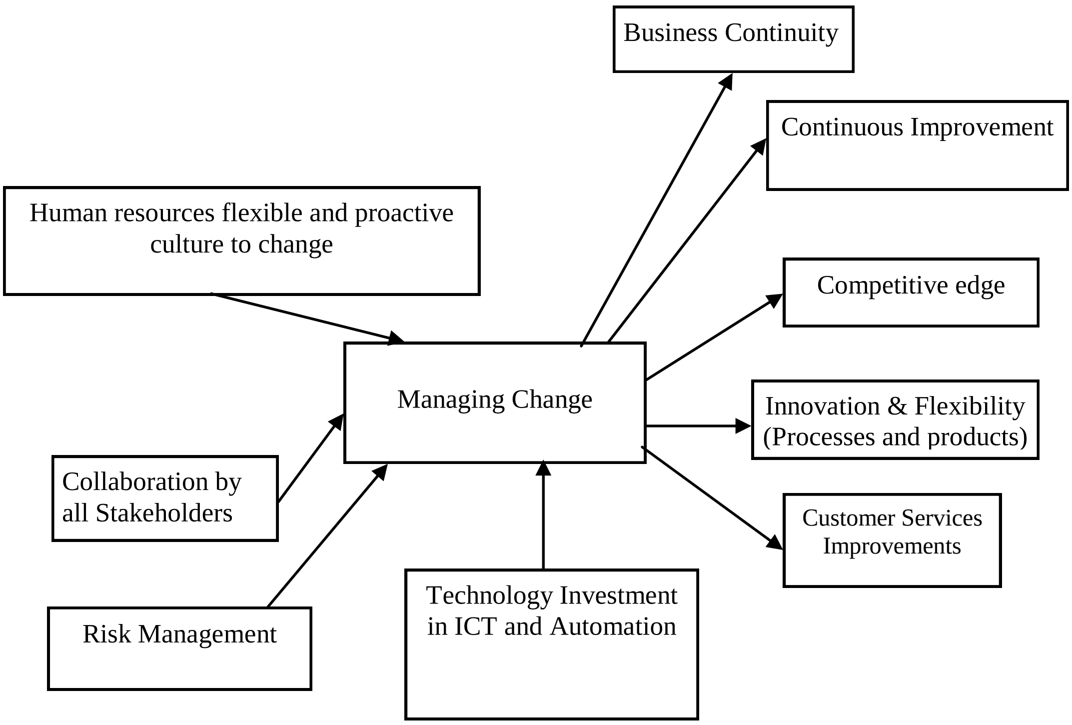


Figure A11.4: Managing Change tentative category (Author)

A11.5 Managing Information Sharing/Communication tentative category

The managing information sharing/communication theme is about capturing and sharing the right information at the right time, within and across the SC, so as to take all the necessary timely collaborative actions so as to promote an integrated approach to all operations and to achieve effective and efficient performance.

To achieve SCI, **information sharing** and **communication** are to be used to enable **integrated operations** with a **continuous improvement** approach with less duplication of efforts, both within the focal firm and across the SC, so as to promote effective and efficient performance. Such minimisation of duplication and continuous improvement approaches respectively, was explained by two participants, by stating that: *'This access to information will avoid the making of any query to the supplier'* (4/INT5); *and 'The idea is written down on the board and is reviewed, monitored and implemented from the written information on the Kaizen board'* (6/INT7). Such an information sharing environment is promoting an integrated approach, as emphasised by three participants, by stating that: '*Data of progress is visible to all through monitors in the shop floor'. 'From suppliers' side, we share stock levels…'* (2/INT 3); '*The sales offices will be updated on their orders and the stock and state of production of the firm'* (4/INT5); and *'Communication is a must for the SCI depth, that all data arrives to all people and at the same time'* (6/INT8). The promoting factors of SCI, as clearly declared by a participant, is communication, by stating that: '*Definitely, communication between all external entities (firms etc) and internally between all departments'* (5/INT 6).

The information shared can either be of a **knowledge** or of an **operational** nature respectively, to meet all collaborative requirements, as referred by one participant, by stating that: '*… sales office … to listen and monitor our products and their use and any problems'*; and '*The logistics layer is important to pass information'* (3/INT 4).

Face to face communication within daily meetings and among staff located physically together or virtually, wins over all other types of electronic communications (e.g. ERP or database systems and e-mails), as clearly expressed by three participants, by stating that 'We measure and discuss everyday all operations' (1/INT 2); the *'Planning and purchasing department are within the same office to promote better communication'* (2/INT 3); and '*We have weekly meetings through video conferencing call'* (6/INT7).

Such information flow provides **SC visibility** which builds on the level of **trust** across the SC so as to promote improved **collaborative** initiatives for better **teamwork**. Such a trustful environment creates a business scenario, where the focal firm may adopt an open book with a continuous dialogue approach with the respective SC member, which goes beyond the contractual commitments. In fact three participants outlined the need for such a trustful environment, by stating that:

'The trust is needed since we share confidential information' (3/INT4). '*When a client engages with a manufacture both engage in a trustful environment, which promotes open communication, apart from the formal contracts'* (4/INT 5); and *'Effective communication is key. Namely not pass the message, but entering in a continuous dialogue with others'* (9TS/INT 6). Though, it cannot be excluded that some SC members do not give access to the focal firm to remain updated with all the necessary information, as referred by one participant, by stating that: *'The end customer of [the Focal firm] is not seen'* (1/INT 2).

ICT applications, through in-house databases or through the internet, are the enablers for such real-time information sharing and communication mechanisms to promote SCI, as clearly outlined by two participants, by stating that: '*E-mails are being used with various customers'; 'Suppliers are contacted … by a simple e-mail'* (3/INT 4); and '*The SC uses cloud computing and groupware systems … with accounting system, ERP, BOM ... which comprises interfaces through web with sales office'; '… these tools are pushing more integration across the SC'* (4/INT5). Such information sharing, through technology, enables the **monitoring** and **management** of all operations of all products through the use of the bar-coding system, which provides an **audit** trail of all the processes in real-time, as referred by the same participant, by stating that: '*The barcode is used to track the items across the SC'* (4/INT5).

Such **information management** enables the focal firm to holistically manage all operations effectively and to detect any deviation in the scheduled performance in a timely manner, as one participant declared the importance to have: *'… a birds' eye view at one point';* and '*This needs information of all the processes'* (4/INT5). With an effective information management stance, it enables management to take **informed decisions** so as to remedy all problematic situations in real-time and achieve all targeted performance in a timely manner, as referred by one participant, by stating that: '*.. based on the information, knowing future projects in the pipeline to have a clear visibility of* *all the projects and assist us in our plans and the material orders in place, we can achieve the targets'* (2/INT3). All information needs to be made available, so that **performance is measured** and **all risks** are managed effectively, as declared by three participants, by stating that: *'Risk management is important since all operations are being monitored to deliver'* (3/INT4); *'The SC measurements are in place to measure all works in progress'* (6/INT7).

Logic Diagram of Managing Information Sharing/Communication tentative category

Table A11.5 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Information Sharing/Communication tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Depth of information sharing	Proactive and in-depth information sharing (e.g. operational and knowledge based information) for informed decisions	Limited information sharing with an inhibited approach
Timely information sharing	Real-time	Delayed
Communication approach	Face-to-face verbal communication with the support of electronic communication tools	Written communication based on IT applications only (e.g. e-mails)
Monitoring and tracking performance to manage all risks	Performance measurements and audit all processes to promote a holistic SC visibility and to detect any deviations in real-time	No measuring or auditing at all
Information sharing and communication for collaborative efforts	Close relationships leading to integrated operations with less duplication of tasks and with a continuous improvement approach	Arms' length relationships
Conditions	Technology deployment in ICT applications; and level of trust between SC members.	

Table A11.5: Managing Information Sharing/Communication tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled by sharing and communicating on both technical and operational information to promote SC visibility across the SC tiers. With the right information in hand, it enables the focal firm to drive production, identify problems, assign priorities by stock code and track the product/s and works with a continuous improvement approach across all SC tiers. Information is retrieved from every SC tier, such as from suppliers, contractors, logistics providers, customers and even from the internal focal firm itself, through either face to face or through electronic communication. Face to face communication, either physically or virtually, remains the best approach for effective communication but still needs the support of technology based information management systems (e.g. ERPs, e-mails and databases) to capture the needed information, since ICT enables monitoring and tracking of all works, such as through bar-coding. Once information is shared between the SC members, this initiates the process of communication to interact together, support each other and takes the necessary informed decisions to solve problems, to manage all risks and to promote a collaborative approach between each other. The level of information sharing depends on the level of trust between SC members which goes beyond the terms within the contractual agreements.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The information sharing/communication conceptual element is considered as part of the SCI phenomenon, where with the support of various moderating variables, promotes several consequences, such as effective and efficient performance, collaboration, information management, performance measurement, risk management, SC visibility, informed decision-making and continuous improvement. The moderating variables are the level of trust between the respective SC members and the technology deployment through ICT based tools. The relationship of the managing information sharing/communication tentative category with all other categories is represented by the conceptual framework in Figure A11.5.

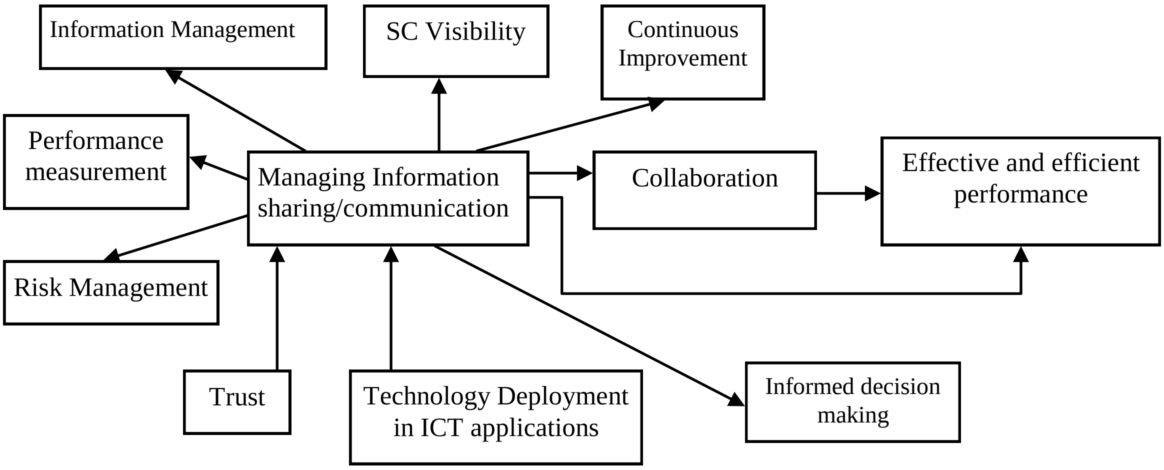


Figure A11.5: Managing Information Sharing/Communication tentative category (Author)

A11.6 Managing Customer Service tentative category

The managing customer service theme is to provide customers an effective service quality with *'the right product, at the right time and at the right price' and 'to ensure that the product has the right quality'* (6/INT 8).

To achieve SCI, the focal firm needs to have a **direct contact** with all the SC members including the end customer and with **interconnected processes,** by **monitoring effectively** the upstream SC not to disrupt the downstream SC, so as to achieve the expected end **customer service quality,** as two participants explained, by stating that: '*Direct contact with the customer…. is critical to achieve, to win the customer feedback and [its] management'* (1/INT 1). *'The client [as the focal firm] has access to suppliers, [updated on] the stock available'* (4/INT5). Though, it cannot be excluded that in some cases the focal firm has no direct connection with the customer and as a result misses crucial information, as clearly outlined by a participant, by stating that: '*The Maltese plant, has no contact with the end-user'* (3/INT 4).

The focal firm needs to assign different **priorities** to each customer to achieve the scheduled quality of service and to build a healthy **customer relationship**, where honesty is the best policy, as referred by one participant, by stating that: '*Production planner assigns the priorities or proceed according to FIFO, but we are flexible to the job order sequence, ... due to the type of customer'* (3/INT4). 'Honesty is the best policy, and we need to inform customer [on any shortcomings]' (10TS/INT7).

The focal firm needs to meet all the SC members including the customers' changing requirements to promote **SC flexibility**, as explained by one participant, by stating that the focal firm needs to: ' ... *undergo the necessary transformation to adapt also to the customer needs'* (5/INT 6).

The focal firm may undergo **vertical integration** in the downstream side of the SC, to become more **lean** and closer to the customer, so as to improve on the customer service to promote **SC responsiveness**, as described by two participants, by stating that:

'*SC includes the [Company X as the distributor] up to the customer. This is a limiting factor of the SC'; '...customer side need to be lean'* (1/INT1); and '*Lean removed the waste in the processes, to be more responsive to the customer requirements and is faster'* (6/INT8).

The customer service needs to be integrated within the focal firm due to the nature of the SC, being a pull-SC, where all orders initiate from the customers' side and needs to be managed effectively to give the right support, as indicated by three participants, by stating that:

'*The future is seen to be built from the information up to the end customer'* (1/INT2); '*The customers are also imposing integration, so that they can see ... design features of the product but also on the process and product flow [delivery]'* (4/INT 5); and *'If you were not integrated as the way we are, it will limit the customer service due to fragmented operations'; '.... we will attend for a hands-on visit ...[at the customers' premises, if there is the need]'* (6/INT 7).

ICT applications remain a key enabler in all operations related to all stages of the product lifecycle and promote **information sharing** across all SC members down to the customer. This is clearly expressed by one participant, by stating that: *'The IT is also driving the process of the SC, since suppliers and clients are requesting that all the members of the SC are to use their software applications to place the order or to see the orders they have for you. Practically the firms are merging with each other'* (5/INT6).

Logic Diagram of Managing Customer Service tentative category

Table A11.6 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Customer Service tentative category properties	**Positive extreme dimensional variation**	**Negative extreme dimensional variation**
Contact with the customer	Direct (i.e. vertically integrated in the downstream side of the SC)	No direct contact but through third parties
Customer Integrated approach	Close interactions with honest approach e.g. on-site customers' visits	Arms' length
Customer priority	Certain customers may need to be allotted a priority	No customer priority at all
Meet customer's changing requirements	A responsive, flexible and adaptable customer support	A passive customer support
Employ lean management to improve on the customer service	Lean operations through downstream vertical integration to be closer to the customer	No dedicated lean approach
Information updates from all the SC members including the customers	Access to all information, enabled by ICT, from the customer to be aware of all requirements	No access to customer information
Conditions	Technology deployment, through ICT applications, provides customers access for the order lifecycle management information.	

