How to Create a Supply Chain for Superheroes: Creating a Lean, Agile and Resilient Supply Chain for the Importation of Comic Books

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Abstract

There is substantial scope for SME's (Small and Medium Sized Enterprises) in new supply chains to apply supply chain management principles to increase their supply chains starting efficiency. Successful application of theory gives the SME systematic tools and knowledge which can be applied to their supply chain to identify and analyse issues and then following on to mitigate or eliminate them. In addition, by focusing on the core principles of supply chain management the SME can achieve efficiencies and responsiveness to their customer's needs. This however, is contingent upon the summarizing of theory to useful applicable techniques and then providing training dedicated to the special needs of the SME in international supply chain.

Acknowledgments

This thesis is dedicated to my supportive family and friends. Without your support, love, patience and inspiration none of my study would have been undertaken. I would also like to thank Professor Marr for his patience, assistance and guidance. Special thanks also need to go to the interview participants who will shortly embark on the endeavour that is creating and maintaining an International Supply Chain, I wish you success.

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Chapter 1: Introduction

1.1 Introduction

The following research is based around the supply chain of a Small to Medium sized enterprise (SME) which will import comic books from the USA for retail in Australia. Section 1.2 begins by introducing to the reader details about the comic book industry in Australia. However, SME's face unique challenges when they participate in supply chains so section 1.3 summarises these. Given these challenges section 1.4 states why SME's should utilise supply chain management. International trade has many barriers to entry, notably to SME's who have limited resources and so this is explained in section 1.5 to illustrate why an SME must have efficient operations. Section 1.6 then introduces the aim of the following research, with section 1.7 following on by detailing the objectives of the research. Finally Chapter 1 concludes by explaining the format of the thesis.

1.2 The Comic Book Industry in Australia

In seeking to describe the comic book industry in Australia for this research, there is a notable lack of academic research to reference in comparison to other media. Patrick (2010, p.1) went so far as to state that the recording of details about comic books in Australia was largely left to fans and collectors, with only "*sporadic attention*" paid by academia.

The majority of comic books are imported into Australia from the USA due to the high costs of production in Australia. This is because economies of scale are not present with the relatively small Australian domestic market. Actual market figures are unavailable for the Australian market due to the prevalence of small retailers supplying the majority of consumers. In addition, very few comic books are written in Australia, with a casual browse of the shelves of the average newsagent revealing the majority being of US authorship.

Ryan (2011, p.1) stated Diamond Comic Book Distributors Inc. is virtually a monopoly supplier to the comic book industry by way of their dominant sales to retailers. This is because they wholesale worldwide the copyrighted products of the most popular comic book publishing houses of Marvel, DC Comics and Dark Horse Comics. Indeed, their dominance is such that of the estimated 690 Million dollars spent in North America on Comic Books in the year to March 2012, 417 Million dollars of that was supplied by Diamond Comic Book Distributors (Comichron (2012, p.1)). Diamond Comic Book Distributors Inc. (2012, p.1) stated on their website that in the March YTD from 2011 -2012 that sales of comic books had increased by 26.7% with a corresponding increase in profit of 25.94%.

The increase in sales volume is occurring despite the movement towards online and digital comic books which have lower production costs, simple distribution channels and via the internet instant

transmission of digital copies (Ryan (2011, p.1)). Ryan went further and stated that comic book enthusiasts still generally prefer the printed material. The reasons for this as explained by Ryan were that the collectors still wanted the opportunity to obtain signed, special and unique physical copies; with the potential over time to resell their collections at a profit. Comic books can appreciate in value over time; however comic books are largely a time sensitive item where most collectors seek to purchase the latest editions, with only limited purchasing of older editions to complete collections. As such comic books can be seen as a product which is time sensitive.

There are several drawbacks to comic book sales via retail stores and newsagents as the outlets will periodically run out of stock, have limited opening hours and the staff may question the comic book enthusiasts choices (Ryan (2011, p.1)). In addition Ryan stated that physical comic book collections take up space and over time may deteriorate or even start to smell.

The supply chain being created and analysed in this thesis has sought to overcome some of these drawbacks by supplying extra benefits that customers will not enjoy by way of traditional comic book stores and retailers. These are the provision of complimentary protective comic book covers with comic book sales and offering subscriptions giving clients the guarantee they will receive each issue in a timely manner with limited to no effort on the customers part. This is in contrast to potential competitors or online comic book retailers, who while they will be able to service customer orders 24 hours a day 7 days a week, they may also run out of stock.

1.3 The Nature of SME's in Supply Chains

Small and medium sized enterprises face different challenges when operating compared to larger enterprises. These disadvantages have direct impacts on the operation of the supply chains they participate in and so need to be identified.

