



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

DEPARTEMENT BEDRYFS- EN SISTEEMINGENIEURSWESE
DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

**COVER PAGE FOR FINAL PROJECT DOCUMENT (BPJ 420) -
2012**

Information with regards to the mini-dissertation

Title (e.g. A Contingency framework for the after-sales inventory at Xxxxx Part Distribution Centre)	Investigation of the Strategic Role and Effective Functioning of the Supply Chain Function in South African Organisations
Author (Last name, Initial(s) e.g. Botha, P.J.)	Binnekade, N.L.
Student number	291 3637 8
Supervisor/s (Last name, Initial(s) e.g. Botha, P.J.)	van Schoor, C
Date (year/month/day) e.g. (2012/10/08)	16/10/2012
Keywords (Provide keywords from your project (for searching purposes). The first word of two words must always have a capital first letter and the rest of the words following must be lower case. In the event of an abbreviation, use as it is known. E.g. Economic recession, ABSA, ERP, Simulation modelling)	Investigative study, Strategic role, Supply chain function, South Africa
Abstract (Provide an abstract of the mini-dissertation. An abstract is a short summary of the contents covered in the item.)	An Investigative study of the Strategic Role and Effective Functioning of the Supply Chain Function in South African Organisations.
Category (Enter the category in which the project was done. E.g. Operations Research, Simulation, Logistics...)	Supply Chain Management

Declaration

1. I understand what plagiarism is and I am aware of the University's policy in this regard.
2. I declare that this is my own original work
3. Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements
4. I have not used another student's past work to hand in as my own
5. I have not allowed and will not allow, anyone to copy my work with the intention of handing it in as his/her own work

Signature

Investigation of the Strategic Role and Effective Functioning of the
Supply Chain Function within South African Organisations

by

NICOLE LAUREN BINNEKADE

291 36378

Submitted in partial fulfilment of the requirements for the degree of

BACHELORS OF INDUSTRIAL ENGINEERING

in the

FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION
TECHNOLOGY

UNIVERSITY OF PRETORIA

October 2012

Executive Summary

Over the last decade integrated supply chain management has been recognised as an essential driver for business success (Lu, 2011) and currently South African organisations are functioning within one of the harshest overall environment to date (Gilmore et al, 2008). These circumstances have brought about the necessity for organisations to become flexible and accommodate transformations within their industries and supply chains to increase their competitive gain.

The objective of this investigation was to provide insight into the current status and role of integrated supply chain management within South African organisations, as well as to identify the major gaps between the current status of integrated supply chain management and the specific best practices.

This investigation was conducted by means of a qualitative study on 31 participating members of the supply chain community from the manufacturing, retail and mining sector. The study consisted of each participant completing a standardised survey based on the SCMAT (Supply Chain Maturity Assessment test) analysis, follow up electronic based interviews and the study of current literature available. The SCMAT analysis provided a platform to subjectively evaluate each participant in terms of a broad overview of the organisations supply chain, as well as the best practice techniques that are currently being implementing and the level of such implementation.

The data was analysed by means of combined analysis, where by the statistically analysed survey results were combined with the information gathered by means of the interviews and current literature to establish the following findings regarding the current status and role of integrated supply chain management within South African organisations;

- Role players in the consumables value chain exhibit a significantly higher level of maturity than role players in other value chains.
- South African organisations are aligning their supply chain strategies with the broader organisational strategy.
- A lack of implementation of information management best practices is evident within South African supply chains.
- South African organisations recognise the importance of being customer focused.

- South African Organisations generally have yet to realise the benefits of collaborating with supply chain partners.
- Planning, forecasting and replenishment strategies are the backbone of South African supply chains.
- South African organisations are not placing emphasis on designing agility into their supply chains.
- Minimal emphasis is placed on minimising inventory within South African supply chains.

Further combined analysis revealed that South African organisations are being hampered by two gaps between the current status of integrated supply chain management and the best practices. The first being the lack of implementation of information best practices and secondly gaps in the understanding of supply chain management and the successful implementation of supply chain collaboration strategies within South African organisations.

In conclusion this investigation has provided an overview of the current status of the supply chain function within South African organisations, as well as providing insight into some of the current gaps between South African supply chain practice and the global standard.

Table of Contents

Executive Summary	0
List of Figures	0
List of Tables	0
Chapter One: Introduction	1
1.1 Background	1
1.2 Problem Statement	4
1.3 Project Aim and Scope	5
1.4 Project Approach	5
1.5 Project Plan	6
Chapter Two: Literature Study on Integrated Supply Chain Management.	8
2.1 Introduction to ISCM	8
2.2 Key Frameworks for ISCM	10
2.2.1 SCOR	10
2.2.2 Demand Driven Supply Networks	12
Chapter Three: Integrated Supply Chain Management within a South African context	15
3.1 Introduction to ISCM within South Africa	15
3.2 Current Issues ISCM faces within a South African context.....	16
Chapter Four: Literature Study on Investigative Study Techniques	18
4.1 Qualitative Research	18
4.2 Qualitative Study.....	18
4.2.1 Designing a Qualitative Study	18
4.3 Survey.....	25
4.4 Interview.....	25
Chapter Five: Literature Study on Supply Chain Maturity Assessment Models ...	27
5.1 SCM Maturity Model	27
5.2 SCMAT.....	28
5.3 Arcs of Integration.....	29

5.4 Supply Chain Maturity Assessment Models Comparison	29
Chapter Six: Research Design	31
6.1 Research Formulation Phase	31
6.1.1 Research rationale	31
6.1.2 Research techniques	31
6.1.3 Research question	31
6.2 Research Planning Phase	32
6.2.1 Sampling space	32
6.2.2 Research design	34
6.3 Research Implementation Stage	34
6.3.1 Data collection	34
6.3.2 Data analysis	35
6.3.3 Data legitimising of findings and interpretations	35
Chapter Seven: Survey Results	36
7.1 The Overall Results	36
7.2 Retail Sector	40
7.3 Manufacturing Sector	44
7.4 Mining Sector	48
Chapter Eight: Findings on the role of ISCM	50
8.1 Current status and role of ISCM South Africa	50
8.2 Gaps between the current status of ISCM and best practices	53
Chapter Nine: Conclusion	54
9.1 Outcome of the Investigation	54
9.2 Further Research	54
Bibliography	55
Appendixes	59
Appendix A: Best practices	59
Appendix B: SA ISCM Survey	62

List of Figures

Figure 1	A basic supply chain model.....	1
Figure 2	Supply Chain Management Processes.....	3
Figure 3	Project plan task diagram	6
Figure 4	The arcs of integration.....	9
Figure 5	The five essential demand-driven strategies.	14
Figure 6	Twelve steps to compile a Qualitative Research Study.	24
Figure 7	The industry and product distribution within the sample.....	33
Figure 9	The overall supply chain maturity of South African organisations.	39
Figure 10	The supply chain maturity of South African Organisations in the Retail Sector.	41
Figure 11	The Consumable Retail sector compared to the Overall Retail Sector.	42
Figure 12	The Semi-Durables/ Durables Retail sector compared to the Overall Retail Sector.	43
Figure 13	The supply chain maturity of South African Organisations in the Manufacturing Sector.....	45
Figure 14	The Consumable Manufacturing sector compared to the Overall Manufacturing Sector.....	46
Figure 15	Industrial Products/ Feedstock's manufacturing sector compared to the overall manufacturing Sector.....	47
Figure 16	The supply chain maturity of South African Organisations in the Mining Sector.....	49

List of Tables

Table 1	An Outline of the Project Approach, Objectives and Key Deliverables.	5
Table 2	Supply Chain Maturity Assessment Models Comparison.	29
Table 3	Respondents Product types and Role Player Placements.	33
Table 4	The ten highest overall ranked best practices.	36
Table 5	The ten lowest ranked overall best practices.....	36
Table 6	The overall findings per best practice category.	37
Table 7	The five highest ranking and two lowest ranking best practices in the retail sector.....	40
Table 8	The category scores for the retail sector.....	40
Table 9	The retail sector ranking distribution percentiles.	40

Table 10	The five highest ranking and two lowest ranking best practices in the manufacturing sector.	44
Table 11	The category scores for the manufacturing sector.	44
Table 12	The manufacturing sector ranking distribution percentiles.	44
Table 13	The five highest ranking and two lowest ranking best practices in the mining sector.	48
Table 14	The category scores for the mining sector.	48
Table 15	The mining sector ranking distribution percentiles.	48

Chapter One: Introduction

1.1 Background

Supply chain management as defined by Ellram and Cooper (1993) is “an integrating philosophy to manage the total flow of distribution channels from supplier to ultimate customer”. The fundamental purpose of supply chain management is to manage the supply chain by meeting the wants and requirements of the end customer; this is accomplished by the use of approaches, frameworks, activities and strategies (Langley et al, 2009).

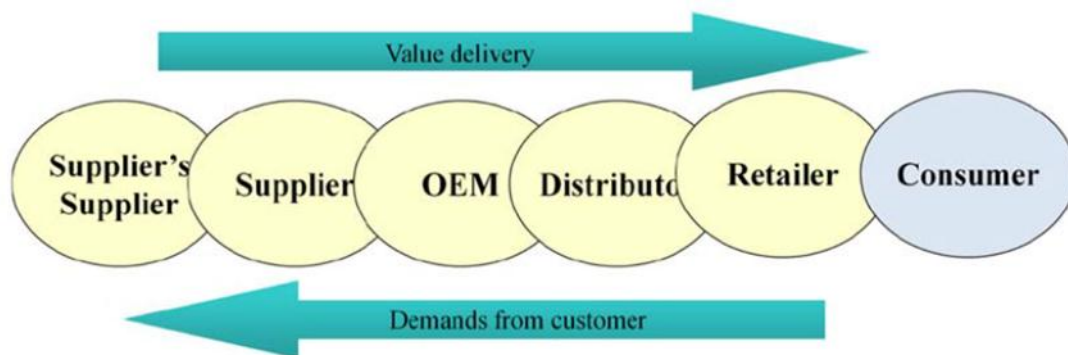


Figure 1 A basic supply chain model.

Source: Fundamentals of Supply Chain Management. (Lu, D, 2011.)

The idea of supply chain management has been prevalent since the 1980's when companies realised the benefits of co-operative relationships within and beyond their own organisations (Lummus & Vokurka, 1999:11). The need for supply chain management has increased due to forces of change such as globalisation, technology, organisational consolidation, government policy and regulation, and an empowered customer base. These forces of change within the supply chain management sector brought about the need for organisations to become more responsive, dynamic and open to transformation, in order to become more competitive within the global arena (Langley et al, 2009).

In the last 30 years supply chain management has evolved considerably (Lu, D. 2011). The earliest recorded use of the term “supply chain management” was within a Financial Times article written by Oliver and Webber in 1982, the article outlined a variety of actions performed by the organisation in procuring and managing supplies (Lu, D. 2011). In the 1990's an evolution in supply chain management occurred, as

the concepts of supply chain integration and supplier-buyer relationships were developed (Lu, D. 2011). The development of these ideas resulted in the acknowledgment by senior level management in numerous organisations that supply chain management was a powerful tool that could be used to achieve global competitiveness (Langley et al, 2009).

Over the last decade integrated supply chain management has been accepted as an essential platform to a business's success. The concept of supply chain integration is based on legally independent participating firms synchronising together as if they are one company, to accomplish a shared goal (Lu, D. 2011). An example of integrated supply chain management is that of Walmart, where they share point-of-sales data with their key suppliers. This technique is called collaborative planning, forecasting and replenishment and is a business model that has a well-rounded approach to supply chain management and the information conveyed among trading partners. The technique uses standard metrics, common language, and firm agreements to increase supply chain effectiveness of all participants (Edwards, J.D. 2003).

A successfully integrated supply chain requires infrastructure and systems to enable the effective flow of information, as well as the alignment of the following eight dimensions or key processes of management throughout the entire supply chain (Lu, D. 2011):

- Customer relationship management;
- Customer service management;
- Demand management;
- Order fulfilment;
- Manufacturing flow management;
- Supplier relationship management;
- Product development and commercialisation; and
- Returns management.

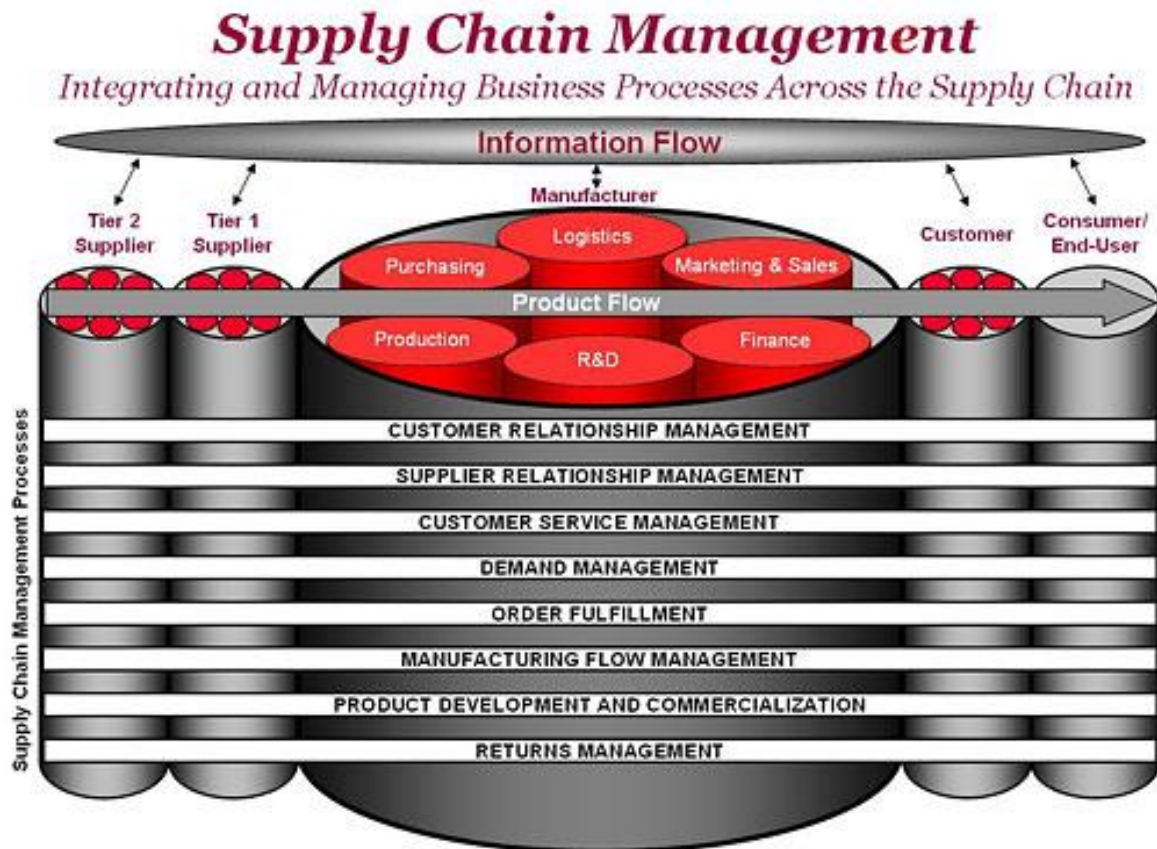


Figure 2 Supply Chain Management Processes.

Source: Supply Chain Management Processes, Partnerships, Performance. (Lambert, D.M & The Supply Chain Management Institute, 2008)

Many firms have seen the advantage of managing their supply chains as a competitive weapon, and have positioned their supply chains as an essential component within their strategic management over the past few years. Strategic supply chain management incorporates integrated supply chain management and the overall strategic decisions of an organisation to meet the end customers' requirements. The worth of strategic supply chain management can be seen in the performance of organisations such as Walmart, Zara, Toyota, and Dell, where they have used their supply chains to gain a competitive advantage over peers (Tomas et al, 2007).

1.2 Problem Statement

Lummus & Vokurka (1999) agree that supply chain management has the ability to increase an organisation's competitiveness. A supply chain's proficiency is as essential to an organisation's overall strategy, as supply chain management is to the promoting of the management of processes across the departments. The linking of supply chain objectives to an organisation's strategy allows for decisions to be made between the conflicting requirements of the supply chain (Lummus et al, 1999). To achieve a business strategy that would incorporate innovation and a quick time to market, a different network of suppliers, manufacturing infrastructure and distribution infrastructure would need to be incorporated into the strategy, opposed to a strategy based on lowering costs (Carter et al, 2009). Thus it is essential that the implemented strategies and the decisions made with regard to the organisation's supply chain be aligned with the overall strategy of the organisation.

For South African organisations to compete on a global level they need to be flexible and be able to accommodate transformation within the industry and their supply chains, as there is little doubt that supply chains are currently operating in the toughest overall environment they have ever faced (Gilmore et al, 2008). With the development and advancement of integrated supply chain techniques and frameworks there is untapped potential for supply chain management to provide a platform for integration into a South African organisation's strategic operating plans.

Supply chain management forms part of the broader management of an organisation and therefore the supply chain strategy should reflect the organisation's broader strategy (Carter et al, 2009). Hence, supply chain executives need to understand this potential to leverage integration and organisational change through supply chain initiatives and should proactively search for and drive transformation towards competitive advantage through integration and collaboration.