Table A11.6: Managing Customer Service tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the managing customer service tentative category, since to perform effectively the focal firm needs to manage effectively the customer service to retain satisfied current customers and win others, through an ongoing relationship building, by adopting the right customer priority. Such a competitive edge is met through a lean management approach to provide the right products at the right time and at an attractive price and with the right quality. Lean management is used so that the focal firm adopts less waste in all processes and to be more responsive to changing customers' needs. Such a lean approach is facilitated with a direct customer contact with no intermediaries in the SC, such as by undergoing vertical integration. ICT applications are used to facilitate all interactions with all customers, through all necessary information updates and follow-ups of all orders.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing customer service conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as SC flexibility and responsiveness, lean operations, customer service quality and customer relationship. The moderating variables are technology deployment through ICT applications, lean management and vertical integration. The relationship of the managing information sharing/communication tentative category with all other categories is represented by the conceptual framework in Figure A11.6.

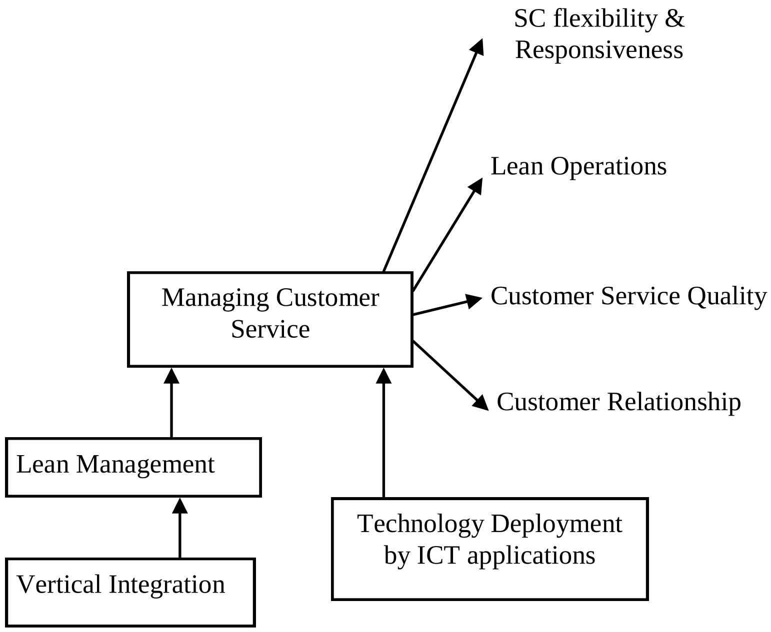


Figure A11.6: Managing Customer Service tentative category (Author)

A11.7 Managing Knowledge tentative category

The managing knowledge theme is about knowledge acquisition through information sharing within and across the SC, to have an informed mindset to promote effective decision-making to deploy state of the art processes through business process re-engineering, both within manufacturing and SC operations.

To achieve SCI, the focal firm shall undergo **training** to promote **learning** and a **change management culture** among all staff in the deployment of newly designed processes. The learning culture needs to build on **knowledge**, so as to adopt an effective **decision making** approach to **reengineer** all manufacturing and SC processes with the right investment in **technology-based production processes** and solutions (e.g. advanced manufacturing systems) and with the required **integrated information systems** (e.g. ERP or common databases). Such an approach was referred by three participants, by stating that:

> *'They need to undergo business process engineering effectively and deliver the training needs to staff appropriately and on a continuous basis'; 'The order trend, with suppliers is integrated over internet (IT)';'The SC uses cloud computing and groupware systems,*

.....which comprises interfaces through the web with sales office, in the global world' (4/INT 5).

Such a SC re-engineering approach will lead to a **higher quality** and a **lower operating cost** with **innovative processes**, both **within and across the SC**, to promote **lean operations**, as referred by three participants, by stating that: *'... material reduction and validation of new resin material used to reduce cost and better quality to improve efficiency, hence the knowledge sharing occurs on these matters'; '..* share the project works and innovative ideas ..' (1/INT 1); and '*Training is given to eliminate waste'* (3/INT4).

The focal firm, in-conjunction with all SC members, from customers to suppliers, including the Corporate, need to build on a **cross-cultural knowledge** platform to **share information** in a teamwork approach. Such **knowledge sharing** initiatives lead to an informed mindset and promote **excellence** with a **continuous improvement**. Such an approach was described by three participants, by stating that:

'Particular staff (engineers) has been trained in lean six sigma and given Kaizen training' (1/INT1)*; 'The relationship is healthy with suppliers and inform us on new products/changes'* (3/INT4); *'Products have been built through these partners (key-suppliers)';* and *'Operational excellence value is key here, because managers are expected to improve processes, people and systems'* (6/INT 8).

Particular SC members may need a more dedicated knowledge sharing approach than others due to the difference in the cross-cultural knowledge and values, as explained by one participant, by stating that: *'The Asian market expects details and full support on a continuous basis. The EU countries are more understandable and flexible to meet all problems and discussions'* (3/INT4).

Logic Diagram of Managing Knowledge tentative category

Table A11.7 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Knowledge tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Training	Ongoing approach	Reactive approach
Information sharing	Open platform to share all information within and across the SC	Minimal information sharing except for exchanging orders information
Learning culture	Commitment to learn through training and knowledge sharing with all SC members	No commitment to learn both within and outside the SC
Innovative approach to re-engineer operations (i.e. change management approach)	Proactive commitments to establish the necessary improvements through re-engineering	Reactive approach to all possible improvements
Sensitivity to different SC members' culture to knowledge	Dedicated effort to exchange knowledge with SC members who retain different cultural values	No efforts to meet cross-cultural differences
Conditions	Investment in technology in automation and ICT applications; Corporate support in all training initiatives; culture adopted by people in learning and change management; and commitment of all SC members to share knowledge.	

Table A11.7: Managing Knowledge tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through managing knowledge tentative category, as it establishes an environment where all SC members, together with the focal firm, manage knowledge through a learning culture with the involvement of all stakeholders to reengineer all SC and manufacturing processes to promote higher quality, lower operating costs and innovative initiatives in line with lean operations. With such a building knowledge approach, the overall SC stakeholders will have an informed mindset with the aim to take effective decisions to promote excellence and to manage change with a continuous improvement approach.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing knowledge conceptual element is considered as part of the SCI phenomenon since it is an action category to promote several consequences such as a learning culture, innovative processes, effective decision-making, continuous improvement, lean operations and change management. The moderating variables are technology investment in automation and ICT based applications that moderate all information sharing initiatives, people culture to learning and change management culture and training programmes. The relationship of the managing knowledge category tentative category with all other categories is represented by the conceptual framework in Figure A11.7.

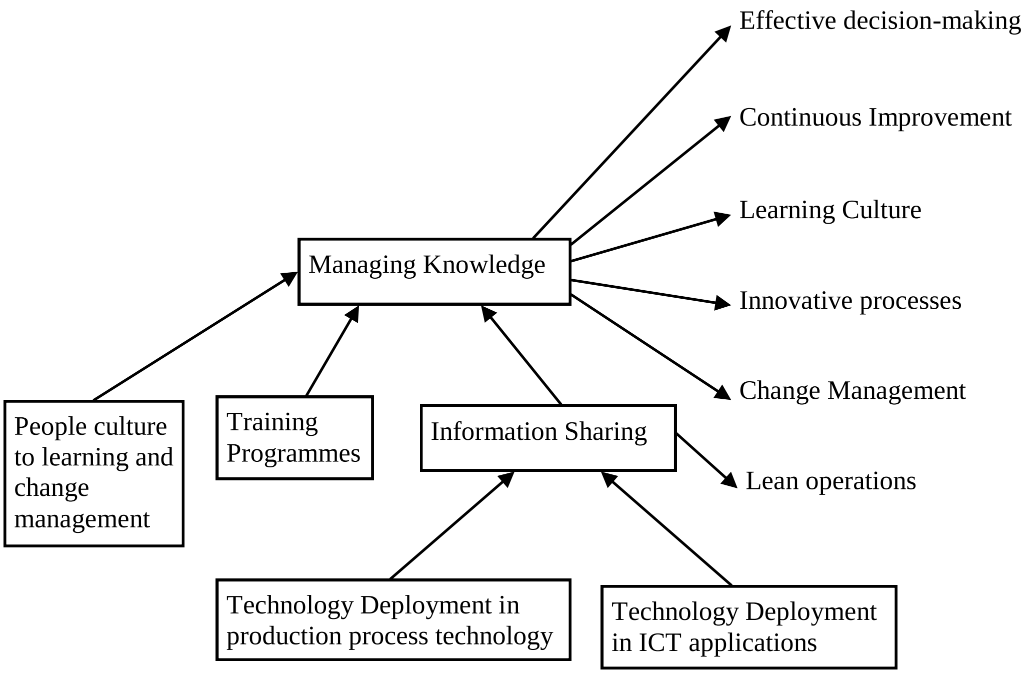


Figure A11.7: Managing Knowledge tentative category (Author)

A11.8 Lean Management and Quality Standards Compliance category

The lean management theme is about how a focal firm together with all its SC members integrate themselves to deploy a systematic approach in all processes to be efficient and effective in the deployment of all resources.

To achieve SCI, the focal firm needs to adopt a **lean management strategic approach** so as to adhere to the established quality standards, sustainable and legal requirements, so as to maximise the use of **resources** and eliminate the **waste** in all **processes**, both within the focal firm and across the SC. **Lean management** provides a systematic approach on how to manage all operations and at the same time improve on the overall firm performance and on the customer service. Three participants substantiated such a lean management approach, by stating that:

> *'…. with lean six sigma introduction … this led to a better integration and such changes were possible to shift equipment and gain from transport costs, delays and smoother operations in Malta'* (1/INT2)*; 'Even office work need to be lean to eliminate duplicated office activities'* (3/INT4); and *'Lean and six-sigma are used in quality assessment to apply the principles in … a systematic process'; 'Lean removed the waste in the processes, to be more responsive to the customer requirements and is faster'* (6/INT8).

Lean management needs that the focal firm **restructures** itself and deploys a **cross-functional** approach in all operations and must comply to all defined quality **standards, legislations** and **sustainable responsibilities** in the sector. Such a lean approach needs to extend with all SC members to promote aligned processes and with a continuous improvement approach to promote business continuity. Four participants described the measurements needed to achieve lean management, by stating that:

> *'Restructure was made and the SC needs to be lean'* (1/INT1); *'We are ISO certified'* (2/INT 3); *'…. the UL affects the SC flexibility in the use of material and stock'; 'All components need to be RoHS directive for Environmental, segregation of waste, minimize waste'* (3/INT4*)*; and *'Lean looks for efficiency in all processes with a continuous improvement approach with strict guidelines to EHS for all workers'* (5TS/INT 2).

The focal firm may **vertically integrate** and/or use local contractors which are preferred from overseas **outsourcing** to be lean. Such a lean management approach, was explained by three participants, by stating that: *'Such a vertical integration promotes lean management'; 'SC full ownership [gives] a lot of benefits'; 'Getting a supply from Mexico is not lean'* (1/INT1); *'… we use locally to benefit from lead time'* (2/INT3); *'[local suppliers are] more flexible since I can push the supplier to perform in time'* (7TS/INT1).

JIT shall be used, wherever possible, by submitting orders when they are needed, to improve on **inventory** and **logistics management** respectively. Such a JIT approach is function of the industry sector and external economic conditions such as recessions. One participant explained, by stating that: *'…..just-in-time approach is being used which means no pre-orders are made, but when needed they are ordered'; 'Forecast was made as usual and due to recession the forecasts being requested were not met by the key suppliers (distributors) since they gave us very long lead times'* (3/INT4).

The SC need to use a low **inventory management** approach to minimise **costs** by deciding on the right trade-off between **ordering the right level of stock** and minimise the **logistics costs** associated with **stock movement**, by employing **JIT**, and whenever possible, avoiding **just-in-case** orders. Stock movement, whenever possible, needs to be moved directly to manufacturing and not to warehousing to minimise costs in logistics, but this is dependent on the **suppliers' commitment** to meet all **scheduled targets**. Wherever strong relationships exist with SC members, a consignment stock approach shall be deployed to gain from the advantages of stock in hand with improved cash flow due to less capital tied in inventory to promote **lean operations**. This situation was explained by two participants, by stating that:

> *'VMI or consignment stock is used. This is used to minimize the stock levels'; '… just-in-time approach is being used which means no pre-orders are made, but when needed they are ordered'* (3/INT4)*;* and *'... put more products in the shipment to cut the costs ….'* (6/INT7).

Information sharing through **ICT applications** shall provide a platform of real-time information to process all information at source and wherever possible to implement automated activities, to avoid duplication, which are needed to **enable** a lean management approach through efficient **processes** within and across the SC. Such lean operations were referred by three participants, by stating that:

'IT systems are used real time to be updated with all information and changes' (2/INT3); *'The role of IT assures the stock levels in a very efficient way'; 'The pdf need to be keyed, a level of duplication but cannot be avoided'* (3/INT4); and *'Technology is a big enabler in this case and has contributed to large increase in efficiencies'* (4/INT5).

Technology based production processes cause the transformation of processes through automation to become more efficient and lean, as described by one participant, by stating that: *'With full or semi automation machines (robotics arms etc) the cheap labour is won over, since one has 24/7 shifts and high quality'* (4/INT5).