Jain (2011, p.1) stated that SME's often have to pay a higher cost per unit because they cannot give the large volume of orders to suppliers larger organisations do. SME's may also have to sell themselves to suppliers in order to secure supply and capacity (Jain (2011, p.1)). This viewpoint was supported by Calipinar (2007, p.92) who stated SME's usually don't have bargaining power against larger enterprises. Perhaps the greatest weakness SME's have when dealing with other members of their supply chain is their limited leverage over their partner's actions. Juttner et. al (2009, p.204) supported this viewpoint when they identified SME's may have little or no influence over their partners and therefore may find it hard to involve them in joint activities such as supply chain risk management. However, as mentioned later in this thesis, there are practical supply chain management techniques which can develop collaboration with supply chain partners.

Basu (2002, p.63) noted in Indian supply chains (featuring SME's) the following were usually present:

- A general lack of information about the needs of partners in the supply chain.
- There was a lack of ability to produce goods which achieved common satisfaction among the members of the supply chain.
- There was a lack of strategic alliances between the various producing institutions to build a sustained supply chain.
- There was inadequate inventory management.
- The supply chain was hindered by restrictive laws and regulations.
- The supply chain did not upgrade products and diversify their products.
- Technology was not being upgraded sufficiently.

Any of the above, if present, is not conducive to an efficient supply chain. All of the above can be addressed by application of supply chain management techniques. The Asian Productivity Organisation (2002, p.4-6) noted disturbing facts about SME's utilisation of supply chain management techniques:

- Awareness of good supply chain management practices among SME's remains low.
- SME's are usually slow to implement supply chain management.
- Supply chain management usage in SME's supply chains is often limited and localised, with the focus of its use being around their place in the supply chain, not undertaking true supply chain wide initiatives.
- Information sharing is usually lacking among and between SME vendors and customers as the supply chain can be plagued by survival and competitive fears.
- SME's often have a lower level of IT usage for supply chain management, viewing IT systems as expensive. In addition, their having less educated employees corresponds to a lower knowledge level relating to IT systems.

It can be seen from the above statements that SME's generally have a low adoption level of supply chain management practices and tools. Thus SME's are at a substantial disadvantage by having a less competitive supply chain. This can further widen the ability of SME's to compete with larger organisations that have knowledge, experience and expertise in supply chain management. This is supported by Jain (2011, p.1) who found that SME's often don't have personnel who have knowledge of supply chain operations and strategy, which in turn often fosters a focus on the internal organisational operations rather than a balanced supply chain viewpoint. It is therefore more difficult to harmonise the entire supply chain. Perhaps due to this lack of skilled supply chain

expertise Calipinar (2007, p.92) found that SME's (in the Turkish experience) do not implement supply chain management correctly, do not utilise it fully, or naturally select supply chain management as a business improvement option or operations methodology.

Despite the many disadvantages faced by SME's they also possess some advantages over much larger enterprises. Jain (2011, p.2) found the distinct advantage that strategic changes can be effected quicker in SME's than in larger organisations. Having flatter organisational structures gives SME's quicker access to senior management, which in turn can result in quicker strategic decision-making. This is a means of risk absorption, as the business can react quicker, thus having increased flexibility, which allows a SME to quickly address any unforeseen supply chain incidents (Juttner et. al (2009, p. 205)). Lynch (2009, p.55) supported that SME's have this advantage when he stated that for an organisation to be able to be prepared for uncertainty it must be able to identify potential risks, rapidly escalate issues to the decision-makers and take action.

Both large and small businesses need to be flexible and responsive to external situations including customer demands and needs. However, often larger organisations have long standing large contracts meaning they don't have to deal with the smaller, more "fickle" customers. Hout et. al (1990, p. 81) identified smaller businesses often have a substantial advantage in terms of responsiveness (time and variety) as it is required for SME's success as they constantly redefine their offerings to satisfy the more fickle customers. This in turn defines that most SME's will need a responsive supply chain design as this is where one of their competitive advantages lie.

The ability to be responsive in changing to external conditions and client demands is required to succeed in business. Lynch (2009, p.187) identified in organisations there may be out-dated or insufficient business and operating models in place, thus the ability to change aspects can be hindered. SME's general lower level of experience and education may hinder their ability to change as required to survive or prosper by not knowing how or what to evolve the supply chain into. Kohona (2002, p.128) added that SME's also face numerous labour issues, such as having lower education levels and labour welfare compliance costs; while having a decreased ability to cope due to the smaller human capital present which may hinder optimising supply chain operations.