1.3 Project Aim and Scope

The aim of this project is to determine the current status and role of integrated supply chain management (ISCM) within South African organisations, considering the current level of awareness and transformation initiatives amongst supply chain leaders and to identify the gaps and opportunities for an increased integrative and strategic role within organisations.

The objectives of this project are:

- To establish an understanding of how integrated supply chain management benefits organisations and how these benefits are achieved.
- Identifying the transformation initiatives being applied by South African organisations.
- Identify the major gaps between the current status of integrated supply chain management within South African organisations and the best practices.

This project will be conducted within the following boundaries:

- The investigation into the current status and role of integrated supply chain management will consist of South African organisations that fall within identified industries.
- Participating organisations must manage their supply chain chains.

1.4 Project Approach

The project shall be approached by means of the following tasks, with the outlined objectives and key deliverables.

Table 1 An Outline of the Project Approach, Objectives and Key Deliverables.

Task	Description	Objectives	Key Deliverables
One	Study the existing literature on ISCM and the best practices.	To establish the best practices used within ISCM.	The best practice frameworks for ISCM.
Two	Compile an investigative study on the current status and role of ISCM within South African organisations.	To design an investigative study that would determine; <ul style="list-style-type: none"> – The current role ISCM plays within South African organisations. – What best practice techniques are being implemented and the level of implementation. 	A comprehensive investigative study in the form of a questionnaire or interview.

Three	Collect industry data with regard to the current status and role of ISCM within South African organisations.	collect data from organisations by means of the compiled investigative study in Task Two.	Investigative study responses.
Four	Evaluate the investigative study responses.	To establish the key findings on the current status and role of ISCM within South African organisations.	Key findings and the current status and role of ISCM within South African organisations.
Five	Identify the major gaps between the current status and role of ISCM within South African organisations and the best practices.	To perform a gap analysis on the current status and role of ISCM within South African organisations and the best practices established in Task One.	A gap analysis on the current status and role of ISCM within South African organisations.

1.5 Project Plan

Activities and Tasks

The following tasks have been compiled as per chart below.

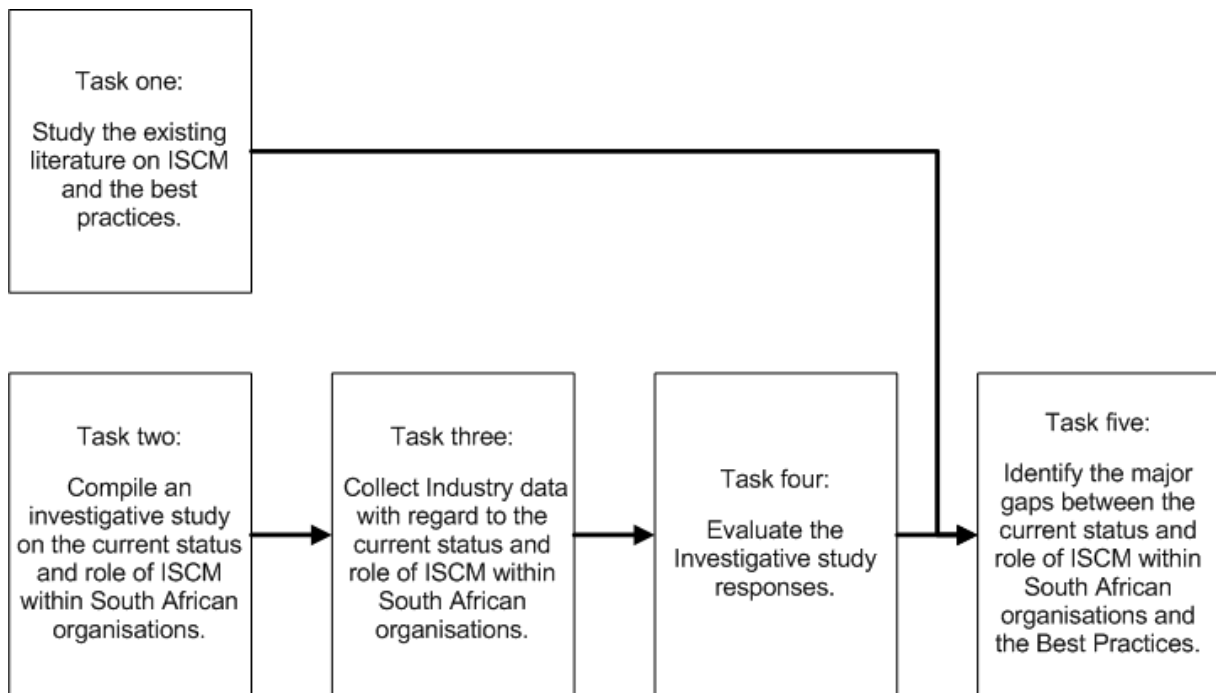


Figure 3 Project plan task diagram

Task One: Study the existing literature on ISCM and the best practices.

1. Perform an in depth study on the current ISCM techniques and best practices.

Task Two: Compile an investigative study on the current status and role of ISCM within South African organisations.

1. Research investigative study techniques.
2. Establish evaluation techniques to be used in the investigative study to determine the key findings.
3. Determine sample space specifications.
4. Select organisations to partake in the investigative study, based on the sample space specifications.
5. Invite supply chain members to participate within the investigation.
6. Determine the required information that the investigative study needs to extract from the participants.
7. Design the Investigative study based on the selected investigative techniques, the selected evaluation techniques and the required information.

Task Three: Collect Industry data with regard to the current status and role of ISCM within South African organisations.

1. Conduct investigation with the agreed upon study participants.

Task Four: Evaluate the Investigative study responses.

1. Evaluate investigative study results to determine the key findings and trends.
2. Compile results and findings.

Task Five: Identify the major gaps between the current status and role of ISCM within South African organisations and the best practices.

1. Evaluate and identify the gaps between the current status and role of ISCM within South African organisations and the best practices established in task one.
2. Compile findings and recommendations

Chapter Two: Literature Study on Integrated Supply Chain Management.

2.1 Introduction to ISCM

An integrated supply chain is a supply chain that has successfully linked their internal processes to the external suppliers and customers. This results in the optimisation of upstream and downstream collaboration between the organisation, its suppliers and its customers (Frohlich & Westbrook, 2001). Supply chain integration is achieved by means of three fundamental dimensions (Childerhouse & Towill, 2011):

- organisational relationship linkages
- information integration
- co-ordination and resource sharing

In a recent international field study that was conducted over a period of eight years on 50 products and their accompanying supply chains, it was proven that the extent of supply chain integration significantly corresponds with improved performance within organisations, yet the majority of supply chains are not well integrated (Childerhouse & Towill, 2011).

Integrated supply chain management arises from a systems' perspective, the optimisation of the overall supply chain within the organisation results in an improved performance, opposed to a series of optimised sub-systems (Childerhouse & Towill, 2011). In 2001, Frohlich and Westbrook established that there are five alternative arcs in which supply chain integration could be categorised. Each arc denotes the extent to which an organisation's supply chain is integrated and provides a valuable manner of classification of the different levels of supply chain integration (Frohlich & Westbrook, 2001), as demonstrated in Figure 4 below.

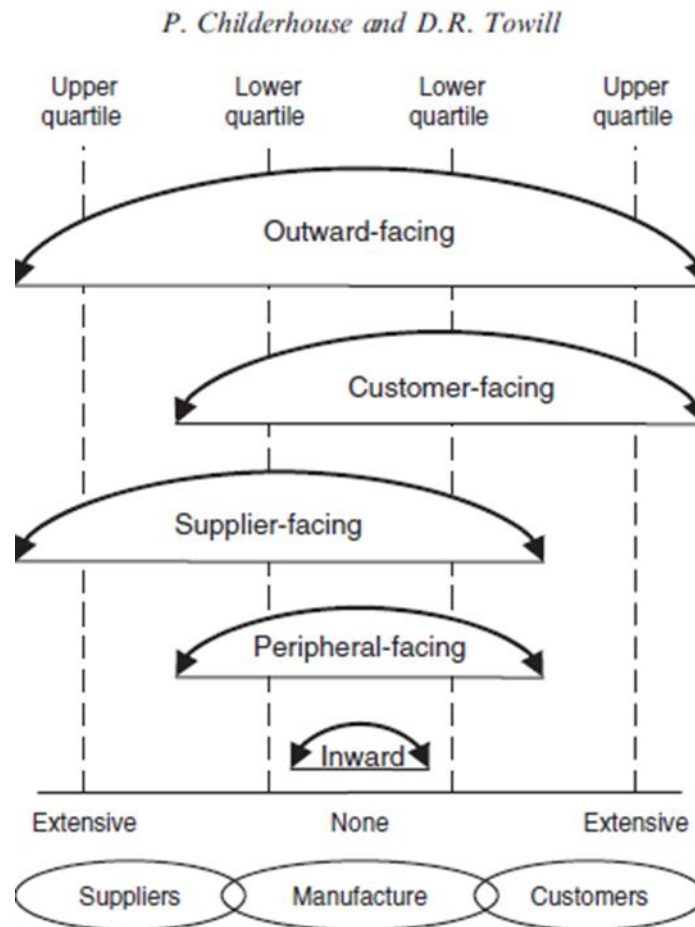


Figure 4 The arcs of integration.

Source: Arcs of supply chain integration. Frohlich, M.T. & Westbrook, R, 2011.

Furthermore, it was established that there is currently a small percentage of successfully integrated supply chains and therefore the arcs of integration concept could be used by an organisation to improve their supply chain integration (Childerhouse & Towill, 2011). The initial step towards full integration of an organisation's supply chain is to accomplish "inwards facing" integration. This could be achieved by improving the following four aspects within the internal supply chain; organisational relationships, information integration, flow of goods through the organisation and the planning and control within the organisation (van Donk & van der Vaart, 2005). These four aspects are imperative to a successful 'inwards facing' integrated supply chain, as they deal with the organisation's internal supply chain, before establishing relationships upstream and downstream within the overall supply chain (Childerhouse & Towill, 2011). The second phase for either route depends on the organisation's choice to focus their supply chain improvements on either customer or supplier delivery performance. Focusing on supplier delivery

performance would result in integrating upstream with the organisation's key suppliers, while customer delivery performance focuses on integration with customers and the product outlets. A key aspect to successfully achieving supplier integration is the sharing of information as it is crucial in reducing inventory and increasing trust, as well as introducing vendor managed inventory and consignment stocking with key suppliers (Childerhouse & Towill, 2011). Lastly the organisation will focus on becoming 'Outwards facing', a point very few organisations have managed to achieve (Childerhouse & Towill, 2011). Outwards facing integration can be achieved by means of collaborative planning and forecasting, vendor managed inventory and joint programmes to enhance customer service.

The majority of organisations are situated in the first phase of the arcs of supply chain integration. These organisations are 'inwards facing' and tend to yield savings in inventory, cycle time, purchasing, logistics, transportation and warehousing, but a small amount manage to improve customer satisfaction (Childerhouse & Towill, 2011). The true industry leaders are found within the 'outward facing' phases of the arcs of integration concept. These industry leaders achieve excellence by gaining the advantage of external networks and alliances and by sharing resources to satisfy the customer. These advantages allow organisations to further reduce costs, utilise total assets better and improve revenue across an integrated supply chain network (Pretorius, 2001).

2.2 Key Frameworks for ISCM

2.2.1 SCOR

The Supply Chain Operations Reference (SCOR®) model was developed by the Supply Chain Council (SCC). The SCC is an autonomous, non-profit, global corporation operating throughout the world, whose purpose is to apply and advance supply chain management systems and practices within organisations. The SCOR model serves the purpose of capturing the Council's overall perspective of supply chain management (Supply Chain Council, 2011). The SCOR® model was developed in 1996 and concentrates on the function of supply chain management within an organisation. This model encompasses operational process perspective, including customer interactions, physical transactions, and market interactions (Zhou et al, 2011).

In 1999 Intel was one of the first major U.S. corporations to adopt the SCOR model and experienced benefits of implementing the model in terms of faster cycle times,

less inventories, improved visibility within the supply chain, and access to important customer information in a timely fashion (Zhou et al, 2011). The SCOR model can be used not only for manufacturing operations, but also in service operations, as seen in a New York hospital that made use of the SCOR model to outline, quantify, and improve their supply chains (Malin, 2006).

The first version of the SCOR model was released to the public in 1997 and it comprised of four stages of a supply chain; Plan, Make, Source, and Deliver as well as metrics of evaluation, best practices and improvement technologies (Phelps, 2006). Later Version 4 was published, being the first version to include the return stage within a supply chain (Zhou et al, 2011). The current available model is version 10.0 and is the twelfth revision since the introduction of the model in 1996. The SCOR® model is revised when the council feels that changes should be made to align the model with industry practice. The SCOR model (version10.0) consists of four major components:

- **Performance:** The standard metrics to describe process performance and define strategic goals.
- **Processes:** The standard accounts of the management processes and process relationships.
- **Best Practices:** The best practices available within industries that result in improved process performance.
- **People:** The standard definitions for skills required to perform supply chain processes.

The performance of an organisations supply chain is evaluated by the following performance metrics, these metrics are used to describe process performance and define strategic goals within the SCOR model:

Reliability - This metric is used to measure the realisation of customer demand fulfilment in terms of being on-time, complete and without damage to the product or service.

Responsiveness - This metric is used to measure the time taken by an organisation to respond to and complete the customer demand.

Agility - This metric is used to measure the ability of the organisations supply chain to accommodate the increase/decrease of the demand within a given planned period.

Cost - This metric is used to assess all components of the cost of the organisation's supply chain.

Assets - This metric is used to assess all resources used to meet the customer demand.

The organisation's processes are then further broken down into the five main processes defined in the SCOR model as:

Plan - processes that balance and plan for the aggregate demand and supply by means of developing a course of action which shall best meet the sourcing, production, and delivery needs.

Source - processes that acquire the goods and services that are required to meet the planned or actual demand.

Make - processes that are used to transform product or goods into the final state required within the supply chain to meet planned or actual demand.

Delivery - processes that deliver the finished goods and services to the planned or actual demand.

Return - processes that move material from a customer back through the supply chain.

2.2.2 Demand Driven Supply Networks

Demand Driven Supply Networks (DDSN) is a supply chain integration driver that is driven by the voice of the customer. The supply chain is designed to serve the downstream source of demand opposed to the upstream supply constraints imposed by the factories and distribution systems (Krivda, 2004). DDSN tightly joins the management of an organisation's demand with the supply and product. This enables the manufacturers to gain an overview and understanding of any changes that occur within each area and act there on. The DDSN framework focuses on areas of business that are traditionally overlooked by supply chain management and thus have the potential to increase efficiencies and stimulate growth within an organisation (O'Marah & Souza, 2004).

AMR Research defines DDSN as a system of technologies and processes that anticipates and responds to immediate demand issues throughout a network that comprises of customers, suppliers, and employees (O'Marah & Souza, 2004). This system encompasses technologies like software applications and databases and

integrates with the business processes. The concept of demand is a multilevel demand, this occurs due to the buyers' willingness to allow one benefit to be traded for another, for example availability for price. The DDSN system requires that quick business judgment can be applied across all demand issues. DDSN requires a network that can accommodate the organisations contract manufacturers, outsourced design and development, and third-party logistics providers, while vertically integrating the organisation core-competence-based networks. These networks require pervasive and reliable communication to be successful in DDSN. (O'Marah & Souza, 2004). The goal of DDSN is to deliver the perfect order; this requires that an order arrives at the correct place, at the correct time, with the correct goods. This would result in enhanced customer satisfaction and improved business metrics (Krivda, 2004).

The successful implementation of DDSN requires cooperation amongst sales, logistics, procurement, and operations. The proficiency with which companies execute DDSN can be measured in four stages: beginners that have almost no integration along the supply chain; companies whose enterprise is connected internally; enterprises connected externally to business partners with which they are beginning to collaborate; and companies with multi-tier integration, this encompasses supporting demand visibility as well as supply chain collaboration (Krivda, 2004).