Logic Diagram of Lean Management and Quality Standards Compliance tentative category
Table A11.8 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Lean Management and Quality Standards Compliance tentative category properties	**Positive extreme dimensional variation**	**Negative extreme dimensional variation**
Waste management	Minimise waste in all processes and materials usage	No waste management at all
Systematic approach (i.e. lean management)	Processes are all organised to follow all established standards with a continuous improvement approach	Processes do not follow any established standard with lack of improvements
Process approach	Process based on efficient and effective approach	Process lacks efficient and effective measures
Ownership span	Vertical integration in both/either downstream and/or upstream sides of the SC to be more lean	Limited integration and ownership initiatives outside the focal firm
Sourcing	Outsourcing from local SC entities to gain from JIT operations and proximity issues	Outsourcing is independent from proximity consideration of SC entities
Conditions	Technology deployment in both/either ICT and/or automation; industry sector; economic recessions; and collaborative initiatives to gain from special arrangement with suppliers (e.g. consignment stock)	

Table A11.8: Lean Management and Quality Standards Compliance tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through lean management and quality standards compliance tentative category, since it establishes an environment where all SC members, together with the focal firm, integrate all operations with a systematic process to be efficient in the use of all resources and effective in meeting the established quality standards and sustainable and legal requirements. Such an approach maximises the use of all resources by minimising waste and by employing the necessary restructuring to promote a cross-functional approach, both within and across the SC, to promote lean operations and an effective customer service. Wherever possible the focal firm vertically integrates to gain from in-house operations or use local sourcing to gain from proximity issues, to deploy JIT so as to gain from a low inventory management approach and effective logistics. Furthermore, the focal firm preferably deploys a consignment stock approach with its suppliers to benefit from improved cash flow management having less capital tied in stock. To deploy lean management, wherever possible, all information sharing applications shall deploy automated tasks through the use of ICT applications to manage all information effectively and similarly all production processes shall use automated technology to promote efficiency in manufacturing.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The lean management and quality standards compliance conceptual element is considered as part of the SCI phenomenon since it is an action category where with the support of various moderating variables, promotes several consequences, such as lean operations and sustainability, efficiency and effectiveness, performance improvements, effective customer service, cash flow, logistics and inventory management, continuous improvement, business continuity and information management. The moderating variables are technology deployment through ICT applications, lean management and vertical integration collaborative initiatives with suppliers, sustainability and legal requirements, information sharing with the support of technology deployment in ICT and automation. The relationship of the lean management and quality standards compliance tentative category is represented by Figure A11.8.

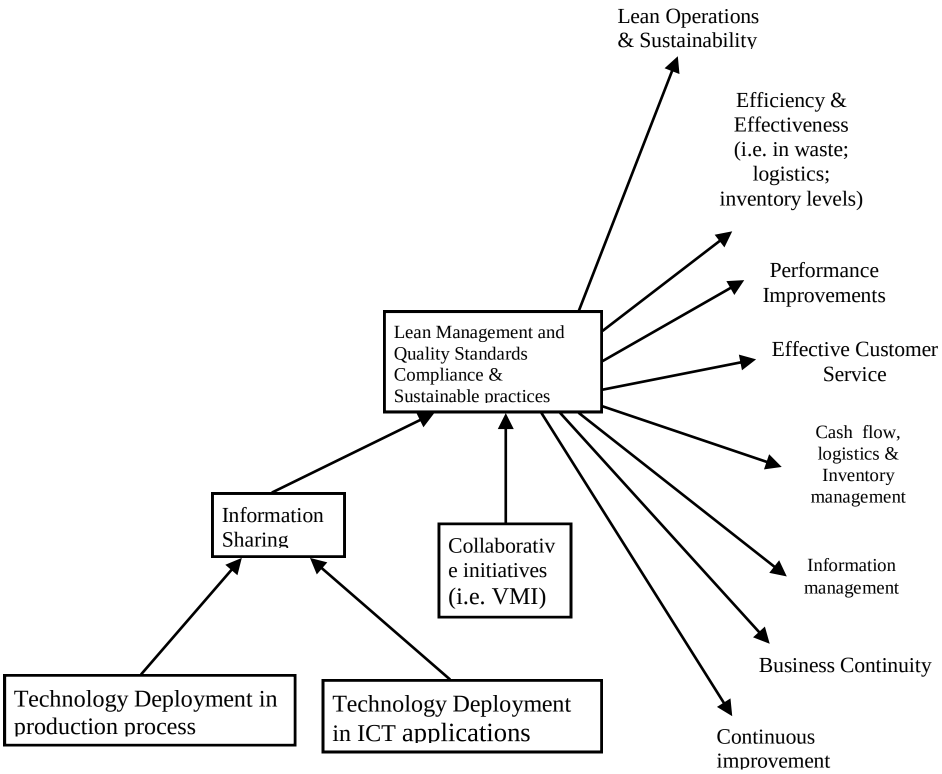


Figure A11.8: Lean Management and Quality Standards Compliance tentative category (Author)

A11.9 Managing Logistics tentative category

The managing logistics theme is concerned with managing the transportation of all merchandise from both the upstream and downstream SC sides in the right time, with the right cost and in the right place.

Managing logistics is a core activity within SCM, since it provides the movement of all raw materials and finished products across the SC, otherwise the manufacturing operations cannot commence or if delayed, may have a ripple effect on the overall SC performance, with the risk of failing to deliver in the scheduled time to meet the expected customer service, as one participant declared, by stating that: *'The logistics is driving the whole set-up'* (3/INT4). It cannot be excluded the importance to consider all logistics requirements of all in-house movements within the factory premises, due to the limited factory space availability, ending up to use fragmented factory units, as one participant highlighted, by stating that: *'Malta has limited space of land and hence most factory units are located apart, that is have their land which is distributed'* (4/INT5).

The transportation mechanism mode of transport (i.e. air, sea or land) is function of the type of merchandise (e.g. weight and volume), distance and geographical nature of the country, being either a land locked or sea locked type. Malta, as a Small Island State, with its insularity characteristics has a relatively expensive and less efficient transport and logistics infrastructure, to meet its tight lead times, due to its infrequent cargo shipping schedules, since it needs to use either sea or air, as the first shipment mode of delivery. Once the mainland is reached the next mode of transport needs to be selected, to resume its journey to reach all suppliers' or customers' localities across the globe, such as Europe, USA, North Africa and Asia, among other countries. Four participants explained such a challenging logistics situation, by stating that:

> *'Logistics is the main problem in Malta'; 'The Sea shipping routes are quite limited and are expensive'; 'Air travel is used for fast moving products and is expensive'* (2/INT3); *'This firm has heavy stock/material and we do not consider airfreight and courier'; 'From Germany we have 5 days transit time'; We are using more the Asian market, with 28 days transit time'* (5/INT6); and *'Malta is an island. This affects logistically, we take 3 weeks to get the deliveries. Abroad the delivery is 3 days, due to transportation on the road'; 'Freight by air is used for urgent orders'* (14TS/INT11).

To achieve SCI the focal firm needs to collaborate effectively with both upstream and downstream SC members, including the freight forwarders. Managing logistics is very challenging and needs to respect both the **lean management** approach and all **environmental responsibilities,** by deploying **effective and efficient logistics management** (e.g. use the most efficient shipping method and effective shipping frequency; use the shortest route with the least carbon footprint; and to manage the capacity of the containers' space or use groupage). Three participants outlined such an effective and efficient logistics management, by stating that:

> *'Consideration is being given by freight forwarders for route planning in line with the roadmap 2050 for low carbon Europe'* (2/INT3); '*SCI within logistics is needed since I always tried to build a good relationship with suppliers and sales (overseas)'* (3/INT4); and *'... stock being kept decreased due to such a faster process of delivery ....'; '... we made vast reduction with the [freight forwarder contractor] on the inventory terms'*; *'.... [we] put more products in the shipment to cut the costs'; 'Italy is near but the stock is not, but we only ship twice a week... so it affects the SC';* and *'The transportation ... have [abroad] feeder trucks everyday'* (6/INT7).

Such an ideal lean management scenario may not always be possible to achieve since some suppliers may fail to meet all contractual obligations, which drive the focal firm to undertake more frequent shipments with an overall increase in the scheduled expenses, as one participant clearly declared, by stating that: *'... we are not having the material on time. So instead of having one shipment per week with a container, we need to have more shipments per week which incurs more costs ....[this] is a major bottleneck'* (6/INT7).

The SC, which may employ an upstream side **vertical integration**, needs to manage the **inventory** in-line with the **lean management** principles to improve on the overall **performance**, such as to meet all stock requirements with the least stock, respect lead times and use lowest transportation cost, as it was referred by two participants, by stating that: *'It is part of the lean six sigma to produce these components here...[to] avoid the transportation costs'* (1/INT2)*;* and *'Process improvement ... refers to the use of less material in our product ... less load in weight for shipping'* (6/INT8).

ICT applications, enable **visibility** of all merchandise' movements across the SC tiers (e.g. web portals transportation tracking services). ICT serves to **synchronise** all **processes** and **actions** and serve as a **risk management** tool to detect any divergence from scheduled target dates of all logistics to promote the necessary timely recovery actions and at the same time, for certain merchandise, evidence through data loggers are used as a guarantee on the temperature stability for the whole journey. Such an ICT support has been described by three participants, by stating that:

'[Freight forwarder] *has a tracking means for logistics'* (1/INT2); *'The logistics layer is important to pass information and promote visibility* (3/INT4); and *'In Malta we use bar-codes [few use RFID]'; '[Particular products are] transported by special containers with temperature controlled equipment where data loggers [are used]'* (4/INT5).

Logic Diagram of Managing Logistics tentative category

Table A11.9 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Logistics tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Sea Transportation availability	Frequent	Not frequent
Space availability within factory premises for effective warehousing	Organised factory space with no duplicated handling and movements	Lack of space within factory resulting in disparate allocation of items with handling duplication
Environmental responsibility for the selection of transport route with the least carbon emission	Most environmental friendly route	No consideration to environmental friendly route
Dedicated services during transportation for effective customer service	Temperature controlled environment (i.e. reefer container)	No dedicated service for merchandise
Lead time management	Meeting targets	Delays in deliveries
Transport available modes (sea, land & air)	Use of the most effective and efficient route to deliver the merchandise	No consideration to route effectiveness and efficiency
Lean management based transportation	Lowest transportation cost, right shipping frequency, shortest route, environmental friendly route and exploit container space.	No lean considerations at all
Conditions	Manufacturing sector determines the type of transport mode (i.e. air, sea and land) due to the product weight and volume; ICT applications to promote visibility of all orders' movement by freight forwarders and couriers (e.g. tracking on web portals); level of vertical integration of the focal firm across the SC; and merchandise special requirements (e.g. temperature controlled transportation)	

Table A11.9: Managing Logistics tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled by the managing logistics tentative category, as logistics needs to be managed effectively and efficiently to ensure that the movement of merchandise arrives at the right time, with the right cost and in the right place, so that the manufacturing process may start at the scheduled date and that the customers' scheduled deliveries are met by the agreed delivery date. Such an environment requires the collaboration of the relevant SC members, which together with the focal firm, interact to meet the scheduled customer service to promote a competitive SC. The location of the focal firm being in a Small Island State, such as Malta, makes managing logistics a more challenging role, being a sea locked island, which demands the use of either maritime or air transport service to get out of the country to the mainland of destination and vice versa. Logistics is part of the overall SC and manufacturing operations to promote lean management and to meet all environmental responsibilities. Any delays on the logistics commitments may need the focal firm to engage in timely recovery actions, to eliminate any risk of failure in the overall SC performance. ICT based tools are used to provide SC visibility to allow all SC members to track all orders by using hotline phone numbers or through on-line access to web portals, provided by freight forwarders or couriers on every order.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing logistics conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences such as customer service, lean management, SC visibility, risk management, effectiveness and efficiency and environmental responsibilities compliance. The moderating variables are ICT and the transport and logistics infrastructure. The relationship of the managing logistics tentative category with all other categories is represented by the conceptual framework in Figure A11.9.

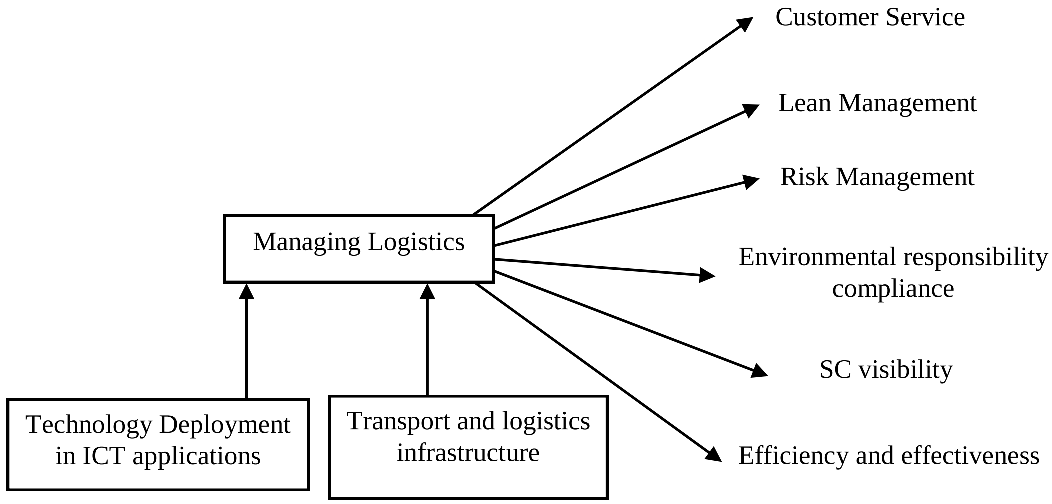


Figure A11.9: Managing Logistics tentative category tentative category (Author)

A11.10 Managing Performance Measurements tentative category

The managing performance measurement theme is about measuring people's behaviour, attitude, skills and commitment to work, to determine their contribution to the overall firm performance. Such an assessment needs to cover not only the focal firm, but also all SC members, to promote an aligned SC with a continuous improvement approach.

To achieve SCI, **performance measurements** are used within the focal firm to cover all management levels down to the bottom line so as to monitor, on a daily basis, the overall performance effectiveness and efficiencies and at the same time create awareness to all staff of all their individual performance targets. The focal firm must then align its operations with all its SC members, by implementing **joint performance benchmarks**, to create awareness of such performance indicators to all involved, to promote the necessary **performance improvements** and settle all the necessary payments. With such a performance measurement approach it enables to uncover all the established gaps, both within and outside the focal firm, so as to meet all the scheduled performance targets effectively. The managing performance measurement scenario was explained by three participants, by stating that:

> *'[Firm] performance is also measured and service issues are being measured and gaps identified to ensure improvements'*; *'We measure and discuss everyday all operations'* (1/INT 2); '*KPIs are used to monitor the progress regarding material, efficiencies of work carried out per station'* (2/INT 3); and *'The invoicing performance is monitored to ensure performance'* (3/INT4).

The focal firm aligns all its internal and external operations with all SC members, through both **transactional** and **transformational leadership styles**, with an ongoing performance measurement approach. Both leadership styles ensure a **motivated workforce** all across the organisational levels, where all **collaborative efforts** are **coordinated**, both internally and externally to the focal firm, so as to contribute to the overall **SC performance improvement** and to promote a **holistic competitive edge** across the SC. The importance of the leadership styles together with the deployment of performance measures, has been described by four participants, by stating that:

> *'Leadership competencies for example is within the appraisal'* (1/INT1)*; '[Focal firm] focus[es] on cross-functional operations, open style policy, teamwork, performance measurements'* (1/INT 2); '… *through performance measurement since one has more direction, benefits and motivation'* (5/INT 6); and *'The manufacturing process needs to report back on a daily basis and on a shop floor level declares on an hourly basis the quality and quantity in-line to the standards'* (6/INT8).