It has been found that the DDSN leaders concentrate on cross-functional, coordinated efforts for demand-sensing strategies, demand-shaping processes, and a corporate understanding of how to achieve a profitable demand response (Cecere et al, 2005). The following five crucial cross-functional strategies are applied DDSN leaders (Cecere et al, 2005):

- The demand is market driven
- The products are developed to drive demand
- Driving Channel-driven fulfilment
- Implementing Demand-driven replenishment
- Implementing Agile networks for customer-centric responses

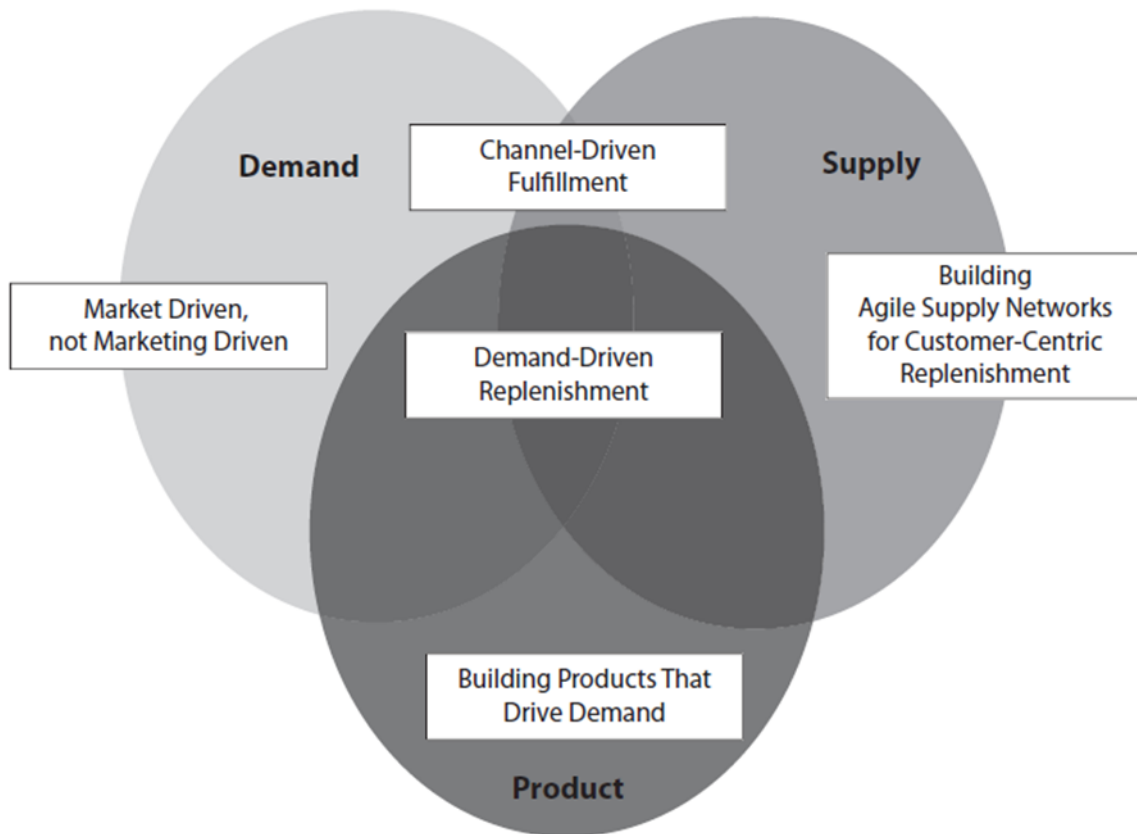


Figure 5 The five essential demand-driven strategies.

Source: The Handbook for Becoming Demand Driven. Cecere, L et al, 2005.

These strategies explain above and depicted in the Figure 5 will then be aligned with demand-sensing tactics, demand-shaping objectives, and processes that would stimulate a profitable demand response. This alignment will increase demand visibility and guide the demand driven supply network (Cecere et al, 2005).

Chapter Three: Integrated Supply Chain Management within a South African context

3.1 Introduction to ISCM within South Africa

In the last few years it has been recognised that due to the global recession, there has been a shift in economic and political power from the longstanding centres in the US and Europe towards new centres in 'emerging economies' (Barloworld Logistics, 2011). These emerging economies are the six largest emerging markets, which have rapidly integrated into the world markets. They are Brazil, Russia, India, Indonesia, China and South Africa and have become an essential element of globalisation over the last 20 years. This has led to organisational and entrepreneurial growth benefits due to the access to potential markets for products and in addition consumers have also gained by being able to access a broader range of less expensive products. (Organisation for Economic Co-operation and Development, 2009).

This shift has presented South African organisations with an opportunity to be able to grow and capture market share. Companies and industries are recognising that the emerging market economies are trading partners as well as new markets for business, and have identified integrated supply chain management as an enabler to remaining profitable and competitive. (Barloworld Logistics, 2012).

The Barloworld Logistics, Supply Chain Foresight 2012 survey identified that current business objectives within South African organisations are to increase flexibility, agility and responsiveness, followed closely by the goal to use the supply chains as more of a competitive advantage. This shift in business strategy from a strong focus on planning and forecasting reveals the desire to make supply chains more competitive and responsive, by means of increasing interaction with customer demand and the market environment opposed to the product and manufacturing schedules. This is evidence of business objectives being focused on growth and expansion into emerging markets. (Barloworld Logistics, 2012).

In 2010 the Supply Chain Foresight survey found that the issue of alignment between a business's supply chain strategy and the business strategy in South African businesses had become a strategic issue at boardroom level (Barloworld Logistics, 2010). In 2012, the same survey found that a further shift in business strategy had occurred in the perception of enhancing visibility within supply chains,

followed by the need to improve the flow of information between the business and its suppliers and customers. This strongly suggests a maturing of the long-held mantra of supply chain collaboration and that businesses are adopting strategic and holistic views that mutually benefit all supply chain players, and offers sustainable benefit to the customer in the long term. (Barloworld Logistics, 2012).

3.2 Current Issues ISCM faces within a South African context

In South Africa efforts to deploy the supply chain as an enabler of growth have been hampered by the following constraints; cost of transport and doing business, the effectiveness of the ports and harbours, lack of skills and expertise within supply chain management, labour unrest and the requirement to reduce the environmental impact of a supply chain (Barloworld Logistics, 2012).

Cost of transport

Currently South Africa's largest supply chain constraint is the cost of transport for almost every industry sector. This is due to South Africa's exorbitant logistics costs, imbalanced rail and road infrastructure and the implementation of tolling and carbon tax fees. (Barloworld Logistics, 2012). According to vdM Steyn et al (2011) all these costs have a direct effect on the broader economy, since logistics cost is usually absorbed through increasing end-product cost to the consumer. Thus, this is an area where the public and private sector need to effectively communicate amongst each other and across all industries to re-examine transportation strategies, as they desperately need to reduce transportation costs in the most cost-effective way possible (Barloworld Logistics, 2012).

Finding skills and expertise to enhance supply chain management

The Supply Chain Foresight survey of 2012 identified the second biggest obstacle hampering growth and competitiveness within South African supply chains is the skills vacuum, as there is a lack of skills, growth and development within the supply chain industry (Barloworld Logistics, 2012). The lack of competency in managing the supply chains results in a negatively affected bottom line. This skills vacuum is a result of a deficient talent pool due to a lack of clear and distinct capabilities and job requirements being established for South African supply chain managers, as well as lack of people with supply chain management skills being produced within business and management programs (Vokurka, 2011).

Efficiency of ports and harbours

The efficiency of ports and harbours is affected by taxes and customs costs imposed on imports and exports, as well as 'Rand Strength' featuring as a constraint, due to currency's volatility as a business constraint, due to the uncertainty for both import and export trade planning (Barloworld Logistics, 2012). According to Raballand et al (2012) the largest constraint faced within South African ports and harbours is that "Weeks-long cargo dwell times in ports have become a serious obstacle to the successful integration of Sub-Saharan African economies into global trade networks, because they make lean, demand driven manufacturing and trading activities virtually impossible."

Labour unrest affecting supply chain operations

Labour unrest, which is similar to labour strikes, is when work stoppage is carried out to corroborate a bargaining position or to protest some aspect of a previous agreement or proposed agreement between labour and management (Investorwords.com, 2012). Labour unrest featured prominently within the South African market and especially in the freight transport sector in 2011. An unstable labour relations platform results in a reduction in investment within South African business and trade (Barloworld Logistics, 2012).

Reducing the environmental impact of a supply chain

It has been established that one of the current constraints within South African businesses is the growing urgency of environmental responsibility and carbon emission reduction. This was seen to be a repeating constraint within the 2012 Supply Chain Foresight survey as there is increasing pressure to reduce carbon footprint and to hold suppliers accountable by means of legislation and tax regimes within South Africa. This pressure on organisations to 'go green' has been identified as one of the factors affecting the bottom line of an organisation (Barloworld Logistics, 2012).

Chapter Four: Literature Study on Investigative Study Techniques

4.1 Qualitative Research

Qualitative research is research that deals with challenging data that is impossible to quantify mathematically, such as beliefs, opinions, characteristics, and symbols. This technique of investigation makes use of interviews, detailed case studies and possible content analysis (Qualitative research, 2005). The research tool of content analysis is used to ascertain certain words or concepts within texts or a set of texts. These texts include essays, books, interviews, discussions, historical documents, newspaper articles, speeches, conversations and any occurrence of communicative language (An Introduction to Content Analysis, 2012).

4.2 Qualitative Study

A qualitative study is a study compiled based on qualitative research, this includes activities such as collecting and analysing data, developing and adapting theory, expanding or refocusing research questions, and recognizing and dealing with validity threats. These activities occur simultaneously and each influences the other. The researcher needs to consistently reconsider or modify any design decision throughout the study to respond to new developments or changes within the design (Maxwell, 2012).

4.2.1 Designing a Qualitative Study

A qualitative study consists of three stages of work, the Research Formulation Stage, the Research Planning Stage and the Research Implementation Stage. Each stage consists of a required number of steps to be completed to successfully compile a qualitative study.

4.2.1.1 Research Formulation Stage

The qualitative research formulation stage consists of five steps used to outline the research area within which the qualitative study will be conducted.

Step 1: Determine the goal of the study.

This entails defining the overall aim of the qualitative study. The purpose of the goal is to guide the design decisions and to justify the worth of the study (Maxwell,2012). The goal of the qualitative study needs to accomplish the following objectives; add to the knowledge base, measure change, have a personal, social, institutional, or

organisational impact, understand complex phenomena, generate new ideas, test new ideas, informs constituencies and examines the past (Onwuegbuzie et al, 2012).

Step 2: Determine the research objectives.

This entails conducting various frameworks of focused literature reviews to establish the objectives of the qualitative study. This step requires the identification of the issues, settings and people the study will be based on (Maxwell, 2012). The three main sources for constructing conceptual frameworks the researcher shall make use of are, their own observed knowledge, current theory and research. This will be accomplished by applying the Interactive Literature Review Process (ILRP) framework, Onwuegbuzie et al (2012) explains that the ILRP framework consists of the following nine stages which are to be completed as a progression of activities:

Stage 1: Explore the belief systems

Stage 2: Initiate the literature review development;

Stage 3: Select a topic;

Stage 4: Explore the literature and identify possible themes;

Stage 5: Formulate a core focus for the research, by selecting and deselecting themes;

Stage 6: Examine, interpret and integrate the literature;

Stage 7: Complete the literature review;

Stage 8: Writing the review of literature

Stage 9: Evaluating goal, objectives and literature review.

Step 3: Determine the research rationale.

This entails identifying a clear rationale of the purpose of the study (Onwuegbuzie et al, 2012). This requires that critical decision be made in designing the study in terms of the paradigm (or paradigms) within which the research shall be conducted (Maxwell, 2012). A paradigm refers to the set of philosophical assumptions that will define the nature of the world and understanding of it that the study shall be conducted within. These are the conventions that are likely to be collectively shared by researchers operating within the same field or practice. They tend to apply specific methodologies and strategies linked to these conventions (Maxwell, 2012).

Step 4: Determine the research techniques.

This entails outlining the research techniques that will be used in the qualitative study. Techniques such as Thought Experiments, Concept Mapping and Grounded Theory could be applied. (Onwuegbuzie et al, 2012).

Step 5: Develop the appropriate research questions.

This entails developing the research questions. The research questions should be formulated once the goals and conceptual framework have been established, as research needs to be conducted to allow for a clear understanding as to the specific research questions the qualitative study wishes to investigate (Maxwell, 2012). The research questions play a central part in the qualitative research processes as they guide the study. (Onwuegbuzie et al, 2012).

During the compilation of the research questions it is imperative that the distinction between the research questions and interview questions be made, a research question identifies the concepts that a qualitative study wishes to comprehend and an interview question generates the data that is required to cognize these concepts (Maxwell, 2012). While structuring the questions one should focus their questions on process rather than variance, as variance questions attempt to measure the differences and relationships within the subject matter, while process questions establish how and why things happen, thus providing the researcher with a more comprehensive understanding (Maxwell, 2012).

4.2.1.2 Research Planning Stage

The research planning involves the definition and selection of the sampling space and the research design. This is an interactive and iterative process as the sample space influences the selection of research design (Onwuegbuzie et al, 2012).

Step 6: Design the sampling space.

The purpose of a quantitative sampling approach is to provide a representative sample of the population; this allows the results of studied population to be generalized back to the larger population. Sampling for a qualitative study can be performed by three sampling methods, convenience sampling, purposeful sampling and theoretical sampling (Marshall, 1996).

Convenience sampling is performed by selecting of the most accessible participants. This form of sampling tends to result in poor quality data and lacks intellectual credibility, thus should be avoided (Marshall, 1996).

Purposeful sampling, also known as judgment sampling is the most commonly used method of sampling in qualitative studies (Marshall, 1996). This allows for the identification of specific settings, persons, or events to be purposely selected based on the significant information they could provide (Maxwell, 2012).

The benefits of using purposeful sampling include;

- Achieving a fair representation of the settings, individuals, or activities.
- The systematic selection of small, homogeneous samples, opposed to samples of the same size where significant random or accidental variation occur, as an adequate representation of the average members of the population.
- The sufficient capturing of the heterogeneity in a population, by ensure the adequate representation of the complete series of variation, opposed to the typical members or some subset of the range.
- Selection of a choice sample to allow for the examination of specific cases that are essential to the theories the study.
- The ability to establish particular comparisons, which would provide clarification on the reasons for differences between settings or individuals.

Theoretical sampling is theory driven and the principal strategy for grounded theoretical approaches. It requires the establishment of interpretative theories from the emerging data and the selection of new samples to examine and further elaborate on those theories (Marshall, 1996).

Step 7: Determining the research design.

A successful qualitative study relies on the triangulation of its data from the assortment of sources and methods collected throughout the study (Denzin, 1970). Triangulation is a strategy that minimizes the risk of the conclusion reflecting systematic bias or limitations of a specific method, as well as allowing enhanced evaluation of the legitimacy and generality of the explanations established. This is achieved by gathering data from a wide variety of sources and methods (Maxwell, 2012).

The research design should thus be conducted by means of one or more of the following five qualitative data collection approaches: case study research, grounded

theory research, phenomenological research, ethnographic research, and narrative research (Onwuegbuzie et al, 2012).

4.2.1.3 Research Implementation Stage

The research implementation stage is conducted by means of four interactive phases, the data collection phase, the data analysis phase, the data validation phase, and the data interpretation phase (Onwuegbuzie et al, 2012).

Step 8: Data collection.

This step requires the establishment of a data collection plan, the plan will consider and understand the research situation and the sample space (Maxwell, 2012). This will allow for the successful collection of data by means of the following data collection sources; interviews, focus groups, surveys, observations, diaries, memos, permanent records, photographs, audio-visual material, pictures, paintings transcription of meetings, and field notes (Onwuegbuzie, 2012).

Step 9: Data analysis.

The process of data analysis refers to the systematic examination of the data sources gathered throughout the investigation (Bogdan & Biklen, 2003). A successful data analysis should be conducted concurrently with the data collection phase (Coffey & Atkinson, 1996), as to encourage the researcher to increasingly focus the interviews and observations on the emerging conclusions (Maxwell, 2012). The data analysis can be conducted by means of three main strategies; categorizing strategies, connecting strategies and memos and displays.

Categorising strategies are used to generate themes, theoretical concepts and organise and retrieve your data to support the general ideas that emerge within the study. In qualitative research, coding is performed by rearranging the data into categories that enable comparison between the data. These categories are established from existing theories, established during the research phase or drawn from the categories of the people studied. The categorisation of data could lead to the disregard of contextual relationships among the data and prevent researchers from using alternative ways of understanding data (Maxwell, 2012).

Connecting strategies attempt to understand the data in context, by means of various methods used to ascertain relationships between different elements within the data sources. This is achieved by using methods such as case studies, profiles, types of narrative analysis and ethnographic microanalysis and share a common

theme of looking for relationships between statements and events within a specific framework (Maxwell, 2012).

Memos and displays accomplish functions that are not directly related to data analysis, instead the strategy reflects on the methods, theory, or goals used within the investigation to support thinking in terms of relationships in the data (Miles & Huberman, 1994). The use of memos during data analysis is recommended, as they provide stimulation and capture ideas about the data. Displays serve the purpose of data reduction and present the data or analysis in a form that provides an overview of the data. Displays include matrices, tables, networks and concept maps (Maxwell, 2012).

Step 10: Legitimising the findings and interpretations.

The legitimising of the findings and interpretations is an important stage within the development of a qualitative study, as bias and variability within a qualitative study would result in the loss of credibility in the conclusions (Maxwell, 2012).

There are five methods of legitimising;

- Descriptive validity: the researcher documents the factual accuracy of the findings and interpretations.
- Interpretive validity: evaluating the researcher's interpretation that it represents the perspective of the underlying group.
- Theoretical validity, evaluating the consistency of the theoretical explanation developed from research.
- Evaluative validity, evaluation of the framework can be applied to the objects of study.
- Generalisability, evaluating the extent to which a researcher simplified the data.

Step 11: Evaluating the findings and interpretations.

The methodological accuracy of the study and the validity of the conclusions are evaluated by the following four questions used as standards for assessment of the investigation (Onwuegbuzie et al, 2012):

- Does the conclusion fall within-design consistency?
- Are chosen methods and designs suitable to adequately address the research questions?