The focal firm must use performance measurements to capture the attitude and performance of the individual employees, the teams and the overall organisation, as a means to assess and reward all employees' **engagement, commitment, skills and empowerment** at all the management levels. Such people management, through the deployment of performance measures, has been described by four participants, by stating that:

> *'… measurement is done on these competencies under the performance appraisal'*; *'….corporate surveys … to show the engagement of the employees to the firm'* (1/INT 1*); 'The delivery performance is all over the staff'* (3/INT4); *'We have a SC measurement for every line ….'* (6/INT7); and *'The production bonuses are on a daily basis and based on three criteria, namely the attitude, quantity and quality at the individual level … and team level'* (6/INT8).

Such performance measurements are based on both lagging and leading daily indicators, which need to be included in the monthly reports in line with the KPIs. The lagging indicators consider performance measurements as a reactive approach whilst the leading indicators consider them as a proactive approach. The leading indicators promote a climate of performance improvement. The proactive and reactive approaches, through the use of performance measurements, have been outlined by one participant, by stating that:

> *'EHS has lagging factors. Lagging indicators measure the lost time accidents and lost time days measurements'; 'Corporate auditors has introduced such leading indicators to implement proactive actions… to prevent the incidents for better assessment'* (1/INT2).

ICT remains the tool that **enables** the management of performance measurements, since ICT is able to facilitate the collection and monitoring of all measurements to provide all the information needed by all SC members, so as to be aware of the real time performance and of all the gaps and at the same time establish what needs to be done to meet the scheduled **competitive benchmarks**. ICT is also used to capture all information from processes associated with **automated production**, so as to track productivity on automated tasks and to promote all the necessary performance improvements. The role of ICT in managing the performance measurements, has been outlined by two participants, by stating that:

> *'… [another IT based system is used to] monitor the progress regarding material and efficiencies of work carried out per station …'; 'IT systems are used real time to be updated with all information and changes'* (2/INT3); and *'Automation enables detection of efficiencies'* (4/INT5).

Cases exist where the performance does not represent the actual performance due to the way it is measured (e.g. measures exclude the firm maximum capacity, so rejecting orders due to full capacity is treated as lost orders). Such a management approach, based on an inappropriate application of performance measurements, has been emphasized by one participant, by stating that: *'The delivery performance does not consider the capacity of the firm'* (INT4).

Logic Diagram of Managing Performance Measurements tentative category

Table A11.10 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Performance Measurement tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
People performance measurement with the right leadership approach	Motivated workforce with full commitment and empowerment in a continuous improvement approach	Reactive workforce with a passive approach to improvements
Alignment of focal firm with SC members in a holistic approach	Aligned focal firm with all SC members with joint established performance benchmarks	No alignment of operations between focal firm and all SC members deploy disparate performance measures
Tracking of performance	Work is monitored and measured in real-time	No monitoring at all
Performance indicators effectiveness	Based on leading indicators to promote proactive actions	Based on lagging indicators which promote reactive actions
Application of performance measures	Performance measurements are applied effectively to represent the reality of the performance	Performance measurements are applied inappropriately and does not represent the real performance
Conditions	Technology deployment to create an information sharing platform of performance measures, from both ICT and automation sources; and an effective leadership style to meet all innovative changes (i.e. transformational leadership) and/or daily operational commitments (i.e. transactional leadership).	

Table A11.10: Managing Performance Measurements tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through the managing performance measurements tentative category since it establishes an environment where the focal firm together with all SC members are made aware of their current performance and the gaps that need to be addressed. Such a performance measurement scenario enables that the focal firm, together with all the SC members, with the deployment of the right leadership approach, will be able to collaborate and align all operations to meet all customers' requirements and promote a continuous improvement approach. It cannot be excluded that ICT creates an information sharing platform of all the measurements on both the employees' performance and on the automated production processes, to enable the necessary tracking of works and at the same time keeps the employees informed so as to promote improvements.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing performance measurements conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences such as performance improvements, holistic competitive edge, improved customer service, continuous improvement and effective and efficient performance. The moderating variables are information sharing, through the deployment of technology, both in ICT and automation and an effective leadership style, to motivate the workforce at all management levels. The relationship of the managing performance measurements tentative category with all other categories is represented by the conceptual framework in Figure A11.10.

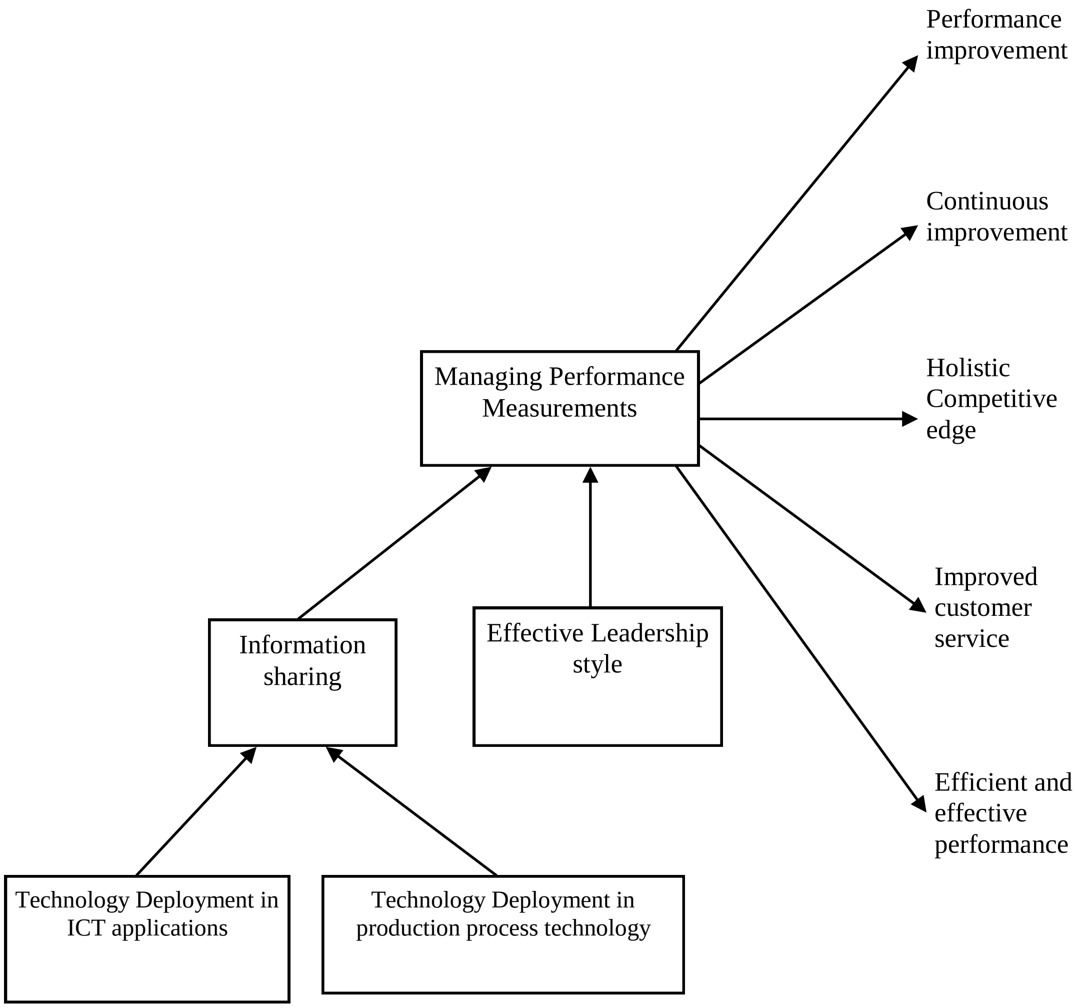


Figure A11.10: Managing Performance Measurements tentative category (Author)

A11.11 Planning and forecasting tentative category

The **planning and forecasting** theme is about establishing the necessary plans of all orders to be manufactured, based on customers' forecasted requirements or orders, to procure all the necessary raw materials, with the collaborative approach of all suppliers, to meet all scheduled deliveries in a timely manner.

To achieve SCI, the focal firm needs to undertake a diligent planning and forecasting approach to meet all orders effectively by establishing all the **inventory requirements**. The inventory management approach needs to maintain the **lowest levels of stock** to promote **lean** management and an effective **cash-flow** management. Furthermore, cash-flow management is enhanced by using a consignment stock approach with a number of suppliers. It cannot be excluded that SC planning needs to adopt a **level of flexibility**, since operational plans may need to be shifted due to lack of stock in inventory but may still meet the customers' agreed delivery dates. Such a planning and forecasting approach has been described by two participants, by stating that:

> *'... schedules and plans [are issued] and materials are purchased and shift plans if we cannot meet the targets due to lack of material'; '... we may shift the plan and accept the order late delivery and still meet the final customer targets'* (2/INT3); and *'The SC planning needs careful and detailed planning'; '... agreements with the clients for a consignment stock and also with the suppliers, to balance out cash flow'* (5/INT6).

The forecasting process is used to determine the customers' orders, as part of the planning process. The inventory levels are based on such **forecasts,** which are information figures, with a margin of error, since these are gathered from **customers' trends** or **orders**, in-line with the **pull SC** principle. Two participants outlined such a planning and forecasting process, by stating that*: '... the plan is based on the market and statistics plans trends ....'* (2/INT3); '*At least you have an estimate of the forecast'* (4/INT 5); and *'The customer gives a forecast of the units needed'* (5/INT 6).

The SC planning process is concerned with the implementation of all orders in a systematic approach in the order of the submitted requests, but the planned priorities may shift due to the customer type, as one participant outlined, by stating that: *'Production planner assigns the priorities or proceed according to FIFO, but we are flexible to the job order sequence, ... due type of customer'* (3/INT4).

Trust between SC members enables the focal firm to capture real **information**, based on the actual requirements of all members, with no inflated figures, not to create the negative results associated with the bull-whip effect, as described by a participant, by stating that: *'Once the forecast is reliable and show real values .....'; and '... some of the requests may have a hidden agenda such as exploded needs and urgency'* (3/INT4).

Recession periods in the economy, depending on the product type, has a domino effect on both **availability of supplies** and **demand forecasts**, which may cause **SC risks** to increase, unless planning includes contingency measures. The product type determines the demand variation since not all products are affected different by recessions. To **manage such risks effectively**, the focal firm needs to deploy a planned buffer level of stock and that of finished products, whenever possible, to make-up for such uncertainties of supply and demand situations and erratic customers' orders. Such a situation of uncertainty was explained by three participants, by stating that:

> *'Forecast was made as usual and due to recession, the forecasts being requested were not met by the key suppliers since they gave us very long lead times'; 'This is an innovative line of activity and the sales are constant independent of the market recession'* (3/INT 4); '*.... we need to deal with production, to meet this excess units of 75 this week'* (5/INT6); and *'Our market did not suffer due to recession may be due to type of product'* (6/INT7).

SC planning is function of **logistics management**, since different **lead-times** exist due to the nature of the global SC, and as a result such transportation durations differences need to be managed accordingly to get all deliveries in time, as one participant outlined that: *'USA we use air freight and this is 1/3 of our sales otherwise 6 weeks by sea'* (2/INT3).

The deployment of technology, through ICT applications, promotes an effective tool in the planning and forecasting process to promote SC visibility to procure all the inventory requirements in time, as two participants explained, by stating that: '*Sales customer system also exist, which gives a delivery date based on forecasts instead of guessing ... to have a clear visibility ... [to] achieve the targets'* (2/INT3); and *'... so that we supply to them such products... It is all done based on ERPs software'* (6/INT7).

Logic Diagram of planning and forecasting tentative category

Table A11.11 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Planning and forecasting tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
SC planning and forecasting flexibility on raw materials and finished products requirements	Adjust the operational planned schedules to have buffer levels to cater for to unforeseen conditions (e.g. recessions)	Adhere to a rigid operational schedules based on forecasts and orders
Collaborative planning with suppliers	Sharing of all scheduled plans and collaborating with all relevant SC members to promote high inventory turnover and better cash flow (e.g. consignment stock)	Every SC member issues schedules with the delivery of all stock to all orders function of individual supplier
Flexible customer priority adjustment	Customer type priority	No priority at all
Exchange of information forecasts between SC members	Real information exchanged between all SC members based on a trustful relationship	Inflated information is exchanged between all SC members due to lack of a trustful relationship
Lead time values	Short lead times with air freight	Long lead times with sea freight
Conditions	Level of trust among SC members; collaborative commitments between SC members; economic recessions; logistics management across the globe; the availability of an information sharing platform across the SC by ICT applications.	

Table A11.11: Planning and forecasting tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through an effective planning and forecasting approach with the collaborative effort of all SC members. Such a planning and forecasting approach is mainly focused on effective inventory management by having less capital tied in stock, with lowest level of stock, to promote both lean operations and cash-flow management. Such inventory levels are based on forecasts, with a margin of error, since these are gathered from the customers' trends, in-line with the pull SC principle. Trust between SC members ensures the exchange of real information, with no inflated requirements, to avoid problems of excess stock, associated with the SC bullwhip effect. Furthermore, trust may result in dedicated arrangements, such as consignment stock by some suppliers. Recession periods in the economy has a domino effect on both supplies availability and demand forecasts, which may cause SC risks to increase, unless contingency measures are taken, by having a buffer level of stock against stock-out situations. Planning needs to employ effective logistics, since different lead-times exist, due to the global nature of supplies, having different transportation modes and durations, function of each origin or destination, to ensure no delays in the manufacturing process or in the finished product delivery process. With the current global SC developments, for a firm to remain **competitive**, it has become a need, whenever possible, to shift purchasing from Asia, which needs a much longer lead times than EU sources. ICT applications are used to have an information sharing platform between all SC members to promote SC visibility across the SC.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The planning and forecasting conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promote several consequences, such as effective inventory management, lean operations, cash-flow management, SC visibility and flexibility, customer service and risk management. The moderating variables are trust, logistics management, lean management and the deployment of technology through the use of ICT applications. The relationship of the planning and forecasting tentative category with all other categories is represented by the conceptual framework in Figure A11.11.