- Are the procedures employed implemented with integrity and thus the methods capture a true representation of the sample population?
- Are the data analysis techniques suitable for addressing the research questions?

Step 12: Compile the research report.

The diagram below demonstrates how the eleven steps to designing and completing a qualitative study interrelate with each other and how the report should be structured.

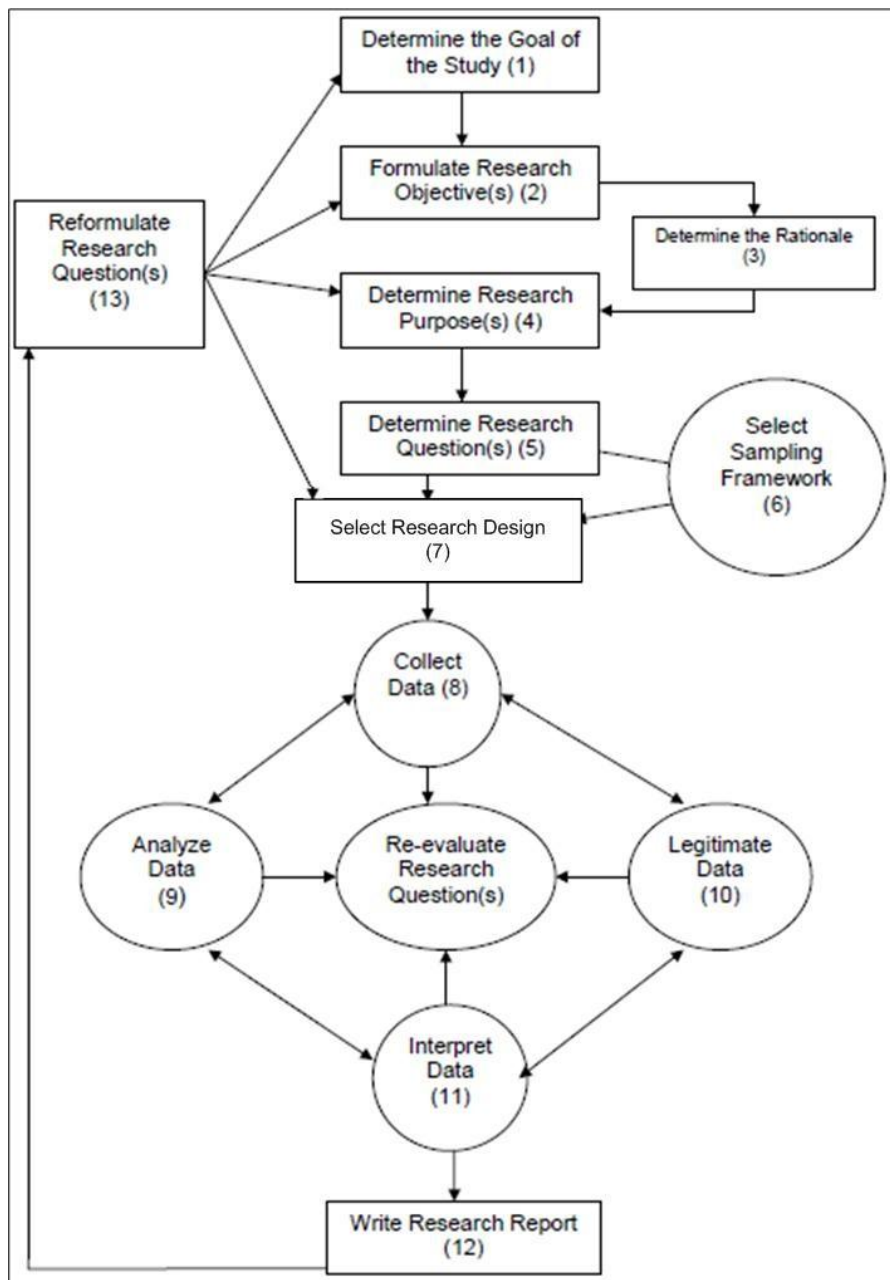


Figure 6 Twelve steps to compile a Qualitative Research Study.

Source: Exemplar for Teaching and Learning Qualitative Research (2012)

4.3 Survey

Surveys are one of the foremost techniques used to collect essential data from fields, such as sociology and economics and are a key component of social science research (Ansolabehere & Schaffner, 2011). They are a data collection tool used to collect information concerning individuals, either factual information or the opinion of that individual (Cherry, 2012).

A survey can be conducted in many ways, the most common being a structured interview or the individual completion of the survey by the participant (Cherry, 2012). There has been much advancement in the methods of surveying, due to the constant evolution due to the advancements in communication technology. This has resulted in researchers having to select the most appropriate sample selections and survey administration to produce the applicable data (Ansolabehere & Schaffner, 2011).

Surveys yield the following advantages:

- They gather ample amounts of data over a short period of time.
- They are an inexpensive data collection technique.
- They can be developed speedily and managed easily.
- They can collect a diverse range of data.

Surveys yield the following disadvantages:

- A poorly constructed survey can undermine a study.
- Poorly selected answer choices depict an inaccurate reflection of the participant's response.
- Random sampling could produce biased results.

4.4 Interview

An interview is a qualitative research technique that encompasses individual interviews with a group of respondents to gain understanding of their perspectives and ideas (Boyce & Neale, 2006). Interviews tend to be secondary tools that are used to provide understanding of the collected data as they provide an overview of the conditions surrounding the data collected. Interviews offer the primary advantage of collecting more comprehensive information compared to other forms of data collection methods. However, there are disadvantages to interviews, such as;

- They tend to be biased, as a participant may wish to skew data.
- They can be time and labour intensive.
- An interview cannot be generalised.

To successfully conduct an interview, one should avoid techniques such as the use of yes/no questions, questions that lead the participant to a certain answer, using inappropriate body language and voicing one personal opinions (Boyce & Neale, 2006).

When conducting an interview the following steps should be applied;

Plan

Planning the interview involves identifying the stakeholders within the project, what information needs to be extracted and from whom and ensuring the research follows the international and national ethical research standards (Boyce & Neale, 2006).

Develop Interview Protocol

Developing an interview protocol defines the guidelines that will direct the government and execution of the interviews. An interview should consist of no more than 15 main questions (Boyce & Neale, 2006).

Train Data Collectors

Identify and train interviewers in terms of the evaluation objectives, data collection techniques, interviewing and interpersonal communication and an overview of ethical issues (Boyce & Neale, 2006).

Collect Data

This involves setting up the interviews with the participants, seeking informed consent of the interviewee and conducting the interview (Boyce & Neale, 2006).

Analyse Data

Analysing the data collected from the interviews requires the researcher to look for patterns and identify the responses given with enthusiasm, opposed replies answered in only a few words, as these will provide more insight in to the investigation (Boyce & Neale, 2006)

Disseminate Findings

Writing the report and providing feed back to the stakeholders and community (Boyce & Neale, 2006).

Chapter Five: Literature Study on Supply Chain Maturity

Assessment Models

The purpose of maturity models is to provide an organisation with an understanding of the maturity of their supply chain operations and to allow organisations to benchmark and enhance their business performance. This is achieved by evaluating their supply chains by means of a variety of assessment techniques. There are assortments of maturity assessment models available and for the purpose of this investigation the following three have been selected.

5.1 SCM Maturity Model

The SCM maturity model was developed to assess a supply chain's lifecycle by means of explicitly defining, managing, measuring and controlling the supply chain and is one of the most commonly used maturity assessment models. This model provides an organisation with the overall supply chain performance and leads to possible stimulation of growth within process capability and consistency across the entire organisation (Dorfman and Thayer, 1997). This SCM maturity model needs to be conducted over an extended period of time but provides a reliable maturity assessment. The SCM maturity model is based on the BPO maturity model and further developed to incorporate the SCOR framework, by doing so the SCM maturity model has a holistic view of the organisations and an in depth performance metric analysis.

BPO stands for Business Process Orientation and the purpose of this maturity model is to improve an organisation's performance by adopting a 'process view' of the organisation. BPO's key areas of focus are (Lockamy III & McCormack, 2004);

Process management and measurement – this is measuring the processes in terms of the output quality, cycle time, process cost and variability within the process.

Process jobs – focusing the jobs on the process rather than the functions required, as well as encouraging cross-functional responsibility.

Process view – developing a cross-functional process, that allows for horizontal integration and focus on elements such as structure, measurement, ownership and customers.

The above mentioned key areas of focus are then used to place an organisation within one of the following five process maturity levels; Ad Hoc being the lowest

level of maturity, Defined, Linked , Integrated and Extended as the highest level of process maturity (Lockamy III & McCormack, 2004).

The latest SCOR V10.0 framework, as explained above, was combined with the BPO maturity model as it conceptualise the supply chain management maturity model, due to its process orientation and extensive implementation throughout the supply chain community. This integration resulted in well-rounded evaluation of a supply chains maturity as the SCOR models performance metrics provide a sound representation of the supply chains maturity.

5.2 SCMAT

The Supply Chain Maturity Assessment Test (SCMAT) aims to serve the purpose of a quick maturity assessment model that is used to map organisations current supply chain state at a strategic and operational level, as well as identify areas of possible improvement within that supply chain (Netland & Alfnes, 2011). The SCMAT V8.0 is currently the latest version available and has been developed to evaluate a supply chain in terms of the current best practices, being implemented within supply chain operations (Netland & Alfnes, 2008). These best practices were selected from a variety of best practice collections that have been established by a multitude of frameworks and organisations, such as SCOR and the Best Manufacturing Practices Centre of Excellence (BMPCOE).

As best practices exist on different levels and in a variety of forms, studies were done to establish the 48 most relevant and most agreed upon best practices in the current supply chain environment (Netland et al, 2007) These best practices have been refined and classified within the seven object classifications of Strategy, Control, Processes, Resources, Materials, Information and Organisation.

The SCMAT analysis can be performed in under an hour as the 48 best practices are ranked in terms of maturity level, a ranking of 1 being the lowest and level 5 being the highest. These results are then evaluated in terms of strategic trade-offs and improvement potential. The SCMAT analysis does not give answers; instead it poses more questions (Netland & Alfnes, 2011). The strength of the SCMAT analysis lies within the fact that it is quick and easy to complete but it requires a contextual background of the best practices, as well an understanding of the organisation to provide the participant with an overall maturity assessment of the organisations supply chain (Netland & Alfnes, 2011).

5.3 Arcs of Integration

The arcs of integration can be used to perform a maturity assessment on an organisations supply chains. As discussed earlier in this investigation the concept was developed in 2001, where it was established that supply chain integration could be categorised into five alternative arcs (Frohlich & Westbrook, 2001). These arcs are defined by the amount of integration between the supplier, manufacturer and customer, by means of ranking them in terms of the incorporation into planning and execution activities within the supply chain.

This method of evaluation requires an extended period of time to conduct the evaluation and does not incorporate the latest best practices and the performance evaluation is subject, thus not providing a true representation of the supply chain maturity.

5.4 Supply Chain Maturity Assessment Models Comparison

The purpose of the supply chain maturity assessment model comparison is to compare the three assessment models against each other by means of their strengths and weaknesses. This will provide insight into which model would best suit the investigations needs to establish the current state of ISCM within South African organisations and the best practices they are currently applying.

Table 2 Supply Chain Maturity Assessment Models Comparison.

	Strengths	Weaknesses
SCM maturity analysis	Provides an in depth analysis of the entire SC. Reliable Metrics to evaluate against industry leaders.	Requires large amounts of time and information to complete.
SCMAT	Simple. Quick. Qualitative answers. Allows for triangulation of answers. Generic to any industry.	Best practices are forever changing. Not Quantitative data. Data could be skewed.
Arcs of integration	Evaluate integration across SC. Has a performance evaluation.	Subjective evaluation. Does not perform an in depth analysis. Requires large amounts of time and information to complete.

The aim of this investigation is to determine the current status and role of Integrated Supply Chain Management within South African organisations and to establish the gaps and best practices required improving the current status thereof, thus the SCMAT analysis best suits this investigation. This is based on the fact that it is a quick and simple evaluation that can be completed in a survey format and it will provide us with a broad overview of an organisations supply chain, as well as the best practice techniques that are currently being implemented. The information gathered from the SCMAT analysis will then be contextualised by further interviews with the organisations and research, which will provide us with a means of legitimising the data and ensuring triangulation within the investigation.

Chapter Six: Research Design

6.1 Research Formulation Phase

The research formulation phase as described earlier in the literature review sets out to outline the research area within which the qualitative study shall be conducted.

6.1.1 Research rationale

The purpose of this investigation is to determine the current status and role of Integrated Supply Chain Management (ISCM) within South African organisations, considering the current level of awareness and key transformation initiatives amongst Supply Chain leaders and to identify the gaps and opportunities for an increased integrative and strategic role within organisations. The investigation will be conducted within the frame of large South African Organisations that acknowledge and concentrate on their supply chains.

6.1.2 Research techniques

The investigation will be conducted by means of the following techniques;

1. Developing a contextual understanding and knowledge of ISCM, current issues ISCM faces within a South African context and the key transformation drivers and best practices currently being implemented within ISCM.
2. Conducting an online survey, by means of a SCMAT analysis on the chosen sample space.
3. Conducting electronic based interviews with the participants to gain further insight into the organisations supply chains and correlate findings.

6.1.3 Research question

The research question for this investigation is: "What is the current status and role of integrated supply chain management (ISCM) within South African organisations?"

Sub-Questions

1. What are the transformation initiatives being applied by South African Organisations?
2. What are the major gaps between the current status of integrated supply chain management within South African organisations and the best practices?

6.2 Research Planning Phase

The research planning phase as described earlier within the Literature study entails defining and selecting the sampling space and establishing the research design.

6.2.1 Sampling space

The selected sample space has been chosen by means of purposeful sampling, to provide a representative sample of the current supply chain industry population within South Africa. This sample has been chosen based on the need for an overall view of the current supply chain perspective across industries and was selected based on the following attributes:

- JSE listed organisation or Private Companies – This would focus the investigation on large organisations that would have complex supply chains, which require management.
- Organisations that participate in the Manufacturing, Retail or Mining sector and provide Consumables, Industrial products/ feedstock's and Semi-durables/durables products – This would focus the study and allow for comparison among similar organisations.
- Operate within the South African market – As this investigation is specifically based on South African organisations, each participant must have a South African management division and its supply chain must operate within and provide to the South African market.

The above mentioned sample space attributes shall ensure a fair representation of the general population and capture sufficient heterogeneity within the sample. The selected sample would allow for particular comparison and evaluation of the data and the sample size requires that 30 or more participants take part within this investigation, to ensure viability within the investigation.

6.2.1.1 Participants

The following organisations participated in the investigation. They were classified into the following groups for analysis purposes and can be found in Table 3 below. The groups were allocated based on the role they play in industry and the type of product they produce. The three roles are Manufacturing, Retail and Mining and the three types of products are consumables, industrial products/ feedstocks and semi-durables/durables.

Table 3 Respondents Product types and Role Player Placements.

	Consumables	Industrial Products/ Feedstock's	Semi- durables/Durables
Manufacturing	Distell LTD Astral Foods Poultry Division Amka Products (Pty) Ltd Nestle Tiger Brands Clover McCain Foods SA Kraft Foods National Brands SAB	Safripol Afrox Shell PG group Nampak Ltd Sappi Paper & Paper Packaging Sasol PPG Industries AfriSam (South Africa) (Pty) Ltd.	
Retailer	Bytes Document Solutions Pick n Pay Woolworths		Dawn Ltd Stuttafords Kia Motors TFG Pep JD Group Nike South Africa
Mining		Anglo American Platinum Exxaro Resources Ltd	

Figure 7 below depicts the industry and product distribution in the sample. The largest industry and product sample space is that of manufacturing consumables and the smallest sample space is the Mining sector.

Industry and product distribution within the sample

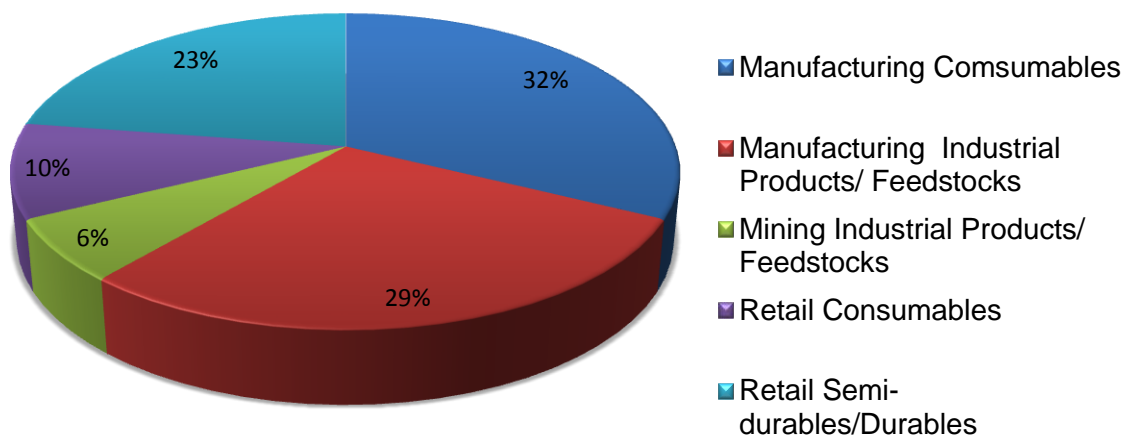


Figure 7 The industry and product distribution within the sample.