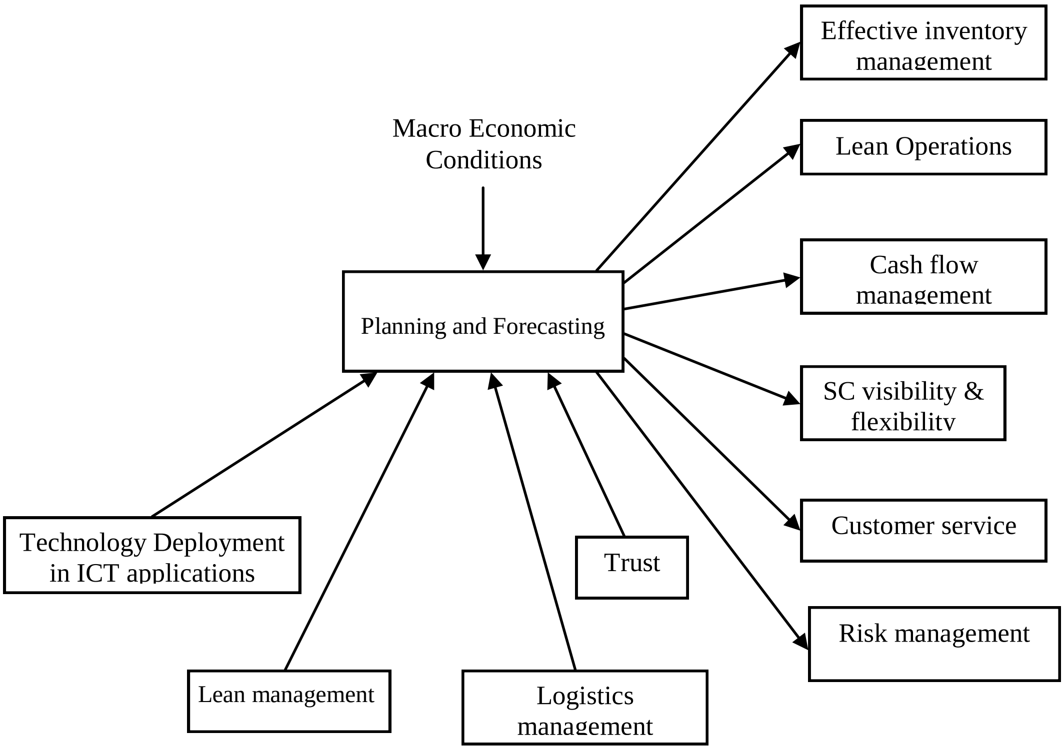


Figure A11.11: Planning and forecasting tentative category (Author)

A11.12 Managing Risks tentative category

The managing risks theme is about taking all the necessary measures in quality, sustainability and legal requirements, within the manufacturing and SC operations and also by monitoring and auditing operational activities, to establish any shortcomings so as to remedy at the earliest, without affecting the customer service quality.

To achieve SCI, **risk management** shall be focused on the **monitoring** of the overall SC with its manufacturing process activities, to remedy all shortcomings in a timely manner, by deploying the necessary contingency measures, so as deliver a **competitive service**. Such a risk management approach needs to effectively manage all the necessary **priorities**, ensures the right **inventory** levels and respects the **quality standards** and **sustainable** requirements. With such process requirements in place, the focal firm also needs to effectively manage the **lead times** of all orders against the effective management of **cash-flow**, not to order excess stock at the expense of liquidity problems, so as to deliver all **orders in time,** with the right **customer service**, so as to promote **business continuity** for a **win-win outcome** for all SC members. Such a risk management approach, has been clearly identified by three participants, by stating that:

> *'… to manage risk of failure in the supply of the raw materials'* (1/INT 1); *'Priority is carefully monitored and to cater for shortcomings'; 'Risk management is important since all operations are being monitored to deliver'; 'The stock needs to be made available without ending up into cash flow problem'; 'Environment and CSR, we have to separate waste, and ISO 14000 is an environment standard, needs traceability on client and supplier waste management processes'* (5/INT6); *'If we are in delay, a mechanism is triggered, to decide [on the actions to be taken] …'* (6/INT8); and *'Today quality systems are urging to undergo risk assessment'; 'The SC will [need to] identify the potential risks'* (13TS/INT 10).

Inventory levels shall be according to the **forecasts** and **orders**, with due attention to forecasting errors, especially in **recession periods**. Such recession periods may drive the firm to take contingency measures by pre-booking the planned stock required, to guarantee its availability, and to effectively manage the risk of stock-out and the inability of suppliers to meet all orders. Such a planning approach, to guarantee stock availability, has been explained by two participants, by stating that:

> *'We pre-book, even if there is no need of the material, not to risk losing the orders. This is against the just-in-time and pull system and we have to use just in case due to such worst conditions'* (2/INT 3); and *'... lack of delivery, mainly attributed to lack of supplies due the recession matter'* (3/INT4).

Stock may become obsolete, which will drive the focal firm to use the grey market or else undertakes an **innovate** approach in its design, so as to use the new available stock in the market. Such a lack of stock situation measures is outlined by a participant, by stating that *'Grey market is used, firms, …it is a market of second hand suppliers…'; '... we try to phase out such component, by redesigning new products or part of the product'* (2/INT3).

The inventory is **audited** to adjust the stock levels records against any misuse by the focal firm, to promote assurance that every individual component is available to minimise the risk of stock-out with the resultant negative effect on production failure. Such an audit approach, has been described by a participant, by stating that: *'... every product has a number of components to complete and hence any missing one, will be a bottleneck'* (3/INT4).

Effective supply management is needed, through due diligence actions, to manage all risks associated with all engagements with suppliers. A **multiple supplier** arrangement is preferred over a single supplier approach, to guarantee supplies and to enhance the **business continuity** against stock-outs. Though, it cannot be excluded that some components may need to be locked with a single supplier, due to the nature of the products. Furthermore, some suppliers may not meet the focal firm requirements due to the low order volumes, which drive the focal firm to order all supplies from a single supplier, to meet the imposed minimum order levels, with the resultant effect of having a substantial level excess of stock volumes and with the associated risks of locking to a single supplier. Such a challenging supply management approach, has been described by four participants, by stating that:

> *'.. to find new alternative sources of parts due to single source, i.e. [avoid to put] all the eggs in one basket'* (2/INT 3); *'…the production will be at risk due to no stock ... [being] locked to a single supplier'; 'The supplier force a minimum order quantity per item'* (3/INT4); and *'.... may be a bottleneck in case this supplier fails and better to have two or more suppliers'* (5/INT 6); and *'We do due diligence ... we validate a supplier, before we enter in any agreement'; 'We revisit the procedures and systems and measure the level of risks, ... one need to be practical and do not overdo it, to avoid analysis by paralysis'* (1TS/INT 5).

An arm's length collaborative effort, may introduce risks associated with opportunism and lack of engagement, feedback and cooperation respectively, both within and outside the focal firm. Such a relationship may drive the focal firm to undergo duplicated activities and to take special measures of precautions, to make up for such shortcomings, when they occur, not to influence the overall SC performance, as referred clearly by two participants, by stating that:

> *'The [intermediary in the downstream side of the SC] is not meeting the expectation of the [corporate expected sales] and the initiatives are being pushed by [the corporate].... This is inhibiting the business model'* (1/INT1); *'There is always room for improvement and there is always rivalry at work between departments'; 'We still have internally silos thinking within departments'* (6/INT7); and *'The various stakeholders are after the same criteria but these may be in conflict with their individual targets/criteria'* (6/INT8).

Malta, as a Small Island State, with its insularity characteristics has a relatively expensive logistics service with its infrequent cargo shipping schedules, since it needs to use either sea or air, as the first or last shipment mode to deliver or bring the products to or from the nearest mainland respectively.

Furthermore, due to Malta's small country size, various plants are ending up in using disparate sites to make up for the required plant size. Managing logistics is very challenging and needs to respect both the **lean management** approach and the **environmental responsibilities** by deploying **effective and efficient logistics management.** With such an approach a solid foundation based on a healthy **social and environmental responsibility** is built not to put to risk the image of the firm with any of its stakeholders. Additionally, it is a must to minimise the expenses associated with all logistics and inventory levels in stores, to manage all costs effectively but without incurring the risks of stock-out Such a logistics management challenging scenario was explained by four participants, by stating that:

> *'Logistics is the main problem in Malta'; 'The Sea shipping routes are quite limited and are expensive'; 'Air travel is used for fast moving products and is expensive'; 'Consideration is being given by freight forwarders for route planning in line with the roadmap 2050 for low carbon Europe'* (2/INT3); *'The firms have problems due to physical space limitations of the building layout, logistics problems due to movement of products, say half an hour away of the buildings. Malta has limited space of land and hence most factory units are located apart'* (4/INT5) *'This firm has heavy stock/material and we do not consider airfreight and courier'; 'From Germany we have 5 days transit time. In case for the electronics SC, one may use courier to win the lead times'; We are using more the Asian market, with 28 days transit time'* (5/INT6); and *'Results also show that, we made vast reduction with the [freight forwarder contractor] on the inventory terms';* and *'.... [we] put more products in the shipment to cut the costs'* (6/INT 7).

ICT tools integrate all sources of information and remain an enabler of all processes, by undergoing **information management,** to promote information sharing within and across the SC and by having access to all information updates on all activities that promotes **SC visibility,** so that the focal firm is always **informed** in real time on any shortcomings by managing risks effectively through **immediate recovery actions**. The deployment of ICT to assist the managing risk approach, has been explained by two participants, by stating that:

> *'The IT integrates ... [gives] all the prompts to manage effectively'. '.... the correct data is important otherwise the production will be at risk due to no stock'* (3/INT4); *and 'SC transparency/visibility is important along the whole SC, so that the suppliers, contractors and clients can detect all the flow such as shipping problems'; 'The workflow thanks to technology has a complete picture with all the details ... [of the overall process performance]'* (4/INT 5).

The **technology deployment** in **production processes** improves the manufacturing capabilities in all activities, in line with **lean management,** by reducing the human intervention, which is more prone to errors and to deploy automated based manufacturing to promote higher quality, efficiency and reliability, to minimise any risk of failure. The use of automation to manage various risks associated with the manufacturing process, has been clearly outlined by two participants, by stating that:

> *'The technology investment in robotics etc, then the cheap labour is challenged since it is still human'; 'With full or semi automation machines (robotics arms etc) the cheap labour is won over, since one has 24/7 shifts and high quality, since human introduce errors which are avoided'* (4/INT5); and *'The production efficiency is higher, around 3 times or less, due to automation ...'; '.. [automation] promotes better/higher reliability from a quality perspective'* (6/INT8).

Logic Diagram of managing risks tentative category

Table A11.12 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Risks tentative category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Monitoring for possible shortcomings in supplies	Full monitoring and auditing (e.g. actions against stock-outs through a multiple supplier and effective logistics)	No monitoring at all
Remedial actions	Immediate/real-time remedial actions (e.g. delays in supplies deliveries or obsolete stock)	Reactive actions
Assigning Priority	Settlement of high priority issues	No attention to priority at all
Proactive assurance actions	Verification approach (e.g. auditing and contingency actions such as multiple supplier engagement)	No verification at all
Compliance to all quality standards, sustainable and legal requirements	Compliance to all requirements	Lack of compliance to all requirements
Conditions	Technology deployment in ICT and automation; recession periods effects; suppliers power to enforce minimum limits of supplies; stipulated quality standards together with all environmental, social and legal requirements; and logistics challenges associated with a Small Island State.	

Table A11.12: Managing Risks tentative category (Author)

Conceptual summary on the tentative category

SCI is enabled through managing risks effectively and efficiently, since the focal firm and all SC members operations are safeguarded against failures or bottlenecks by taking all the necessary proactive or contingency measures, through a collective approach, to promote business continuity. Shortcomings may vary since they originate from both internal and external sources. ICT tools integrate all sources of information and enable all processes by providing access to all information updates for the focal firm to deploy an effective risk management approach through immediate recovery actions. Automated activities within manufacturing also promote higher quality, efficiency and reliability to minimise any risk of failure.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The managing risks conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as SC flexibility and visibility, competitive service, win-win outcome, information management, business continuity, customer service, quality, HES and legal compliance, efficiency and effectiveness, business sustainability, business continuity and competitive operations. The moderating variables are lean management, cash-flow management, customer service, performance measurement, auditing of operations, quality standards with environmental, economical and social practices and legal responsibilities, forecasting of inventory requirements, supply management, collaboration, inventory and supply management, innovative product design, logistics management, inventory forecasting and planning, information sharing and technology investment in ICT applications and automation. The relationship of the managing risks tentative category with all other categories is represented by the conceptual framework in Figure A11.12.

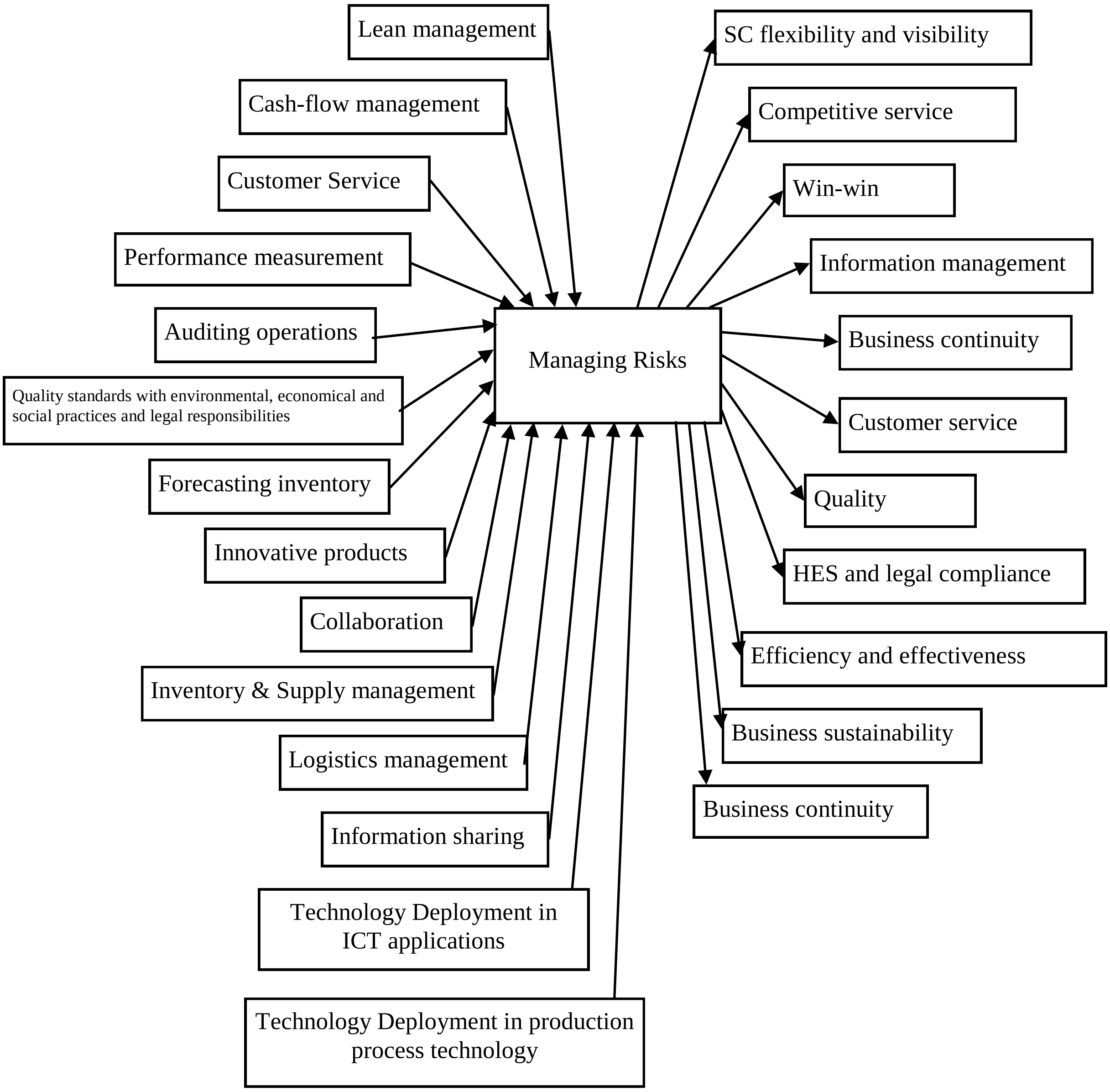


Figure A11.12: Managing risks tentative category (Author)

A11.13 Supply Management tentative category

The supply management theme is about taking all the necessary collaborative measures with all suppliers to procure the necessary stock in time, with the right quality and with a competitive price, by managing stock and cash flow effectively. The suppliers need to implement all the necessary sustainable measures in line with the focal firm processes.

Vertical integration is deployed by the focal firm to increase the ownership in the upstream side of the SC to manufacture products in-house so as to promote a lean management approach with less cost attributed to stock held in inventory and with the result of improved cash flow management and logistics management respectively. Such a vertical integrated process, has been described by one participant, by stating that: *'Shift equipment to Malta, to do the components in Malta and not order to store which was leading to idle stock'* (1/INT 2).

The focal firm undertakes innovative initiatives to design new products or else make use of new components with the same products' design, to facilitate supplies availability. Such an innovative approach, has been described by a participant, by stating that: *'The SC may hold the launch of the* *product and if such components are not available then the design may be changed according to the market available components'* (2/INT 3).

Improved supplies' delivery is achieved through better collaborative effort in supply management, by the deployment of a consignment stock approach. Such a collaborative approach with suppliers promotes better flexibility to meet new orders or to manage any unforeseen changes in stock requirements, due to the available stock in hand and at the same time manage cash flow effectively, by having less stock tied in capital, considering the relatively high raw materials costs. Such a collaborative scenario, has been described by four participants, by stating that:

> *'The consignment stock refers to stock supplied before the order is made'; '… consignment agreement to pay until it is used … this will cater for stock availability in the firm'* (5/INT6); *'…consignment stock … assists the cash flow financially'* (6/INT8); and *'The business strategy is focused on effective management of materials since 90% of the costs are the material and the rest is labour costs'* (2TS/INT3); and *'50 % is material [costs]'* (1TS/INT5).

Risk management through a multiple supplier arrangement is employed to eliminate the risk of stock-out, associated with single supplier situations, due to no alternative sourcing possibility. Such a risk management approach is also achieved through an ongoing stock-take of inventory, to guarantee the required levels of stock for each stock code, since a single missing component may lead to SC failure (e.g. kitting errors in stock issue). Supply management is concerned about timely supplies' deliveries. Such deliveries are monitored to identify at the earliest any possible bottlenecks, by taking all the necessary timely measures to promote business continuity. Such a risk management approach, has been described by four participants, by stating that:

> *'The latter suppliers are available in more than one, to manage risk of failure in the supply'* (1/INT1); *'… focus more on strategic issues, say to find new alternative sources of parts due to single source i.e. all the eggs in one basket [situation needs to be avoided]'* (2/INT3); *'… components are based on weight and may vary [in stock issues]…'; '… the production will be at risk due to no stock and delays from suppliers and also components that are locked to a single supplier. Both the two issues are crucial to the SC operations'; '… every product has a number of components to complete and hence any missing one, will be a bottleneck'* (3/INT4); and '*Familiarity breeds contempt, you get the quote for every year budget and you spread the orders among these key suppliers'* (13TS/INT 10).

Forecasts are established to guide the inventory levels needed so as to undertake effective supply management in a timely manner to respect the lead time of all orders. With the right inventory requirements in hand, the focal firm is in a position to meet the scheduled manufacturing capacity, in line with the customers' contractual agreements. Though, such a forecasting process may be in error, due to inflated values, given by different downstream SC members, which may drive the firm to end up into over stock situations. Such forecasts represent real values once the SC members employ a certain level of trust. Such an effective supply management becomes more critical in recession periods since stock needs to be pre-booked and procured ahead before time, to guarantee stock availability. Such an approach is against the JIT and pull-SC system, but needs to be deployed to make up for the negative effects brought about by the recession periods so as to act as a contingency measure against stock-out. Such a challenging approach, has been described by three participants, by stating that:

> *'Two years ago the situation was the opposite situation, since stock was available and just-in-time was used'; 'We pre-book, even if there is no need of the material, not to risk losing the orders [in recession periods]'* (2/INT3); *'Once the forecast is reliable and show real values …..'; 'Forecast was made as usual and due to recession the forecasts being requested were not met by the key suppliers (distributors) since they gave us very long lead times'* (3/INT4); and *'When a client engages with a manufacturer, both engage in a trustful environment'* (4/INT 5).

Auditing suppliers is performed both during the suppliers' selection screening process and also in their performance, to ensure that they meet the focal firm requirements, such as in quality, price and lead time criteria. Additionally, control measures are put in place on such suppliers to detect at the earliest any defective products or shortcomings in the delivery performance. The supplies are normally procured from distributors since they are preferred over leading manufacturers sources, since such distributors buy in bulk from such leading manufacturers and at a better price and as a result can supply such components at a more attractive price than the manufacturers themselves. Low order volumes are a key problem to get prospective suppliers engaged within the SC. In fact, effective supply management becomes more critical to achieve if the relatively low volumes required are divided among different suppliers, to deploy a multiple supplier approach, so as to minimise the risk of stock-out, since the orders for each supplier will be much smaller than the normal order levels. Some suppliers may even force a low minimum order level to supply stock, causing excess stock in inventory, low stock turnover and also introduce cash flow problems, due to tied up capital in stock. Such minimum order levels problems and other challenging criteria in supply management, are being encountered from Eastern markets suppliers, since today's trends are to order from such markets, to benefit from attractive price offers to remain competitive. The challenges associated with the managing of supplies, has been outlined by five participants, by stating that:

> *'Selection of suppliers by audit suppliers with respect to operations, management of inventory of suppliers, the lead times to match our lead time'* (1/INT1); *'We buy directly from the supplier (such as Arrow, Abacus) and could be a distributor himself, who in turn they buy from leading manufacturers such as Toshiba, ST etc. These suppliers source the items and reduce price due to the bulk buying principle'* (2/INT3); *'.... Another supplier may not meet our requirements, due to the low volumes of orders'; 'The supplier force a minimum order quantity per item, this leads to a problem of over stock'* (3/INT4); and *'... the choice of component will have certain standards and makes a difference to meet the customer in time or not, due to the standards needed'* (5/INT6); and *'The cost of supplies needs to cater low cost sources, such as China. Such a stance need special measures which are different from other well established sources of suppliers [such as] ... time, communication problems, material quality, minimum order quantities, lead time variation is greater, credit terms etc'* (5TS/INT2).

Local suppliers are preferred over overseas suppliers, whenever they meet the focal firm requirements, since improvement occurs in both lead time and cash flow management respectively, especially for Malta being a sea locked island, as indicated by two participants, by stating that: *'Lead time is eliminated with the use of local manufacture 3rd parties, which are excellent in their operations'. '... [firm] transferred most of the operations... in Malta, to improve on the lead time'* (1/INT 1); and *'Due to the logistics lead time, abroad is 1 day, but here we need 1 week to 1½ week'* (10TS/INT7).

All SC members need to comply with all sustainable measures within both SC and manufacturing operations, to promote uniform processes and improve on the efficiencies in line with lean operations. Such sustainable processes, has been referred by two participants, by stating that:

> *'[These are the] standards that need to be met'. 'UL needs investment for the approval by implementing these standards, such as raw material specs used, plastic type use'; 'All components need to be RoHS directive for Environmental, segregation of waste, minimize waste'* (3/INT4*);* and *'EU rules, policies and standards are key,... due to standards compliance'; and 'Environment and CSR ... needs traceability on client and supplier waste management processes'* (5/INT6).

The use of ICT is pivotal in stock management and its procurement and in all real-time information updates, by integrating the focal firm with all its SC members, so as to manage all stock effectively and efficiently and also ensures that all parties are timely informed in all stock movement and in any deviations from the scheduled plans. Such ICT applications, includes both office and mobile applications, to ensure that SC visibility is available not only from the workplace but even on the move. The use of technology, has been described by three participants, by stating that:

> *'The order trend, with suppliers is integrated over internet'; 'The client has access to suppliers, the stock available and the customer is aware of the order and the shipping details…'; 'This monitoring is also done today by smart phones, where managers are mobile and can see the orders, make new orders and raise issues. Thanks to these tools these are pushing more integration across the SC'* (4/INT 5); *'Software is being used that manages information per component'* (5/INT 6); and *'The effective management of stock uses a common order system for all orders, based on a common database (e.g. ERP) so that all orders are included to promote flexibility to switch from one product to another'; 'This process is very dynamic since such information … is continuously changing '* (2TS/INT3).

Logic Diagram of the supply management tentative category

Table A11.13 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Supply management category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Supply management set-up	Multiplier supplier for effective inventory management with vertical integration	Single supplier arrangement with fragmented operations leading to risk of stock-outs
Lead time of supplies deliveries	In-time deliveries	Delayed deliveries
Orders' forecasts	Engage in trustful relationship with all stakeholders to establish the real order requirements	Inflated order requirements due to lack of trust
Collaborative approach in supplies	Consignment stock approach	Forced minimum orders of stock
Innovative approach to use available market components/raw materials	Availability of supplies is a priority in the products design	Obsolete or unavailable supplies to meet the products design
SC visibility in stock movement and orders' deliveries	Information sharing and real-time updates within and outside the focal firm	Lack of information visibility both within and outside the focal firm
Conditions	Recession periods; level of trust within the focal firm staff and also between the focal firm and all SC members; innovative products designs; and technology deployment in ICT applications.	

Table A11.13: Supply management tentative category (Author)

Conceptual summary on the tentative category

To achieve SCI the focal firm must select and manage a small suppliers' base, to promote close collaborative initiatives, to be supplied with the **necessary stock** within the scheduled **lead time** and with a **win-win objective** for the two parties, so as to meet all **customers' requirements** effectively. A firm may undergo **vertical** integration, to perform in-house certain operations, so as to improve on its supply management, with improved lean operations, logistics management of all deliveries and cash flow management respectively. Inventory levels required are to be based on **forecasts** or **actual orders** to promote a **JIT** approach and effective cash flow, in line with **lean management**. In recession periods, supply management may need special measures to guarantee stock availability, by implementing **pre-booking** and/or **purchase-to-stock**. Attention shall be given to the customers' forecasts, since the information does not always represent the **real requirements,** unless a trustful relationship exists, but carry inflated figures. A supplier, apart from the **contractual agreements**, may also undergo **collaborative initiatives** with the buyer, to promote improved supply management, by adopting a VMI approach. Suppliers need to be audited, both initially as part of the selection screening process and also in their operations, to ensure compliance to all focal firm requirements, such as in quality and in all sustainable processes. **Knowledge sharing** is to be exchanged between suppliers and the focal firm on the materials' **quality, specifications and price,** to assist in the right selection of materials. **ICT** assists in the **information sharing** of stock levels across the SC, to promote **flexibility** and **changes** in supply and inventory management in real-time, to ensure no risks associated with stock-outs situations so as to promote business continuity. Stock which becomes obsolete requires **innovative changes** to the product design to use other stock or else procure stock from other alternative sources.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The **supply management** conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as win-win outcome, effective customer service, SC flexibility and visibility, innovative products design, lean operations, business continuity, performance effectiveness and efficiency, and sustainable operations. The moderating variables are lean management, contractual agreements, collaboration, auditing suppliers, knowledge sharing, logistics management, quality and sustainable processes, vertical integration, cash flow management, risk management, and technology deployment in ICT applications. The relationship of the supply management tentative category with all other categories is represented by the conceptual framework in Figure A11.13.