6.2.2 Research design

The research design consists of the three different forms of data, being the contextual research, SA ISCM survey and the follow up electronic based interviews and these three forms of data shall ensure triangulation within the data and results.

Contextual Research

The contextual research consists of the research conducted within the Literature Review to establish a contextual understanding and knowledge of ISCM, current issues ISCM faces within a South African context and the key transformation drivers and best practices currently being implemented within ISCM.

SA ISCM Survey

The SA ISCM survey, found in Appendix B, was aligned with the pre-existing SCMAT v.8.0 test sheet extracted from 'A practical tool for supply chain improvement – experiences with the supply chain maturity assessment test (SCMAT)', by Netland, T.H. and Alfnes, E. The SA ISCM survey serves the purpose of establishing the current state of each participants supply chain and the best practice techniques that are currently being implemented. A description of each best practice technique can be found in Appendix A.

Follow up Interviews

Each follow up interview shall be designed specific to the participant's responses and contextual research gathered and shall be conducted by means of email. The interview serves the purpose of reviewing the consistency and accuracy within the provided answers, enquiring on noted trends and answers and further investigating results found with regard to both the individual data and the group data.

6.3 Research Implementation Stage

The research implementation stage as described earlier in the literature review sets out to collect, analyse, validate and interpret the data.

6.3.1 Data collection

The data collection of the three forms of data shall be conducted by the following means:

Contextual Data

The contextual data shall be collected by means of the Literature Study.

SA ISCM Survey

The SA ISCM survey data shall be collected through the medium of an online survey. The survey shall be distributed by means of email and accessed by a web link provided by Survey Monkey. Survey Monkey is a web-based survey provider, which collects survey responses and provides the data to the survey designer.

Follow up Interview

The follow up interviews will be conducted after the analysis of the SA ISCM surveys has been performed, for the purpose of this investigation this shall be conducted by means of a structured personalised email sent to each participant to verify their data and the findings of the investigation, as well as provide any experiences they had had in terms of the findings.

6.3.2 Data analysis

The data analysis shall be performed by means of categorizing strategies and connecting strategies, as explained in the Literature Study. The data shall be evaluated by the following methods;

1. Statistical Analysis- The collected data shall be evaluated in terms of the mean and standard deviation of each best practice, category, industry and overall data.
2. Combined Analysis – The statistical results shall be evaluated with the contextual data and follow up interview data acquired by means of connecting strategies. This shall provide analysis of the data in terms of the relationships between best practices, categories and industries.

6.3.3 Data legitimising of findings and interpretations

The results and findings shall be legitimised by means of performing a descriptive validity evaluation, where the factual accuracy of results shall be checked and a Theoretical validity evaluation, where all theoretical explanations and theories developed there on shall be evaluated in terms of consistency with the data.

Chapter Seven: Survey Results

The following results were found by evaluating of the 31 survey responses, as a group and across the three prescribed sectors. These sectors comprised of 10 respondents from the Retail sector, 19 respondents from the Manufacturing sector and 2 respondents from the Mining sector.

7.1 The Overall Results

The following results were found when analysing the 31 responses as a group. Table 4 comprises of the top ten highest ranked best practices and Table 5 comprises of the ten lowest ranked best practices.

Table 4 The ten highest overall ranked best practices.

Top Ten Highest Ranking	Type of Best Practice	Best Practice	Average Implementation Ranking	Standard Deviation
1	Strategy	Aligned strategy	4.19	0.79
2	Control	Supply Chain Coordination	4.19	0.95
3	Strategy	Customer focus	4.06	1.00
4	Control	Aligned PMS	4.03	1.22
5	Control	Balanced KPIs	4.00	1.11
6	Strategy	HSE&CSR	3.94	1.01
7	Strategy	Supply Chain Strategy	3.90	1.03
8	Resources	Utilisation of tangibles	3.87	0.82
9	Materials	Material Flow	3.87	0.73
10	Processes	Continuous improvement	3.84	0.79

Table 5 The ten lowest ranked overall best practices.

Top Ten Lowest Ranking	Type of Best Practice	Best Practice	Average Implementation Ranking	Standard Deviation
1	Control	Mass Customisation	2.45	0.89
2	Information	Virtual networks	2.48	1.01
3	Materials	Modularised products	2.65	1.25
4	Information	Track & Trace technologies	2.74	1.34
5	Information	ICT integration	2.77	1.17
6	Information	ITC strategy	2.81	1.10

7	Materials	Minimised inventories	2.84	0.87
8	Strategy	Aligned incentives	2.87	1.13
9	Information	Supply Chain transparency	2.97	1.17
10	Information	Information visualisation	3.03	1.17

Table 6 below shows how each best practice category scored overall, as well as any noteworthy trends or findings. The following abbreviations have been used in the table below; BP - Best Practice, OC -The Overall Category maturity average and STD- Standard deviation.

Table 6 The overall findings per best practice category.

Category	Best Practice	Ranking	Average Value	STD	Observation
Strategy	Aligned strategy	Highest	4.19	0.79	Highest BP
	Aligned incentives	Lowest	2.87	1.13	8 th Lowest Overall
	Aligned roles	2 nd Lowest	3.94	0.93	
		OC average	3.64	0.71	Highest OC
		Range	1.32		
Control	Supply Chain Coordination	Highest	4.19	0.95	1 st and 2 ND differ by STD of 0.04
	Aligned PMS	2 nd Highest	4.03	1.22	
	Mass Customisation	Lowest	2.45	0.93	Lowest Overall
		OC average	3.57	0.93	
		Range	1.74		Largest Range
Processes	Continuous improvement	Highest	3.84	0.78	
	Ordering seamlessness	2 nd Highest	3.61	1.09	
	Standardised processes	Lowest	3.13	1.12	
	Customer diversification	2 nd Lowest	3.32	1.14	
		OC average	3.46	0.95	
	Range	0.71		Small Range	
Resources	Utilisation of tangibles	Highest	3.87	0.81	
	Core competence focus	2 nd Highest	3.65	1.08	
	Technology leadership	Lowest	3.26	1.06	
	Agility	2 nd Lowest	3.32	0.99	29 th over all

		OC average	3.52	0.67	
		Range	0.61		Small Range
Materials	Material Flow	Highest	3.87	0.73	Smallest STD
	Optimised distribution	2 nd Highest	3.65	0.95	
	Modularised products	Lowest	2.65	1.25	
	Minimised inventories	2 nd Lowest	2.84	0.86	
		OC average	3.33	0.58	
		Range	1.23		
Information	Real time information	Highest	3.26	0.82	
	Information dashboards	2 nd Highest	3.10	1.11	
	Virtual networks	Lowest	2.48	1.00	2 nd Lowest BP
	Track & Trace technologies	2 nd Lowest	2.74	1.34	
		OC average	2.90	0.87	Lowest OC
		Range	0.77		Small Range
Organisation	Fellow Feeling	Highest	3.61	1.15	
	Best in Class people	2 nd Highest	3.32	0.91	
	Knowledge Level	Lowest	3.06	0.81	
		OC average	3.32	0.68	
		Range	0.55		Smallest Range

Upon evaluation it was established that the current overall average implementation ranking within South African organisations was 3.39, with a standard deviation of 0.66. This means that South African organisations are sometimes or partially managing to implement most best practices.

In Figure 9 below, the radar diagram depicts the overall best practice implementation of South African organisations and how the current emphasis and deployment of these best practices are being applied.

Overall Supply Chain Maturity within South African Organisations

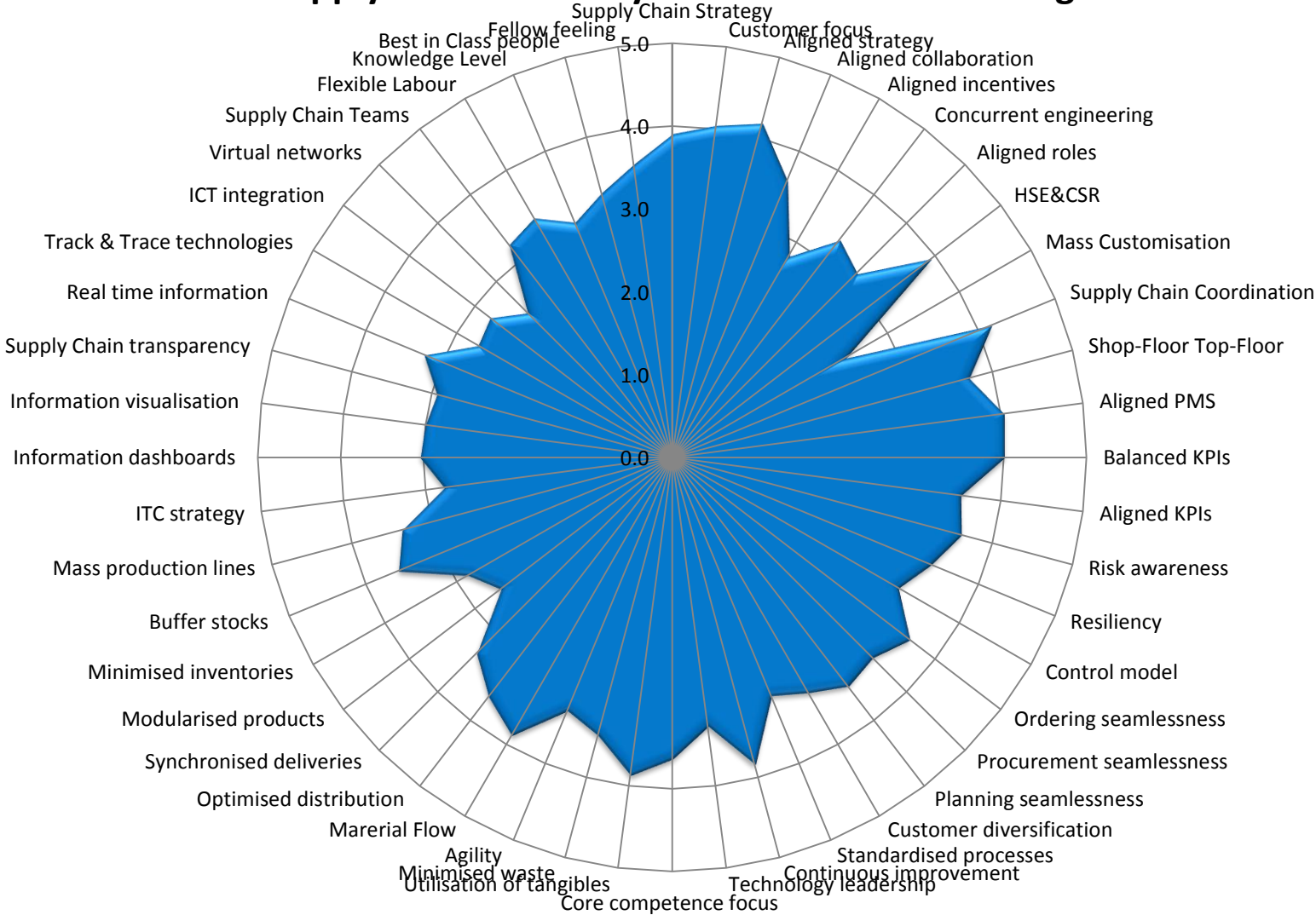


Figure 8 The overall supply chain maturity of South African organisations.

7.2 Retail Sector

The retail sector consisted of 10 respondents, of which 3 were in the consumables value chains and 7 with the semi-durables/ durable value chain. Table 7 below shows the five highest ranking best practices and the two lowest ranking best practices in the retail sector, Table 8 displays the category scores for the retail sector and Table 9 shows the ranking percentile distributions for the retail sector.

Table 7 The five highest ranking and two lowest ranking best practices in the Retail sector.

Category	Best Practice	Ranking	Average Value	Standard Deviation
Strategy	Aligned strategy	1 st	4.50	0.85
Control	Balanced KPIs	2 nd	4.40	0.97
Control	Aligned PMS	3 rd	4.20	1.14
Strategy	Customer focus	3 rd	4.20	1.14
Organisation	Fellow feeling	5 th	4.10	0.74
Materials	Modularised products	47 th	2.50	1.08
Information	Virtual networks	48 th	2.40	1.07

Table 8 The category scores for the retail sector.

Category	Retail Sector Category Average
Control	3.71
Strategy	3.69
Resources	3.42
Organisation	3.68
Processes	3.19
Materials	2.98
Information	3.50

Table 9 The retail sector ranking distribution percentiles.

Ranking	Percentage (%)	Percentage found above Ranking
1 - Never or does not exist	6	
2 - Sometimes or to some extent	17	
3 - Frequently or partly exist	26	78
4 - Mostly or often exist	29	51
5 - Always or definitely exist	22	22

In Figure 10 below, the radar diagram depicts the best practice implementation of South African organisations in the Retail sector.

The supply chain maturity in the Retail Sector

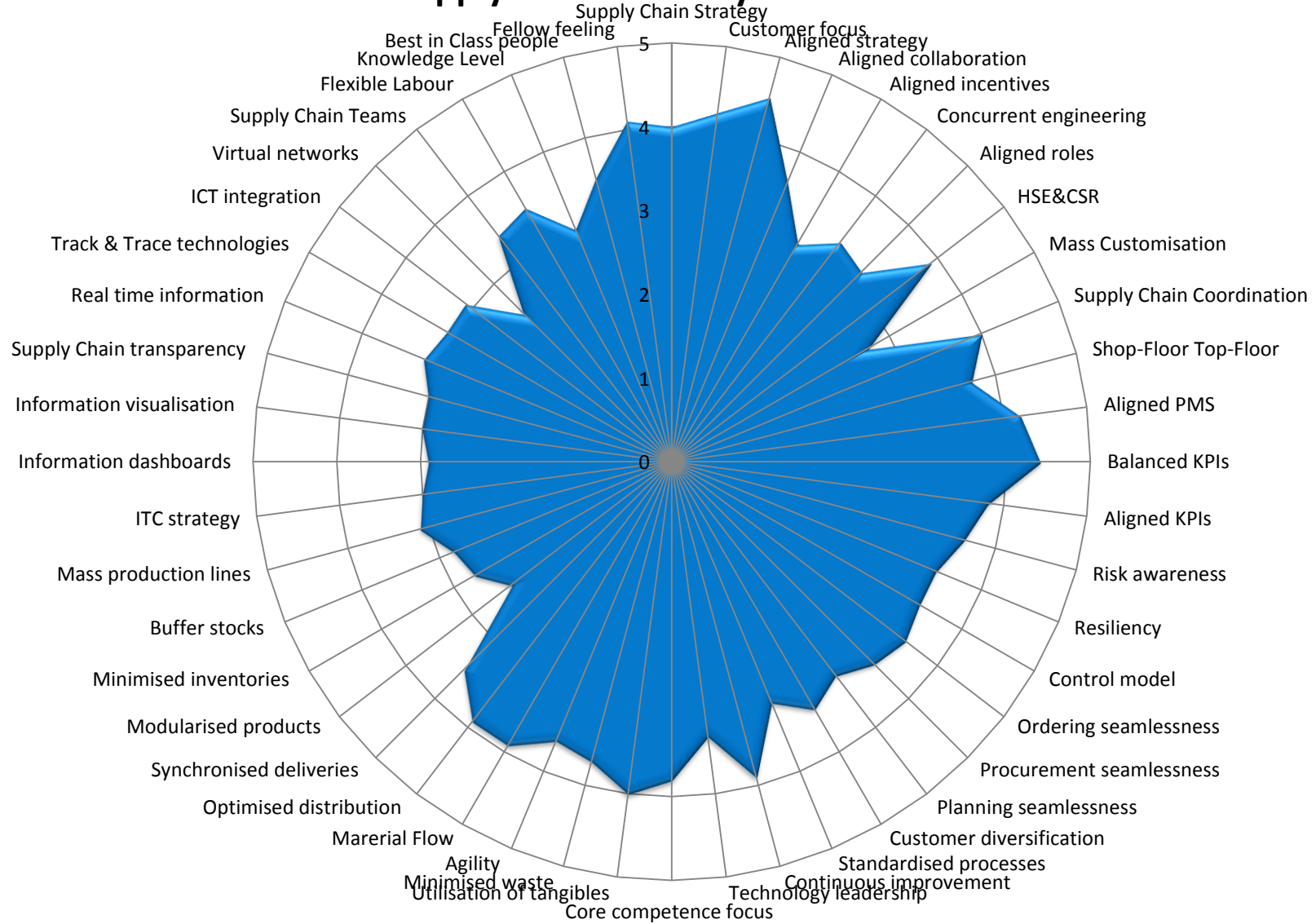


Figure 9 The supply chain maturity of South African Organisations in the Retail Sector.

The Consumable Retail sector compared to the Overall Retail Sector

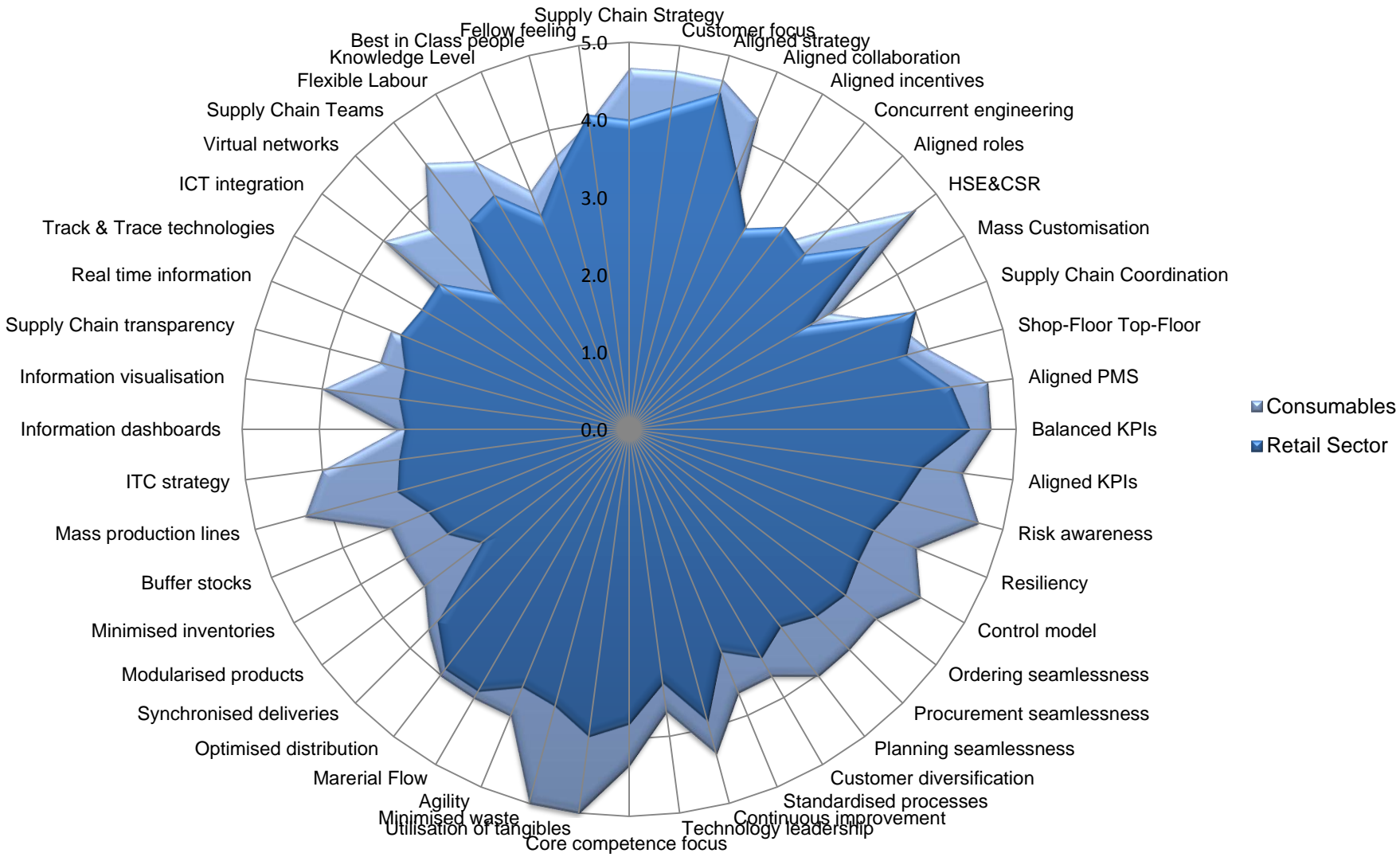


Figure 10 The Consumable Retail sector compared to the Overall Retail Sector.

The Semi- Durables/ Durables Retail sector vs the Overall Retail Sector

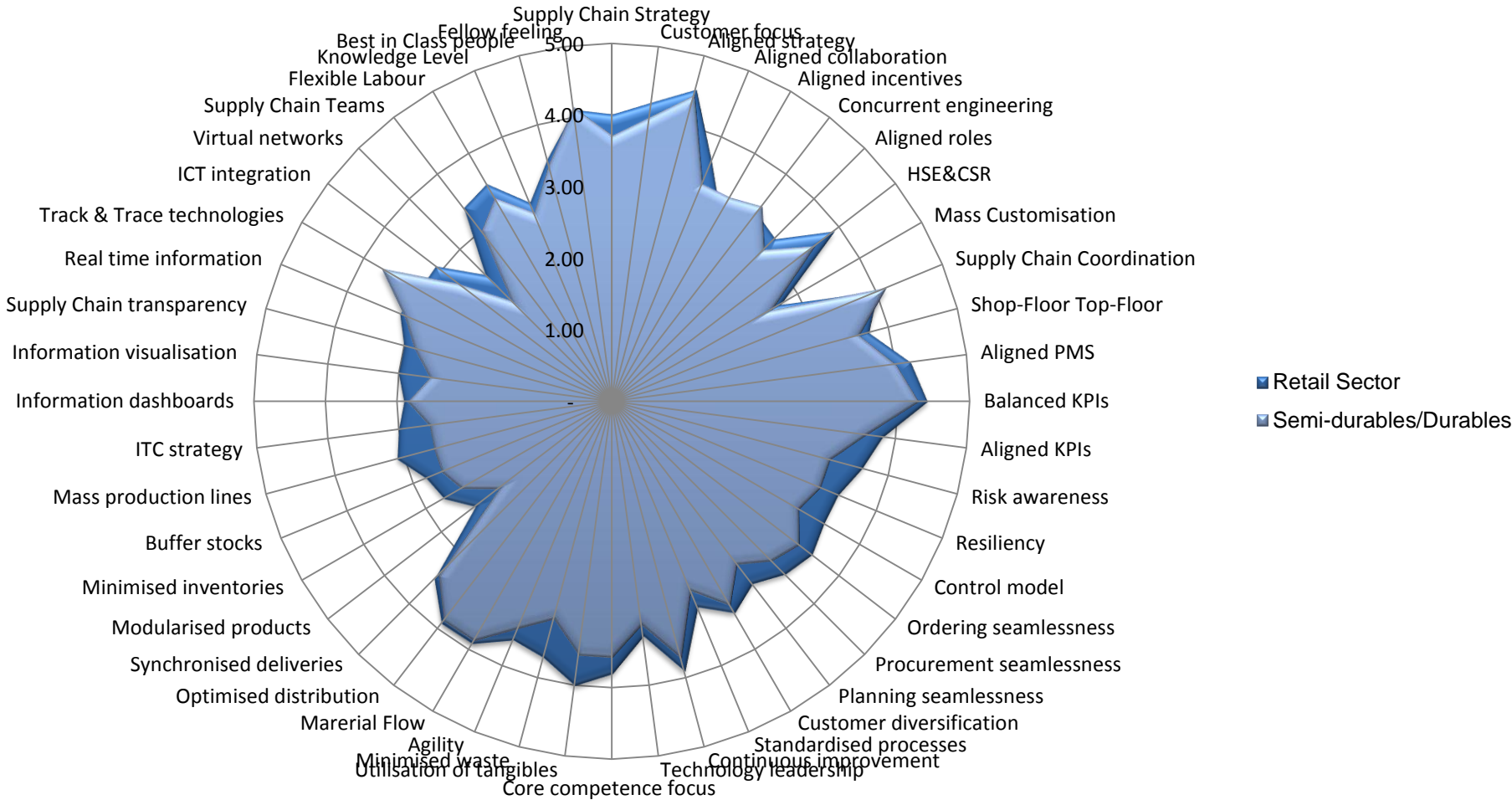


Figure 11 The Semi-Durables/ Durables Retail sector compared to the Overall Retail Sector.

7.3 Manufacturing Sector

The manufacturing sector consisted of 19 respondents, of which 10 were in the consumables value chains and 9 with the Industrial Products/Feedstock's value chain. Table 10 below shows the five highest ranking best practices and the two lowest ranking best practices in the manufacturing sector, Table 11 displays the category scores for the manufacturing sector and Table 12 shows the ranking percentile distributions for the manufacturing sector.

Table 10 The five highest ranking and two lowest ranking best practices in the Manufacturing sector.

Category	Best Practice	Ranking	Average Value	Standard Deviation
Control	Supply Chain Coordination	1st	4.37	0.83
Strategy	Aligned strategy	2nd	4.05	0.78
Strategy	Customer focus	3rd	4.05	0.85
Control	Aligned PMS	4th	4.05	1.08
Strategy	HSE&CSR	5th	4.00	0.88
Information	Virtual networks	47th	2.47	0.90
Control	Mass Customisation	48th	2.37	0.96

Table 11 The category scores for the manufacturing sector.

Category	The Manufacturing sector Category Average
Control	3.58
Strategy	3.59
Resources	3.45
Organisation	3.42
Processes	2.86
Materials	3.28
Information	3.58

Table 12 The manufacturing sector ranking distribution percentiles.

Ranking	Percentage (%)	Percentage found above Ranking
1 - Never or does not exist	4	
2 - Sometimes or to some extent	18	
3 - Frequently or partly exist	29	79
4 - Mostly or often exist	35	50
5 - Always or definitely exist	15	15

In Figure 13 below, the radar diagram depicts the best practice implementation of South African organisations in the Manufacturing sector.

The supply chain maturity in the Manufacturing Sector

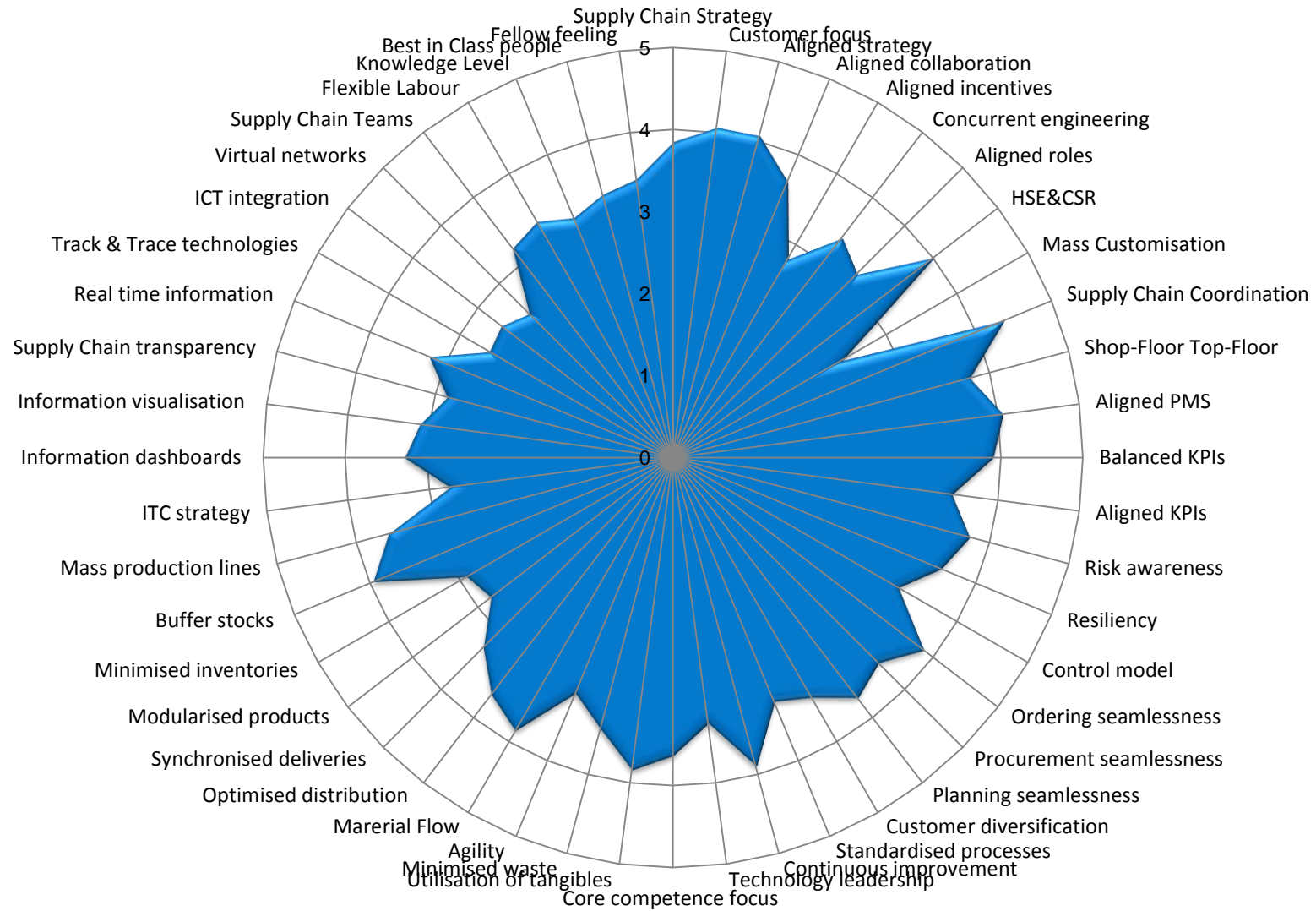


Figure 12 The supply chain maturity of South African Organisations in the Manufacturing Sector.

The Consumable Manufacturing sector compared to the Overall Manufacturing Sector

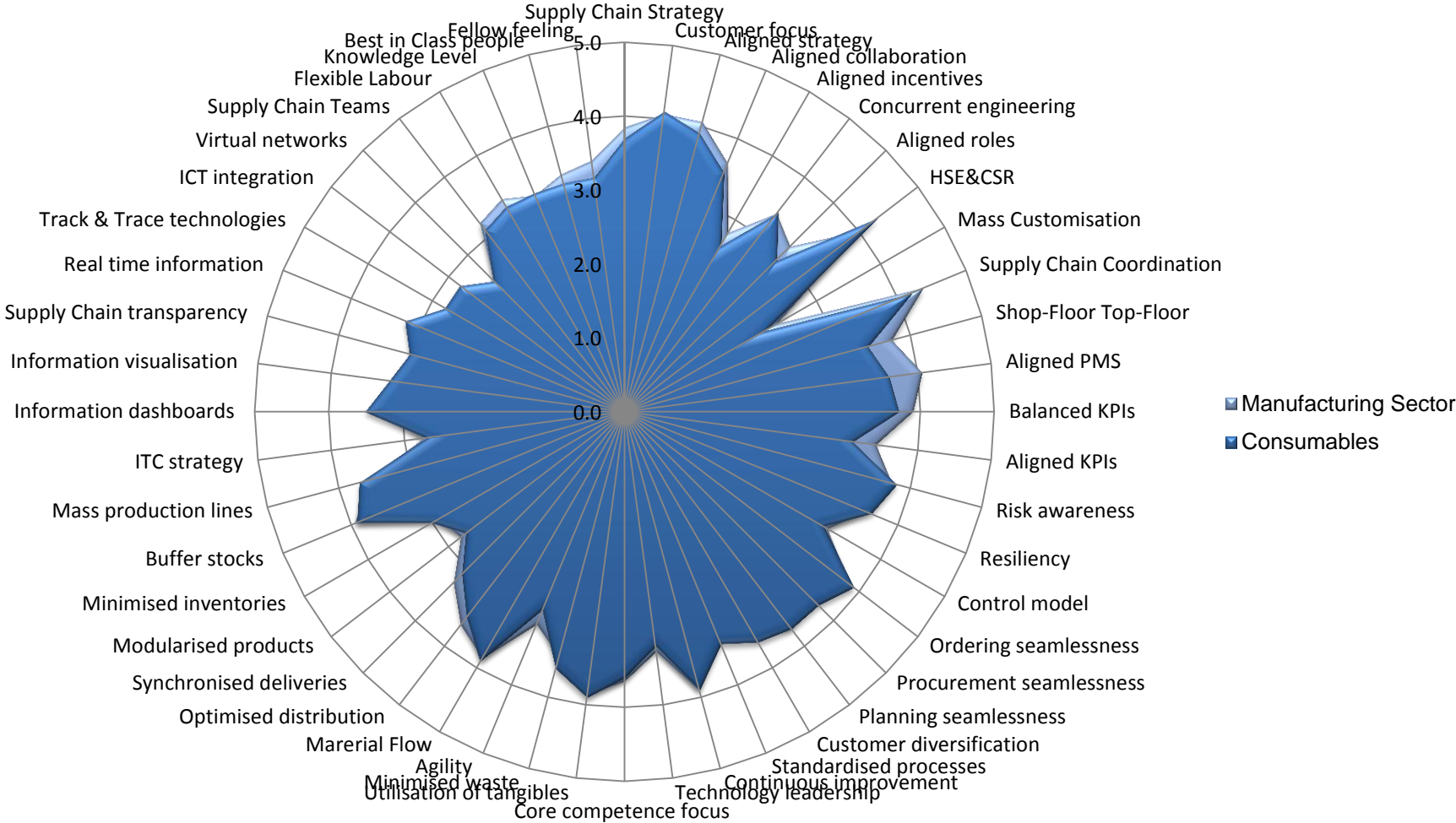


Figure 13 The Consumable Manufacturing sector compared to the Overall Manufacturing Sector.