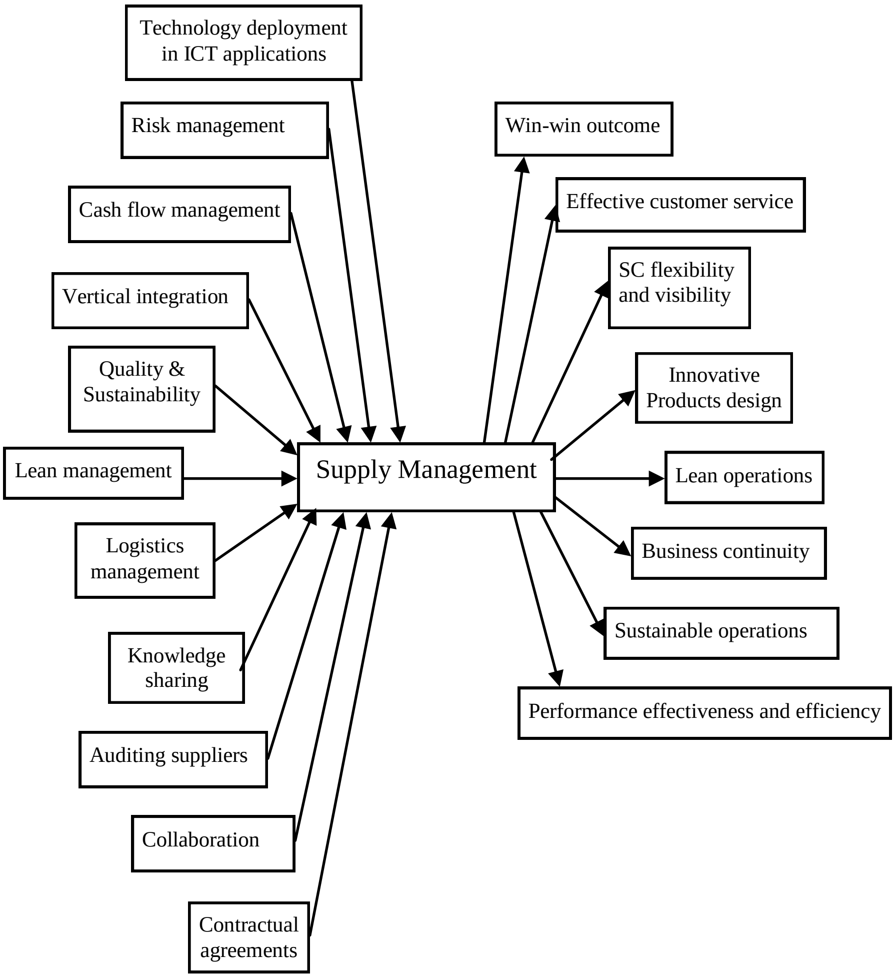


Figure A11.13: Managing the supply management tentative category (Author)

A11.14 Managing Trust tentative category

The managing trust theme determines the type of collaborative relationships between people and organisations across the SC. With a trustful environment, effective information and knowledge sharing takes place, within and across the SC to promote a level of teamwork with all stakeholders.

Trust is function of the relationship build-up between the focal firm and all SC members. Within the focal firm, together with the Corporate, there are a set of common values and objectives which promote a high level of trust between all people to be empowered so as to improve on their performance. The focal firm with all external SC members, need to build a relationship, depending on the nature of operations engaged with the focal firm, although every SC member may have different values, roles and objectives due to globalised nature of the SC. The level of trust varies since a SC member may be a partner or just a one-off supplier of a product or a service. The focal firm needs to build such a trustful environment by auditing all suppliers to establish all work practices so as to ensure common and unified commitment, in line with the overall SC objectives and also to establish any deviations from the scheduled performance to remedy at the earliest and minimise any risk of failure. Such a trustful environment, has been described by four participants, by stating that:

> *'For inter-company the performance is more easy to be dealt with due to same values, culture and language'; 'But with local suppliers and others external European suppliers to firm, requires the validation and audit parameters/criteria as established with the corporate KPIs and its suppliers'; 'Relationship between US [Corporate] and Malta … trust between both exist'* (1/INT 1);. *'SCI is in depth since the outsourced activities involves part of the core processes'; 'All obstacles are being monitored to ensure such smooth delivery, using risk management approach'* (3/INT 4); *'We have suppliers of the compressors, as the core activity … these suppliers are partners and have an in-depth relationship, based on years of experience'* (5/INT6); and *'We have a good relationship with the customers and hence they trust us'; 'The trust is key since we work together and we use empowerment to take decisions'* (6/INT 7).

Communication is needed within and outside the focal firm to promote trust building among all people. With trusted SC members, the exchanged information would represent the actual requirements, with no inflated figures, so as to minimise any effect associated with the bull-whip effect. Contractual agreements shall be in place to formalise the SC operations with all SC members, but what counts is the trust between all people to create an open communication environment, with both a formal and an informal organisation approach, to meet all the needed trade-offs for the common good of the overall SC so as to promote effective and efficient performance. Such an open communication based environment, has been described by four participants, by stating that:

> *'Communication is a priority … to promote more trust in between the staff'* (1/INT 2)*; 'There are head of sales that communicates with us, some of the requests may have a hidden agenda such as exploded needs and urgency, but one need to achieve a balance to keep the relationship live and kicking'; '….build the trust and collaboration'* (3/INT4)*; **'**When a client engages with a manufacturer, both engage in a trustful environment which promotes open communication apart from the formal contracts'; 'This leads to improved operations and the more access given, the more is the trust build-up'* (4/INT 5)*;* and *'For example, if a purchasing manager feedback is not trusted, then I will include safety factors in my orders, which may not be needed. So with trust between us, then the orders done are trusted and are kept as given'* (6/INT 8).

Intellectual property (IP) protection needs to be established through formal agreements, though such protection assurance depends on the level of trust with the respective SC members. It is not being excluded that a certain level of disclosure occurs independent of the signed non-disclosure agreements. Such a trustful approach, has been described by a participant, by stating that:

'The trust is needed since we share confidential information [with suppliers] and they outline the current technology used. We sign an NDA, non-disclosure agreement, so that the supplier cannot give drawings associated with us and use it to other interests'; and *'Trust exists but leakages are not being excluded'* (3/INT 4).

Trust builds with time and engagement, with both internal and external stakeholders. Suppliers may engage with better credit terms and also adopt a consignment stock approach with the focal firm, based on the established trust and close relationships between parties, since '*business is based on trust and not on money'* (9TS/INT 6). Such a trustful relationship, has been described by three participants, by stating that:

'You need to pay before you purchase from such suppliers and as time goes by, the [relationship] depth increase, credit terms improve and trust builds' (5/INT 6); *'.....we negotiate the material procurement contracts and we use consignment stock'* (6/INT7); and *'That the key positions and heads ... are the same people over a period of time, so as to build teamwork, based on experience and trust and the data integrity fed is trusted in the details or contents'* (6/INT 8).

Technology investment in ICT applications is pivotal within and across the SC, to promote real-time information sharing, but the trust build-up takes a priority over ICT deployment, since trust between people and the SC members is the initial stepping stone that drives the collaborative environment. The role of ICT remains an important tool to enable and may also drive such a collaborative relationship. The importance of trust over ICT applications, has been described by three participants, by stating that:

'[Factors that] Promote integration, above the information systems, is to build the trust and collaboration' (3/INT4); *'Technology is a big enabler in this case and has contributed to large increase in efficiencies'* (4/INT5); and '*The IT is also driving the process of the SC, ... to place the order or to see the orders'* (5/INT6).

Logic Diagram of managing the supply management tentative category

Table A11.14 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing Trust category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Role of SC member vis a vis the focal firm	Partner with focal firm	One-off supplier of products or service
Relationship depth between focal firm and SC members	Close relationship	Arm's length relationship
Level of trust	Empowered staff of SC members to meet focal firm requirements	SC members provide basic services as required by the focal firm
Monitoring SC members	Little monitoring at all due to high level of trust in the relationship	Full monitoring to ensure meeting the expected performance due to arm's length relationship
SC members' behaviour	Joint commitment and teamwork approach with the focal firm with real information exchange	Opportunistic approach taken by a SC member to the focal firm, such as inflated requirements
Conditions	Intellectual property rights protection; contractual agreements; and different roles and values of SC members (e.g. partners or suppliers)	

Table A11.14: Managing trust tentative category (Author)

Conceptual summary on the tentative category

To achieve SCI the focal firm needs to consider that **trust** remains a key determinant of all **collaborative initiatives for relationship building,** especially between the focal firm and upstream SC members, with the deployment of a consignment stock arrangement. Trust builds with **time of engagement**, **communication** and **information sharing** between all SC members, so as to tackle all challenges from a **holistic perspective** through a **cross-cultural knowledge** approach for a better working relationship. Such an approach needs to reach a level of flexibility, understanding and joint problem-solving to promote **teamwork** among all SC members, with all the necessary measures to be taken by all entities for the protection of intellectual property rights. Trust enables sharing of **real information** and **minimises opportunistic requirements** from any of the SC stakeholders, to minimise the negative effects associated with the bullwhip effect, by exchanging the real orders' requirements, to promotes **effective and efficient performance**. For multi-national firms, the inter-company trust is more easily achieved, due to the shared **strategic objectives, values and culture,** but with different SC members, such a trust needs to be built, due to the different strategic objectives, values and cultures of each SC member across the globe. Technology deployment is needed to facilitate and drive all information based processes, but trust among people remains the initial stepping stone before the role of technology becomes effective. **Auditing** is performed on both the focal firm and externally on all SC members, to build on the trustful relationship by establishing all conformities and especially divergences from the established contractual agreements and scheduled performance, to remedy at the earliest, so as to strengthen the relationships and at the same time minimise any associated **risk of failure** to promote **business continuity**.

Tentative relationship between all emerged potential categories in line with the coding paradigm

The **managing trust** conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as effective and efficient performance and business continuity. The moderating variables are collaboration, communication, information sharing, knowledge sharing, SC flexibility, technology deployment in ICT, contractual agreements and risk management. The relationship of managing trust tentative category with all other categories is represented by the conceptual framework in Figure A11.14.

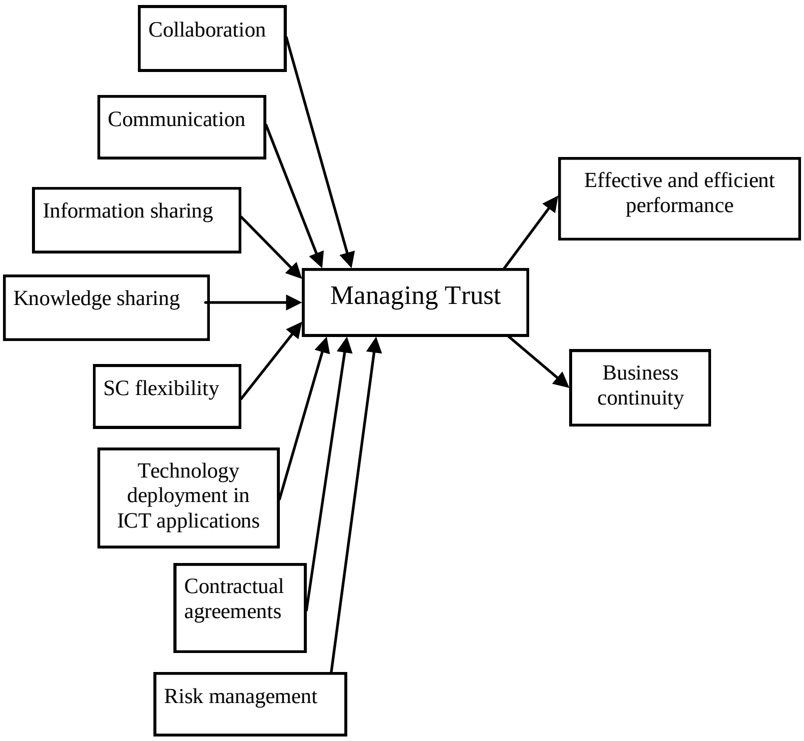


Figure A11.14: Managing trust tentative category (Author)

A11.15 Managing Culture tentative category

The managing culture theme is concerned on the management approach that the focal firm needs to adopt, to create a working attitude that promotes understanding and flexible collaborative efforts between all stakeholders, to achieve a more integrated approach with effective and efficient performance.

The cultural aspect needs to be future looking which shall also include all contingency measures so as to promote efficiencies and resilience in all operations, as one participant outlined, by stating that: *'We use a culture to cater for the future and undergo cost savings (13% reduction say) to make up for future situations that are negative such as recessions. All this promote resilience'* (1/INT 2).

Training is needed to meet the innovative changes to be introduced within the focal firm, so as to overcome the challenges offered by the ingrained staff cultural values, associated with the retention of the previous established procedures and legacy systems. Culture differs between different SC members due to the globalised nature of their origins, having different cultural values, which are function of the country of origin and the respective firms' organisational values. SCI requires the focal firm to overcome such cross-cultural differences through learning and with an effective management and leadership approach to promote understanding and flexibility with optimised and innovative processes. Such a need for a training and learning culture, was referred by four participants, by stating that:

> *'Common values, validation and parameters are used although we are different from other [EU] countries'* (1/INT1); *'The USA culture differs from the EU countries in the way of collaboration, since they show a level of superiority and that they take a one-sided view of the communication. The Asian market expects details and full support on a continuous basis. The EU countries are more understandable and flexible'* (3/INT 4); and '*One needs to de-train and re-train, to ensure that new processes are being used, due to the previous culture. Not to use the old systems again on the new processes'; 'Other firms have the same product but use different processes due to different management styles and culture'* (4/INT5); and *'Maltese workforce is very skilled'; 'When you deal with Japanese and Chinese it is a different story when compared to Malta'* (9TS/INT6).

The focal firm needs to keep an open eye for the cultural values of each SC member, since the country of origin has a direct influence on its operations and commitment to all established schedules. This is attributed to the different calendar activities, since any changes in the scheduled performance, due to unforeseen circumstances, may occur during a public holiday of that SC member, which may disrupt the timing schedule of the overall SC, due to the difficulties to take immediate action. Furthermore, more negative cultural values, that may subject bottlenecks in SC operations, may be attributed to SC members that face political instability and corruption. Such different cultural values, were referred by three participants, by stating that:

> *'Case in point is the Chinese New Year. The supplier had promised to send a number of boards as agreed. We checked for such a delay ... He informed us that being the Chinese New year not even the mail works. This holiday matter is the source for a 15 days delay or more. Israel, Friday, is a holiday but on Sunday, you may communicate with them'; 'All suppliers inform us by giving their calendar to keep us updated [on their holidays]'; 'The customer is not interested on firm lead times but on the delivery of the product in 3 weeks or less'* (5/INT6); and *'... plant has different work hours per week due to Ramadam, it affects the SC on how we supply them'* (6/INT 7); and *'In some areas, where we have no reps, like Eastern Europe, due to heavy corruption. Libya we did not set-up a country manager, due to legal instability and corruption and leads to huge business risk'* (13TS/INT10).

The downstream SC members need to be given priority, due to the pull-SC approach, but the customers need to understand that all requests need a lead time dedicated for the manufacturing and delivery of all orders. Any requests for tighter lead times, requires that customers need to pay for any excess costs allocated for crashing of resources. The downstream SC members' culture is to have all products on demand with zero lead time. Such zero lead time does not represent the current true reality, due to the make-to-order business scenario. Such a customer demanding oriented approach, was referred by a participant, by stating that:

> *'A customer once had a stock adjustment of 75 large units and the pressure was shifted on us'; 'Say, one of our key customers, expects that when an order is received from his side, we need to give him the unit there and then'; '[Stock adjustment] is a Customer side error, and to meet this, the customer is informed about the lead times and payments needed. This will need special costs to reduce the lead times… since it needs for special air freights to meet such a request'* (5/INT 6).

Technology deployment is pivotal in all processes, but the cultural element still plays a crucial role in the introduction and use of new information technology based systems, since employees' culture may offer a certain level of resistance to adapt to changes. Such a resistance to change may drastically obstruct the effective deployment ICT applications to interact with all people, both within and outside the focal firm. Such a cultural element to restrain from the use of technology, was referred by two participants, by stating that: '*At that time this ERP was said to be a 'monster' and most of the workers showed resistance to implement and use'* (1/INT2); and *'Certain cultural barriers are difficult to overcome, since you give them the technology but still they do not use it'* (4/INT5).

Logic Diagram of managing culture tentative category

Table A11.15 outlines the main characteristics of this tentative category in a logic diagram (Strauss and Corbin, 1990).

Managing culture category properties	Positive extreme dimensional variation	Negative extreme dimensional variation
Flexible work practices	Adapt effectively to all changes	Resistance to change
Sensitivity to other SC members' needs	Dedicated effort to understand each others' needs	Rigid approach to others' needs
Oriented approach to business resilience	Long-term oriented (e.g. cost savings and training investment)	Short-term oriented based on quick fix solutions
Change management approach	Innovative approach to change (e.g. training investment)	Traditional approach with the deployment of legacy systems
Conditions	Globalised SC with various SC members across the globe with different cultural values such as different working hours per day; political instability; corruption; and different non-working days across the yearly calendar.	

Table A11.15: Managing culture tentative category (Author)

Conceptual summary on the tentative category

The globalisation of the SC, has created the need that for the focal firm to achieve SCI, both within and outside the focal firm, dedicated measures need to be deployed by the focal firm to manage effectively all the different cultures that characterise all individual stakeholders. Such cultural differences need that the focal firm adopts a flexible behaviour, based on collaborative initiatives and relationship building, so as to be ready to adapt and be sensitive to the different requirements of all stakeholders, by shifting from a local to an international mindset. The culture of any SC member is a set of values and beliefs that determines the way people perform their operations, both within each organisation and how they associate in all interactions with the different stakeholders, both locally and globally. Such a collaborative approach needs to promote a climate of understanding, information sharing and teamwork in all changes, negotiations and interactions, since sometimes the culture of any

SC member may be deeply rooted within the people values and is hard to change it (e.g. different selling prices are used for the same products in different countries all over the world even within EU itself; different working times; different understanding approaches; corruption; political instability; and different salaries across the globe). The focal firm needs to build a culture based on sound management values and work practices, through the necessary training, to have an excellent workforce that is ready to adopt the right mindset with all stakeholders and a working attitude that performs effectively and efficiently and at the same time also promotes economic resilience, by taking all the necessary measures for any future economic downturns (e.g. cost cutting approach in all processes).

The globalised SC, has several SC members located in different countries, which is drastically influenced by the each member culture, since apart from the world clock time differences, SC members may have different working times and different holidays and shutdowns along the year, which differ from the local Maltese calendar. Such contextual conditions, influence the SC performance, due to possible bottlenecks in the SC operational time schedules, since this may affect the SC effective collaborative initiatives and logistics management. As a result the focal firm staff needs to adapt to such differences of all suppliers or distributors and other stakeholders, who may have all their services temporarily on hold, due to such non-working hours or days. A **lack of understanding** and **cooperation** culture may exist, in the downstream side of the SC for certain manufactured products. Such a stance may be originated by the customers' lack of interest to the **lead time** requirements of the focal firm to manufacture and deliver the products. Responsibility and pressure may be shifted by the customer on to the focal firm, even for any mistakes originated by the customer, referred as '**stock adjustment'**. In such a case the customer, through **negotiation** with the focal firm, has to make up for the extra costs for a faster response, so that the focal firm is in a position to meet the new order by the necessary dedicated measures (e.g. crash resources and faster delivery mode of transport).

Tentative relationship between all emerged potential categories in line with the coding paradigm

The **managing culture** conceptual element is considered as part of the SCI phenomenon since it is an action category, where with the support of various moderating variables, promotes several consequences, such as sustainable performance, effective and efficient performance, flexibility to adapt to change, optimised and innovative processes. The moderating variables are effective collaborative mindset, sustainable economic measures, effective management and leadership approach and training. The relationship of managing culture tentative category is represented by Figure A11.15.

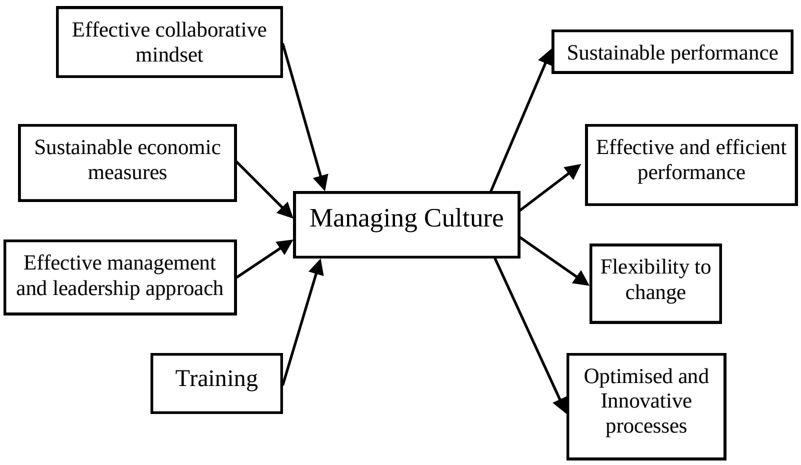


Figure A11.15: Managing culture tentative category (Author)

Appendix 12: The IMLA supporting strategic actions to achieve competitive capabilities

A12.1 The business strategy

The key scope is to align the business goals at all management levels down to the bottom line to promote unity of actions based on the agreed commitments and a level of collaborative relationship throughout the focal firm together with all stakeholders. Such a strategic approach promotes leverage of the firm core competences with that of the relevant stakeholders, to promote a competitive advantage in all processes from a system wide perspective (e.g. exploit manufacturing and/or SC based processes through outsourcing; sub-contract works which are performed better than the focal firm; and learn from the expertise and build on knowledge from other stakeholders).

A12.2 The Manufacturing Strategy

The key scope is about the ‘make’ or ‘buy’ decision, which the focal firm needs to adopt by focussing on its core activities so as to outsource non-essential tasks but still undertake all the necessary collaborative initiatives, so as to exploit each others’ resources and capabilities to create value-added operations for an improved and innovative product. The manufacturing strategy needs to employ, apart from the necessary contractual agreements, all the necessary measures to innovate all processes, through cost cutting measures and/or new techniques, on an on-going basis to promote improved manufacturing operations.

A12.3 The Supply Chain Strategy

The key scope is to establish the SC set-up, through either vertical integration (i.e. ‘make’ manufacturing decision) or virtual integration (i.e. ‘buy’ manufacturing decision) and to decide on the type of SCI approach to be adopted with all SC actors, depending on the role of each SC actor. The SCI approach may vary from an arm’s length to close collaborative approach (i.e. arm’s length where information and orders are issued on need to know basis only or else in-depth integration to form a partnership type of approach to work in unison and by adopting dedicated measures, such as VMI).

A12.4 The holistic SCI management approach

The key scope is to integrate all operations both within and outside the focal firm to gain from synergies of each other’s performance, so as to achieve a competitive edge. The holistic SCI management approach refers to all the sixteen measures needed to be applied from a holistic perspective, to build a teamwork based environment with all people across the SC, which is enabled by technology, so as to promote visibility of all operations and to take all the necessary proactive actions to ensure that all processes are in line with all quality standards, sustainable objectives and business continuity measures. The sustainable objectives are after the triple bottom line approach, where the overall SC performance considers the economic, environmental and social commitments to promote a sustainable SC from a holistic perspective, which may need to undergo the necessary trade-offs with each SC actor for an overall SC win-win outcome. Such a holistic approach is based on the involvement of all stakeholders in all relevant decisions to promote such a win-win approach for all SC members but with the main priority focused on the common good of the overall SC, so as to build a transparent, responsive and unified SC to achieve competitive capabilities. The sixteen conceptual elements building up the holistic SCI management approach are:

A12.4.1 Auditing Operations

Auditing operations needs to validate all suppliers and contractors together with the focal firm itself, to ensure that all scheduled targets are in place and all materials and processes comply with all quality standards and sustainable measures.

A12.4.2 Supply Management

Supply management needs to ensure that there exist a concentrated number of reliable sources of supplies with a stronger relationship, as partners, to promote all stock deliveries in the right time and at the right price with special dedicated collaborative measures, such as VMI.

A12.4.3 Managing Knowledge

Managing knowledge needs to ensure that the overall SC leverages knowledge from each other core capabilities to create a learning environment based on a holistic approach in view of the end customer to promote value-added and innovative processes and products/services respectively.

A12.4.4 Managing Cash Flow

Managing cash flow needs to promote economical sustainability through the right allocation of stocks, without excess of idle capital in inventory, which may also lead to obsolete stock, but with dedicated provisions of stock to meet unforeseen orders or changes to promote SC flexibility.

A12.4.5 Managing Change/Innovation

Managing change and innovation needs to ensure that the focal firm focuses on change and innovative processes and products development initiatives with the involvement of all SC stakeholders' knowledge, to meet the uncertain business environment with its contextual dynamic conditions (e.g. recessions) to promote 3BL sustainability and produce competitive products/services.

A12.4.6 Managing Collaboration

Managing collaboration needs to ensure, that both within and outside the focal firm, all people contribute to a teamwork organisational climate based on trust to promote synergies across all the SC up to the end customer and also responsive SC (e.g. VMI, CPFR). Such collaborative approaches may vary from an arm's length to a close-collaboration depending on each SC actor role.

A12.4.7 Managing Culture

Managing culture needs to ensure that the focal firm, with all of its stakeholders, understand each other' values and requirements to ensure that together operate in concert and with a shared vision for the common good, by adapting to each other' priorities and needs, to promote a win-win outcome. Such values are enhanced through both formal and informal interactions.

A12.4.8 Managing Customer Service

Managing customer service needs to build on a customer relationship and to adopt a proactive approach to all requirements with customised products/services, so as to promote the right customer service, with all the necessary value-added activities and innovative measures to the end customer.

A12.4.9 Managing Information

Managing information needs to adopt an open dialogue with an effective communication approach consisting from both face to face interactions and electronic based applications, with the necessary depth and frequency of information exchange, to promote SC visibility and an informed mindset with all stakeholders, to promote effective decision-making and an audit trail of all activities.

A12.4.10 Managing Lean Operations

Lean management needs to be adopted to streamline and optimise all SC and manufacturing processes to promote 3BL sustainability (e.g. social sustainability through a teamwork-based motivated workforce with less duplication; economical sustainability through cost efficiencies in less running operating costs; and environmental sustainability through the use of friendly and certified green resources and less waste in all resources and processes).

A12.4.11 Managing Logistics

Managing logistics needs to be adopted to achieve effective and timely movements of all materials within the focal firm and across the SC to promote (e.g. social sustainability by employing the necessary health and safety measures for handling of items in warehouses; economical sustainability through cost efficiencies in delivery of items, through groupage or shortest routes; and environmental sustainability through dedicated route planning to deploy less overall carbon footprint by selecting the right modal mode in all orders' deliveries).

A12.4.12 Managing Performance Measurements

Performance measures need to be adopted, both within the focal firm and across the SC, by implementing a holistic measuring approach of all operations, so as to meet all scheduled targets in a timely and effective manner, so that any variances are detected at the earliest to implement an effective risk management approach to promote business continuity. Such metrics need to include both financial and non-financial indicators to achieve competitive performance.

A12.4.13 Managing Planning and Forecasting

Planning and forecasting is needed to establish all materials requirements and deliveries, with the relevant support of all stakeholders, based on the demand/orders to ensure no stock-out and neither excess stock situation, so as to meet all orders in time and with an effective cash flow to promote economic sustainability.

A12.4.14 Managing Quality and Sustainability

Managing quality and sustainability measures are needed to be adopted to promote compliance to all quality standards and all sustainable measures by all SC stakeholders in all their supplies and processes to promote high quality products/services and also to be in line with all the triple bottom line sustainable measures.

A12.4.15 Managing Risks

Managing risks is needed to monitor and review all operations, both within and outside the focal firm, with the support of the deployment of performance measurements and audits, to ensure immediate bottlenecks identification and to employ timely remedies to promote business continuity of the overall SC.

A12.4.16 Managing Trust

Managing trust is needed to build a solid foundation in all types of interactions, commitments and relationships between people, both within the focal firm and across the SC with all stakeholders. Contractual obligations need to be employed by the focal firm with all SC members, but a level of trust is needed to promote integrity and ethical behaviour by all actors in all type of collaborative initiatives. Such a trustful climate is achieved by sharing the right information and knowledge, so as to enable an effective decision-making approach so as to foster a teamwork environment, with the leverage of each other' capabilities and resources, with a level of flexibility and adaptability, so as to pursue common objectives for a win-win outcome.

A12.4.5 The Technology Deployment

The key scope to deploy technology, in both ICT applications and manufacturing automation, is to enable the holistic SCI management approach to be achieved in a more effective and efficient approach, both within and outside the focal firm, by investing in the right technological applications, in both IT and automation (e.g. ERPs, web portals, CAM and CAD). Such a holistic process needs all management levels to perceive the important role of technology deployment and to understand the dedicated commitment and collaborative initiatives needed by the focal firm with all SC actors, through technology based initiatives, so as to implement the most effective and efficient processes. The ICT applications enable the management of all information in an effective way, by providing SC visibility and transparency, so as that all management levels are informed to enable an effective decision-making process. Such an information platform is highly enhanced with today's applications on the internet, which provides all SC actors the possibility to be updated on a real-time basis across the globe, to assist timely decisions for all actions. IT does not replace people but enable and support all informed decisions effectively and efficiently and sometimes may even drive processes. The SC needs to streamline and unify all the actors' different processes into one seamless holistic process by integrating their IT infrastructure (e.g. interface or replace all disparate legacy IT based systems) to fit and meet all the focal firm requirements with all SC actors, so as to enable real-time information sharing and achieve timely and proactive actions (e.g. web based access provisions through common platforms based on databases/ERPs). Furthermore, the automation based technology within manufacturing is used to perform repetitive tasks with greater process efficiencies to promote a competitive edge.