The Industrial Products/ Feedstocks Manufacturing sector compared to the Overall Manufacturing Sector

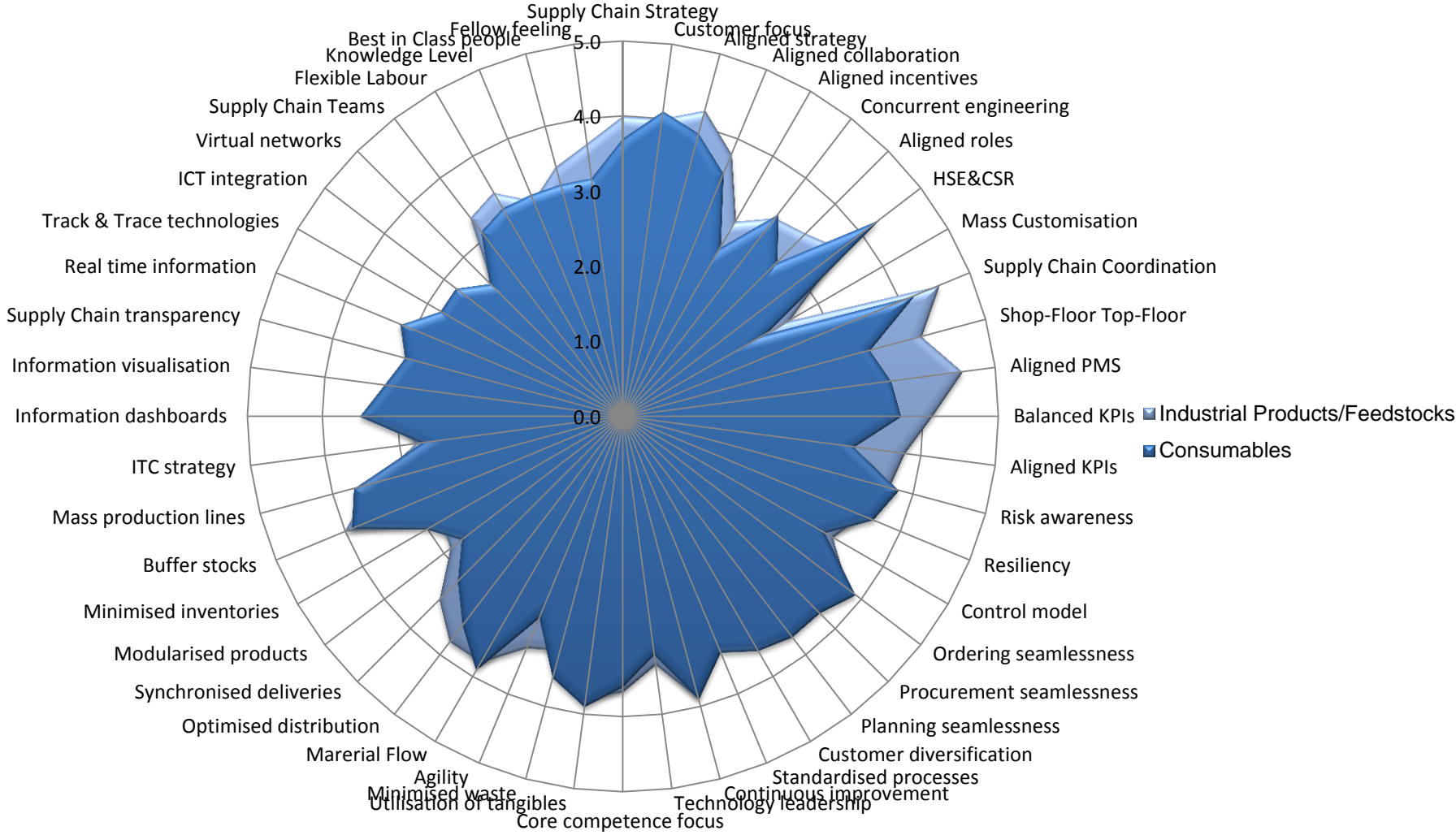


Figure 14 Industrial Products/ Feedstock’s manufacturing sector compared to the overall manufacturing Sector.

7.4 Mining Sector

The mining sector consisted of 2 respondents. Table 13 below shows the five highest ranking best practices and the two lowest ranking best practices in the mining sector, Table 14 displays the category scores for the mining sector and Table 15 shows the ranking percentile distributions for the mining sector.

Table 13 The five highest ranking and two lowest ranking best practices in the mining sector.

Category	Best Practice	Ranking	Average Value	Standard Deviation
Strategy	Aligned strategy	1st	4	0
Strategy	Aligned collaboration	1st	4	0
Resources	Agility	1st	4	0
Materials	Material Flow	1st	4	0
Information	Supply Chain transparency	1st	4	0
Information	Real time information	1st	4	0
Strategy	Supply Chain Strategy	2nd	4	1.4

Table 14 The category scores for the mining sector.

Category	The Mining sector Category Average
Control	3.5
Strategy	2.9
Resources	2.5
Organisation	3.3
Processes	3.2
Materials	2.9
Information	2.8

Table 15 The mining sector ranking distribution percentiles.

Ranking	Percentage (%)	Percentage found above Ranking
1 - Never or does not exist	23	
2 - Sometimes or to some extent	15	
3 - Frequently or partly exist	9	63
4 - Mostly or often exist	45	53
5 - Always or definitely exist	8	8

In Figure 16 below, the radar diagram depicts the best practice implementation of South African organisations in the mining sector.

The supply chain maturity in the Mining Sector

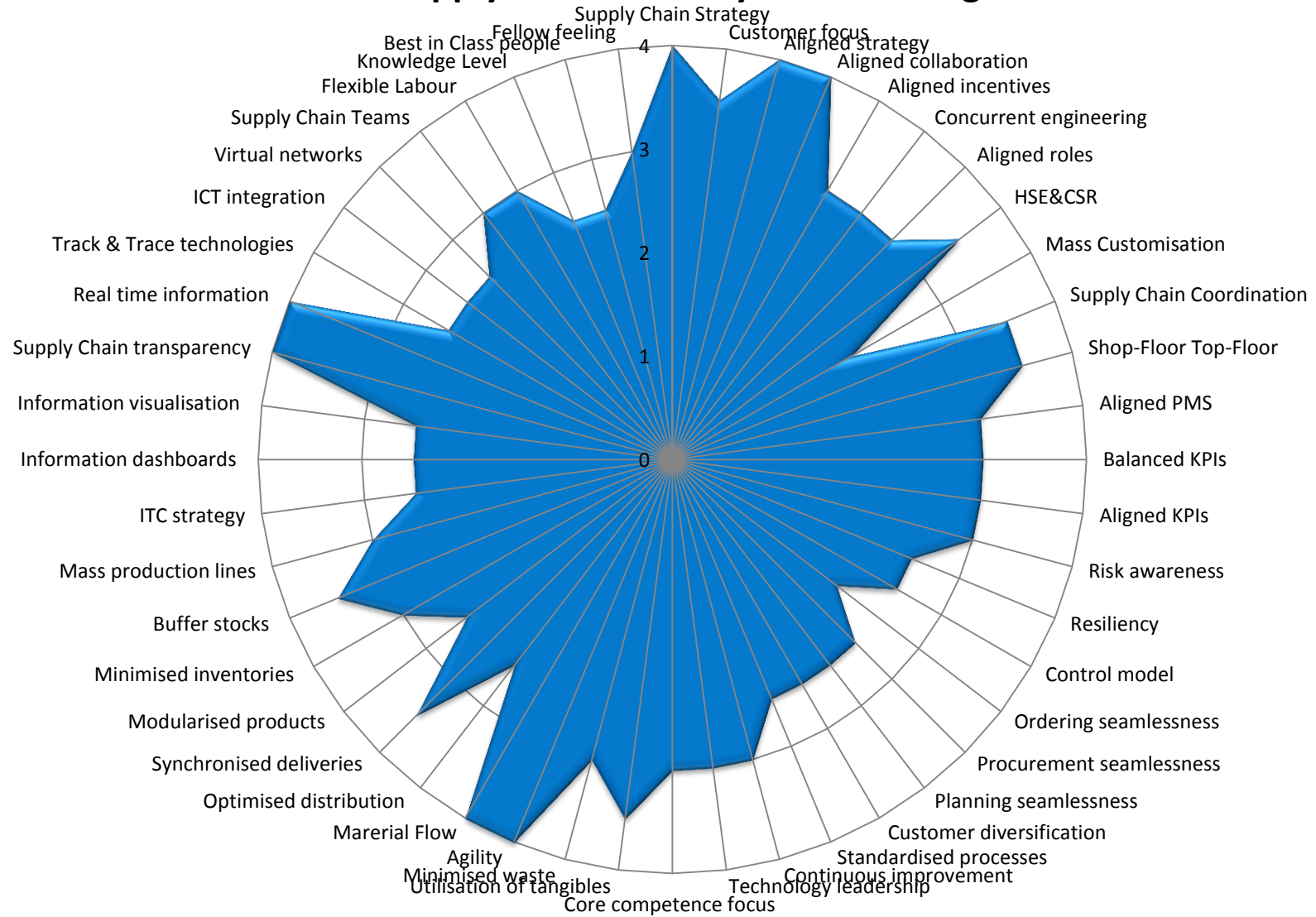


Figure 15 The supply chain maturity of South African Organisations in the Mining Sector.

Chapter Eight: Findings on the role of ISCM

8.1 Current status and role of ISCM South Africa.

The following findings were established regarding the current status and role of integrated supply chain management (ISCM) within South African organisations.

1. Role players in the consumables value chain exhibit a significantly higher level of maturity than role players in other value chains

Within the survey sample, organisations that operate within the consumable products industry have a 62% maturity percentage compared to organisations that operate within the non-consumables industry, such as the semi-durable and durables and industrial products/feedstock's with a 44% maturity percentage. This reveals that the consumables industry is more likely to have a mature supply chain, than role players operating within other industries.

2. South African organisations are aligning their supply chain strategies with the broader organisational strategy

It was found that South African organisation's chose to align their supply chain strategies with the organisation's overall strategy, as this strategy ranks the highest, with a low standard deviation of 0.79. 84% of the participants indicated that they mostly or always fully implement this best practice strategy, opposed to only one of the participants stating that they implement an aligned strategy to some extent. It was also found that Retail organisations scored a high average of 4.5, indicating emphasis on successfully aligning strategies.

3. Lack of implementation of information management best practices within South African supply chains

Information best practices scored the lowest overall within South African organisations, with an overall average maturity rating of 2.90 out of 5, with a standard deviation of 0.87. Six of the eight information techniques were within the top ten lowest ranking best practices. This reveals that information best practices are not generally held in high regard within South African supply chains. As established in the literature study, many of the key frameworks available for ISCM rely heavily on the use of information best practices to monitor and successfully integrate a supply chain and thus South African supply chains seem to be impairing their supply chain capabilities.

4. South African organisations recognise the importance of being customer focused

The investigation revealed that South African supply chains, across all role player sectors, have chosen to design their supply chains to be customer focused. This is evident from the implementation of a customer focused strategy ranking third overall within the study, with an average mean of 4.03 and a standard deviation of 1.00. The larger standard deviation reveals that South African organisations are attempting to design and managed their supply chains to be customer focused, but there is significant variation in the implementation and success thereof. 70% of the supply chains mostly or always fully implement this best practice strategy, while 27% of the supply chains partially implemented this strategy. Customer focus is an essential driver for a successful supply chain and this is a positive indicator of supply chain best practice implementation within South African organisations.

5. South African organisations have yet to realise the benefits of collaborating with supply chain partners

The best practice strategy of aligned incentives ranked 41st overall and 46% of the participating organisations never or sometimes collaborated with their supply chain partners, while 46% of South African supply chains are partially managing to successfully collaborate and fully utilise aligned incentives within their supply chains. Aligned incentives and aligned roles, are best practices strategies that concurrently work together within a successful supply chain management strategy and it was found that both strategies ranked in the lower quartiles of the study. This indicates that there is gap between the knowledge of supply chain management and the successful implementation of supply chain collaboration strategies within South African organisations.

6. Planning, forecasting and replenishment strategies are the backbone of South African supply chains

The investigation revealed that South African organisations place great importance on the implementation and successful management of supply chain coordination control methods, in terms of planning, forecasting and replenishment, as Supply Chain Coordination ranked 2nd highest overall with a mean of 4.19 and a standard deviation of 0.95. The effective use of supply chain coordination control methods can particularly be noted by the role players within the Manufacturing sector.

7. South African organisations are not placing emphasis on designing agility into their supply chains

The investigation revealed that South African organisations on average are not placing emphasis on designing agility into their supply chains, as agility ranked 29th overall, with a mean of 3.32 and a standard deviation of 0.98 within the total sample. This is supported by the observation of a large distribution across the implementation ratings in the Retail sector, where 50% of the participants barely or partially implemented the best practice and 50% of the participants frequently or mostly implemented the best practice. Furthermore it was found that 68% of the Manufacturing role players barely or partially implemented this best practice.

8. Minimal emphasis is placed on minimising inventory within South African supply chains

Overall minimised inventory scored very low throughout the investigation, by being ranked 43rd within the overall investigation, with a mean of 2.84 and a standard deviation of 0.86. It was found that the lack of implementation did not differ between role players, though the manufacturing and mining value chain members chose to keep buffer stock, while the retail value chain members placed very little emphasis on minimising inventory and maintaining buffer stock, which were ranked 46th ranking 45th within the Retail sector.

8.2 Gaps between the current status of ISCM and best practices

The following findings have been made with regard to the major gaps between the current status of integrated supply chain management within South African organisations and the prescribed best practices.

Closing the Information gap

The lack of implementation of information management best practices within South African supply chains is one of the barrier's hampering performances within South African organisations. This is due to the fact that information management and integration thereof is a crucial part of the three fundamental dimensions of supply chain integration and that many of the information techniques support and promote broader best practice strategies. This has resulted in a gap, as South African organisations are choosing to implement best practice strategies such as positioning their supply chains to be customer focused, as well as implementing collaboration strategies, but do not have the information structures to support, manage and control these strategies.

This can be substantiated by the fact that participants in the manufacturing of consumer goods sector have identified information management maturity as one of the greatest gaps their organisation is currently facing and has implemented a three to five year plan to bridge this gap.

Aligning the understanding and implementation of Supply Chain Collaboration

The successful collaboration between supply chain partners requires implementation of both aligned incentives and aligned roles within a successful supply chain management strategy, as these two best practices support each other. The investigation revealed that South African organisations were implementing the best practices of aligned roles and aligned incentives at different implementation levels, which indicates that there is a gap in the understanding of supply chain management and the successful implementation of supply chain collaboration strategies within South African organisations.

Chapter Nine: Conclusion

9.1 Outcome of the Investigation

The outcome of this investigation was to establish the current status and role of integrated supply chain management within South African organisations, focusing on the transformation initiatives being applied by South African organisations and the major gaps between the current status of integrated supply chain management within South African organisations and the best practices.

The investigation established by means of a qualitative study that South African organisations are recognising the advantages of managing their supply chains as a competitive weapon and are positioning their supply chains as essential components within their strategic management. This can be seen by the high level of awareness and transformation initiatives being implemented by means of aligning supply chain strategies with the broader organisational strategy, becoming more customer focused, realising the benefits of collaborating with their supply chain partners and implementing planning, forecasting and replenishment strategies.

A successful supply chain requires a holistic approach; and there is no single best practice that can optimise and manage an entire supply. It was found that the following issues were hampering the successful operation of supply chains within South African organisations. The first being the lack of implementation and successful deployment of information management techniques within South African organisations and the second, the gap in the successful implementation of supply chain collaboration strategies within South African organisations.

9.2 Further Research

This investigation provides an overview of the current status and role of integrated supply chain management within South African organisations, but further research should be conducted to investigate the importance and aspiration levels of each best practice within South African organisations and a further investigating of the factors that lead to the identified gaps which are preventing successful implementation of integrated supply chain management within South African organisations.

Bibliography

Ansolabehere, Stephen & Brian F. Schaffner. 2011. "Re-Examining the Validity of Direct Survey Modes for Measuring Public Opinion in the U.S.: Findings from a 2010 Multi-Mode Comparison." Working Paper.

An Introduction to Content Analysis [online]. (2012) [Accessed 2012/04/30]. Available from: <<http://writing.colostate.edu/guides/research/content/pop2a.cfm>>.

Barloworld Logistics, 2011. Evolving Strategies: Competitive Supply Chains in emerging economies. 2011 Supply Chain Foresight, 8, 1-26.

Barloworld Logistics, 2012. South Africa Inc.: Growth, Competitiveness and the Africa Question. 2012 Supply Chain Foresight, 9, 1-18.

Bogdan, R. C., & Biklen, S. K. (2003). Qualitative research for education: An introduction to theories and methods (4th ed.). Boston, MA: Pearson.

Boyce C and Neale P. (2006). Conducting In-depth Interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. Pathfinder International tool series Monitoring and Evaluation. 2, pp.4-16.

Carter, P. et al. 2009. Supply Chain Integration: Challenges and Good Practice. Focus Study, 1 (1), p.1-9.

Cecere, L, Hofman, D & Martin, R. (2005). The Handbook for Becoming Demand Driven. AM R R e s1 e a r c h R e p o r t [online]. 1, p.1-28.[Accessed 2012/04/25]. Available from: http://www.economia.unict.it/web/MatDid_vecchio/Anno2009-2010/mromano/Materiale_Didattico/da_log_distr_comm/AMR-The Handbook for Becoming Demand Driven.pdf

Cherry, K. (2012). What Is a Survey? [online]. [Accessed 2012/04/28]. Available from: <<http://psychology.about.com/od/researchmethods/f/survey.htm>>.

Childerhouse, P. and Towill, ID.R. (2011). Arcs of supply chain integration. International Journal of Production Research [online]. 9, p.7441-7468.[Accessed 02 May 2012]. Available from: <<http://0-www.tandfonline.com/innopac.up.ac.za/doi/abs/10.1080/00207543.2010.524259>>.

Closs, DJ., Meacham, N & Speier, C. (2010). Sustainability to support end-to-end value chains: the role of supply chain management. Journal of Academy of Marketing Science. 39, 101–116.

Coffey, A., & Atkinson, P. (1996). Making sense of qualitative data: Complementary research strategies. Thousand Oaks, CA: Sage.

Croxtton, K.L., García-Dastugue, S.J., Lambert, D.M. & Rogers, D.S. (2001). The Supply Chain Management Processes. *The International Journal of Logistics Management*, 12, 13 – 36.

Dorfman, M. & Thayer, R.H. (1997), The capability maturity model for software, in Dorfman, M. and Thayer, R.H. (Eds). *Software Engineering*, IEEE Computer Society Press, Los Alamitos, CA, pp. 427-38.

Ellram, L & Cooper, M. 1993. "Characteristics of supply chain management and the implications for purchasing and logistics strategy", *International Journal of Logistics Management*, Vol. 4 No. 2, pp. 1-10.

Frohlich, M.T. and Westbrook, R. (2001). Arcs of integration: an international study of supply chain strategies. *Journal of Operations Management*, 19 (2), 185–200.

Gilmore, D. and Nardone, R. (2008). The Integration of Planning and Execution. *CSCO (Chief Supply Chain Officer) Insights*, 1, p.5-38.

Investorwords.com [online]. (2012) [Accessed 2012/04/30]. Available from: <<http://www.investorwords.com/5807/strike.html>>.

Krivda, C (2004). Next Generation Supply Chain Management. The Solution Series [online]. 1, p.1-6.[Accessed 2012/04/29]. Available from: <<http://www.businessweek.com/adsections/2004/pdf/0438supplychain.pdf>>.

Lambert, D.M (2008). *Supply Chain Management Processes, Partnerships, Performance..* 3rd. ed. United States of America: Supply Chain Management Institute.

Langley, JC, Coyle, JJ, Gibson, BJ, Novack, RA & Bardi, EJ. (2009). *Managing Supply Chains A logistics Approach.* 8th ed. Canada: South-Western Cengage Learning. 7-21.

Lockamy III, A. & McCormack, K. (2004). The development of a supply chain management process maturity model using the concepts of business process orientation. *Supply Chain Management: An International Journal*. 9 (4), 272 – 278.

- Lu, D. 2011. *Fundamentals of Supply Chain Management*. London: Ventus Publishing p. 8-112.
- Lummus, R.R & Vokurka, R.J. (1999). Defining supply chain management: a historical perspective and practical guidelines. *Industrial Management & Data Systems*. 99 (1), 11-17.
- Malin, J.H. (2006). "Knowing the SCOR: Using Business Metrics to Gain Measurable Improvements." *Healthcare Financial Management* 60(7):54–59.
- Marshall, M.N. (1996). Sampling for qualitative research. *Family Practice*.13, pp.522-525.
- Maxwell J.A (1996). *Qualitative research design: an interactive approach*. 1. ed. Michigan: Sage Publications.
- Miles, M. B., & Huberman, A. M.(1994). *Qualitative data analysis: An expanded source-book* (2nd Ed.). Thousand Oaks, CA: Sage.
- Netland, T.H., & Alfnes, E. (2008). A practical tool for supply chain improvement – experiences with the supply chain maturity assessment test (SCMAT).
- Netland, T.H., Alfnes, E., & Fauske, H. (2007). How mature is your supply chain? A supply chain maturity assessment test. *EurOMA*, (p. 17-20). Ankara.
- Netland .T.H. & Alfnes, E., (2011), Proposing a quick best practice maturity test for supply chain operations. *Measuring Business Excellence*. 15 (1) ,66 – 76.
- O'Marah, K & Souza, J. (2004). *DDSN: 21st Century Supply on Demand*. AMR Research Report.1, pp.1-10.
- Onwuegbuzie, A.J, Leech, N.L, Slate, J.R, Stark, M, Sharma, B, Frels, R & Harris, K. (2012). An Exemplar for Teaching and Learning Qualitative Research. *The Qualitative Report*. 7, pp.16-77
- Organisation for Economic Co-operation and Development.(2009). *Globalisation and Emerging Economies*. Policy Brief [online]. 1, 1.Available From:<http://www.oecd.org/dataoecd/35/34/42324460.pdf>.
- Phelps, T. (2006). SCOR and benefits of using process reference models. In proceedings of the 2006 Supply Chain International Conference, Taipei, Taiwan.

Pretorius, S.J.J. (2001). Effective Supply Chain Management in the Furniture Retail Industry Masters degree in Business Administration Thesis, University of Pretoria.

Qualitative research [online]. (2005) [Accessed 2012/04/30]. Available from: <[http://medical-dictionary.thefreedictionary.com/Qualitative study](http://medical-dictionary.thefreedictionary.com/Qualitative+study)>.

Raballand, G, Refas, S, Beuran, M & Isik, G. (2012). Why Does Cargo Spend Weeks in Sub-Saharan African Ports?: Lessons from Six Countries. Washington DC: World Bank Publications. [Accessed 2012/04/30]. Available from: <<http://0-books.google.co.za.innopac.up.ac.za/books?hl=en>>.

Siegel, D. S. (2009). Green management matters only if it yields more green: an economic/strategic perspective. *Academy of Management Perspectives*, 5–16.

Supply Chain Council [online]. (2011) [Accessed 2012/04/30]. Available from: <<http://supply-chain.org/scor>>.

Tomas, G, Hult, M, Ketchen, D J & Arrfel, M. (2007). Strategic supply chain management: improving performance through a culture of competitiveness and knowledge development. *Strategic Management Journal*. 28 (1), 1035–1052.

van Donk, D.P. and van der Vaart, T. (2005). A case of shared resources, uncertainty and supply chain integration in the process industry. *International Journal of Production Economics*, 96 (1), 97–108.

vdM Steyn, W.J., Bean, W, King, D, & Komba. J. (2011). Evaluation of Selected Effects of Pavement Riding Quality on Logistics Costs in South Africa. *Transportation Research Record: Journal of the Transportation Research Board*[online]. 2227, 138-145. Available From: <http://0-trb.metapress.com.innopac.up.ac.za/content/x63h21w4023g52j1/>.

Vokurka, R.J. (2011). Supply chain manager competencies. *SAM Advanced Management Journal*[online].2,1-5. Available from: http://findarticles.com/p/articles/mi_hb6698/is_2_76/ai_n58582795/?tag=content;col.

Zhou, H, Benton, .W. C, Schilling, D.A & Milliga, N.G.W. (2011). Supply Chain Integration and the SCOR Model. *Journal of Business Logistics*.32, pp.332-344.

Appendixes

Appendix A: Best practices

Area of Best Practice	Best Practice	Description
Strategy	Supply chain strategy	The organisation has a clearly stated and defined supply chain strategy.
Strategy	Customer focus	The organisations strategies are customer focused. This can be seen in frameworks such as DDSN being implemented.
Strategy	Aligned strategy	The supply chains strategy is aligned with the organisation's strategy, vision and mission.
Strategy	Aligned collaboration	Decisions on the degree of collaboration within the supply chain are decided and based on analysis of factors such as strategic importance of product, availability of product and degree of customisation. This can be seen in frameworks such as CPRF being implemented.
Strategy	Aligned incentives	Risk, costs and rewards are shared among Supply chain partners, thus aligning incentives for to increase performance.
Strategy	Concurrent engineering	Concurrent engineering is practiced by designing Processes, components and products in collaboration with suppliers and customers.
Strategy	Aligned roles	The roles and responsibilities of each actor within the supply chain are distributed to optimise performance and avoid conflict within the supply chain.
Strategy	HSE&CSR	Corporate Social Responsibility and Health Security and Environment issues are key focus points within the supply chain to meet the expectations of all stakeholders.
Control	Mass customization	Strategic uses of customer decoupling-point are implemented within the supply chain and products are designed for postponement and mass-customization.
Control	Supply Chain Coordination	Planning, forecasting and replenishment decisions are coordinated within the supply chain.
Control	Shop-Floor Top-Floor	The local controls and management of production sites are integrated within the supply chain's global controls and management.
Control	Aligned PMS	The performance management system translates and defines the supply chain strategy into objectives, metrics, initiatives, and tasks tailored per group and individual

		within the supply chain
Control	Balanced KPIs	Key Performance Indicators address financial and non-financial perspectives, internal and external perspectives, and short-time and long-time perspectives.
Control	Aligned KPIs	Automatic measurement and reporting of Key Performance Indicators through-out the supply chain to provide consistency and comparability.
Control	Risk awareness	Risk awareness is practiced by monitoring risk indicators, contracts, alternative suppliers or transporters issues etc. within the organisations supply chain management.
Control	Resiliency	Contingency plans for supply chain events exist.
Control	Control model	A holistic and graphic control model of the supply chain entailing the production and logistic processes exists.
Processes	Ordering seamlessness	A seamless ordering process from customer request to delivery of product exists.
Processes	Procurement seamlessness	A seamless procurement process throughout the integrated manufacturing and supplier relationships.
Processes	Planning seamlessness	Seamless planning of processes is performed by a dedicated supply chain team, establishing cross-division of the supply chain.
Processes	Customer diversification	Key customer groups are continuously re-defined, profit-monitored and diversified according to product and service-level.
Processes	Standardised processes	Processes are defined, updated and documented) to enable standardised plug and play connectivity between supply chain actors.
Processes	Continuous improvement	The supply chain is continuously being evaluated and improved to focus and provide tangible results.
Resources	Technology leadership	Leading production technology are continuously being sought and implemented.
Resources	Core competence focus	The supply chain is strongly focused on its core competences.
Resources	Utilisation of tangibles	The supply chain ensures high utilisation of its machines, transportation vehicles, inventories and facilities.
Resources	Minimised waste	The supply chain focuses on minimising waste by high utilisation of personnel. This can be seen in Lean or six sigma.
Resources	Agility	The supply chain can manage an unexpected large increase in demand (> +20%) and deliver within agreed short-time delivery conditions.
Materials	Material flow	The flow of materials is directed and well defined through the supply chain.

Materials	Optimised distribution	Focus is placed on optimising distribution through route planning, cross-docking etc.
Materials	Synchronised deliveries	Deliveries of products and/or complementary services from different actors are synchronized to fulfil customer needs within the supply chain.
Materials	Modularised products	Products are modularised to improve flexibility within the supply chain.
Materials	Minimised inventories	Inventories are minimised, implementation of lean or six sigma.
Materials	Buffer stocks	Inventories of key product components are kept to prevent manufacturing delays.
Materials	Mass production lines	To optimise capabilities of each product line different supply chains are created for each product lines.
Information	ICT strategy	An Information and Communications strategy is clearly stated for the supply chain.
Information	Information dashboards	A centralised information decision point (dashboard) is enabled to collect, process, visualise and present critical information to make decisions.
Information	Information visualisation	Information is visualised in all processes, both value-adding and administrative.
Information	Supply Chain transparency	Equal access to forecasts, inventory status, point-of-sales data and plans is provided by means of a system to all actors.
Information	Real time information	Decisions based on data and information are made in real-time by Data capturing technologies and IT-systems facilities.
Information	Track & Trace technologies	Track and trace functionality throughout all supply chain processes by means of Bar codes, sensors and/or RFID.
Information	ICT integration	Integration of supply chain actors within an ICT system.
Information	Virtual networks	Modular standardised interfaces exist within the ICT systems to provide connectivity through a plug and play functionality between actors in the network and thus creating virtual networks among actors.
Organisation	Supply chain teams	Hand-offs across functional boundaries are handled by cross functional and inter-organisational teams to improve supply chain performance.
Organisation	Flexible labour	Supply chain actors have flexible and empowered labour force trained to carry out different processes.
Organisation	Knowledge level	The supply chain actors have knowledge about advanced supply chain management tools, best practices and have a good understanding of all supply chain processes.
Organisation	Best-in-class people	Best-in-class people hold the key positions within supply chain management.
Organisation	Fellow feeling	A healthy organisation culture exists, that supports the overall supply chain strategy.

Appendix B: SA ISCM Survey

Supply Chain Maturity Assessment

***1. Please complete the following.**

Company:

Email Address:

***2. What type of Industry is your company in?**

***3. What type of product does your company provide?**

***4. What is your position within the company?**

Please rank the following questions based on the extent to which your firm uses these best practices.

***5. A clearly stated supply chain strategy exists.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***6. The strategy is customer focused.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***7. The supply chain strategy is aligned with the company's strategy, vision and mission**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***8. The degree of collaboration in the supply chain is decided and based on analysis of factors such as strategic importance of product, availability of product and degree of customisation.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***9. Supply chain partners share risk, costs and rewards when improving supply chain performance, i.e. incentives are aligned.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***10. Processes, components and products are redesigned in collaboration with suppliers and customers (concurrent engineering).**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***11. Roles and responsibilities of each actor are distributed to optimise performance and avoid conflict in the supply chain.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***12. Corporate Social Responsibility and Health Security and Environment issues are focused, i.e. the company strives to understand and respond to the expectations of all stakeholders in society.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***13. The supply chain has a strategic use of customer decoupling-point where products are designed for postponement and mass-customization.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***14. Planning, forecasting and replenishment is coordinated in the supply chain.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***15. Local control and management of production sites are integrated in the supply chain's global control and management.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***16. The performance management system translates supply chain strategy into objectives, metrics, initiatives, and tasks customised to each group and individual in the supply chain.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***17. Key Performance Indicators address financial and non-financial perspectives, internal and external perspectives, and short-time and long-time perspectives (i.e. they are balanced).**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***18. Key Performance Indicators are automatically measured and reported in same format through-out the supply chain; providing consistency and comparability.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***19. Risk awareness (risk indicators, contracts, alternative suppliers or transporters etc) is an integrated part of supply chain management.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***20. Contingency plans for supply chain events exist.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***21. The supply chain has a holistic and visual representation (control model) of how production and logistic processes are conducted.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***22. There is a seamless ordering process from customer request to delivery of product.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***23. There is a seamless procurement process through integrated manufacturing and supplier relationships.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***24. There is a seamless planning processes performed by dedicated supply chain teams representing a cross-division of the supply chain.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***25. Key customer groups are continuously re-defined, profit-monitored and diversified according to product and service-level.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***26. Processes are standardised (defined, updated and documented) to enable plug and play connectivity between supply chain actors.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***27. Continuous and incremental improvement is focused and gives tangible results.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***28. The supply chain is continuously seeking and implementing leading production technology.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***29. The supply chain has a strong focus on core competences.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***30. The supply chain has a high utilisation of machines, transportation vehicles, inventories and facilities.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***31. The supply chain has a high utilisation of personnel, where waste is minimised.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***32. The supply chain can manage an unexpected large increase in demand (> +20%) and deliver within agreed short-time delivery conditions.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***33. The flow of materials in the supply chain is directed and well defined.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***34. Distribution is optimised through route planning, cross-docking etc.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***35. Delivery of products and/or complementary services from different actors in the supply chain is synchronized to fulfil customer needs.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***36. Products are modularised to improve flexibility.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***37. Inventories are minimised.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***38. An inventory of key product components is kept to prevent manufacturing delays.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***39. Different supply chains are created for different product lines to optimise capabilities for each product line.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***40. A supply chain ICT strategy is clearly stated.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***41. Information is collected, processed, visualised and presented in a centralised decision point (dashboard), to enable efficient decision making.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***42. Information is visualised in all processes, both value-adding and administrative.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***43. A system is implemented that provides all actors equal access to forecasts, inventory status, point-of-sales data and plans.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***44. Data capturing technologies and IT-systems facilitates decisions based on data and information that are in real-time.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***45. Bar codes, sensors and/or RFID are used for track and trace functionality throughout all supply chain processes (supply, manufacturing, distribution).**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***46. All supply chain actors' ICT systems are integrated.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***47. ICT systems have modular standardised interfaces to provide connectivity through a plug and play functionality between actors in the network (creating virtual networks).**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***48. Cross functional and inter-organisational teams are established to improve supply chain performance and eliminate the hand-offs across functional boundaries.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***49. Supply chain actors have flexible and empowered labour force trained to carry out different processes.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***50. The supply chain actors have knowledge about advanced supply chain management tools and best practices and have good understanding of all supply chain processes and their interaction.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***51. Best-in-class people possess the key positions for supply chain management.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

***52. There exists a healthy organisation culture supporting the overall supply chain strategy and stating “we’re all in this together”.**

- 1 - Never or does not exist
- 2 - Sometimes or to some extent
- 3 - Frequently or partly exist
- 4 - Mostly or often exist
- 5 - Always or definitely exist

Thank you for participating!