1.4 Why SME's should use Supply Chain Management in Particular

Calipinar (2007, p.90) made the statement that SME's can become more financially viable if they implement supply chain management, as it will give them synergy of operations. In addition, Khan et. al (2009, p.150) stated, by adopting agile strategies across the supply chain some of the risks of

participating in global exchanges can be minimised. For a SME to consider and adopt supply chain management should be mandatory as Calipinar (2007, p.97) stated:

> *In conclusion, Turkish SME's should develop and implement supply chain system, which continuously integrates all institutions and channels from supply resources to customer centres, in accordance with their structural features in order to maintain their existence in regional, national and international competition markets.*

The GFP (2005, p.1) stated that SME's account for 60-70 per cent of employment in OECD countries, but unfortunately SME's fail more often than larger companies. The GFP (2005, p.1) identified that while SME's encounter some barriers to international operations many obstacles could be eliminated through successfully integrating into international supply chains. This integration into the international supply chain can be aided by using the techniques of supply chain management to ensure end customer satisfaction, while ensuring efficient and cost effective operations.

For example, the implementation of supply chain management techniques by Wenginarti (2002, p.70-72) in the Indonesian Cement Industry led to benefits to the supply chain (in which the SME analysed operated) of:

- A better management of product distribution and supply to meet customer demand leading to increased market share.
- Optimising distribution facilities.
- Reducing costs by synergy between all participants in supply chain.
- Increased productivity and improved work efficiency.
- Satisfied customers – making existing customers loyal and increasing brand reputation.

1.5 Barriers to SME's

Before commencing operations due diligence dictates that a SME should ensure all necessary factors are in place for the success of the enterprise. This should also extend to ensuring that the supply chain they propose to operate is efficient, profitable and will serve the customer needs successfully. The UNECE were quoted by the GFP (2005, p.2) stated that there were fourteen obstacles to the internationalisation of SME's:

- A lack of entrepreneurial, managerial and marketing skills (this could be expanded to include a lack of supply chain management skills).
- Bureaucracy and restrictive regulations / policies preventing operations.
- SME's having a lack of accessibility to information and knowledge.

- Difficulties accessing financial resources and having a lack of capital.
- Having a lack of accessibility to technological resources and know how to optimise their use.
- The lack of non-conformity of standardisation, of quality awareness and mutual recognition schemes.
- Product and service range and usage differences between countries and markets.
- Language barriers and cultural differences. In addition, due to SME's having a smaller workforce they are more likely to not have knowledgeable human resources to overcome these.
- The inherent risks in selling abroad (this could also be expanded to risks in purchasing abroad).
- Competition of indigenous SME's in foreign markets for sales and purchases.
- Inadequate behaviours of multinational companies against SME's and a lack of government supporting programs for SME's.
- The complexity of trade documentation including packaging and labelling.
- Lack of government incentives for SME's to commence international trade.
- Inadequate intellectual property protection exposing SME's to risk.

Strategies are needed to overcome the above. These factors, if not mitigated, will inhibit the integration of SME's into international supply chains. To overcome some of these obstacles the GFP (2005, p.2) endorsed SME's to gain access to information on such items as laws, taxation and customs regulations through business advisory services. In addition, the GFP (2005, p.2) is encouraging gaining access to a private sector associations such as a Chamber of Commerce which can give access to both sources of information and the means to establish contacts through which networking and clustering may occur.

Wenginarti when evaluating the operations of an unnamed SME in the Indonesian Cement Industry (2002, p.70-72) noticed further barriers that appeared in its supply chain as:

- Differences in organisational visions between it and its trading partners, that is, the supply chain does not truly focus on the needs of the ultimate end customer.
- An uncertainty in the delivery process due to limitations in equipment (available vessels) and product (e.g. if cement can't be loaded because of rain).
- A non-uniformity of technology understanding and usage between partners– inadequate use of IT in the supply (e.g. a supplier or customer not using the internet or having a computer system).

- Substantial differences in people's skills and attitudes with regards to implementing supply chain management between the trading partners.

These barriers are not unique to the supply chain/s in which SME's participate. Strategies, tools and tactics to overcome all of these are present in the science (even perhaps the art) that is supply chain management.

1.6 Aim of the Research

The aim of the following research is to develop a comprehensive toolkit for SME's, summarising best practice supply chain methodology, while determining if this can be successfully applied to an international supply chain increasing its performance.

1.7 The Objectives of the Research

There are five objectives:

- Explore the specific supply chain concerns for SME's.
- Describe the key theories of supply chain management applicable to SME's.
- Summarise and explain usable theories which can be given to SME's to improve their supply chains.
- Apply the relevant tools and theories to an international supply chain and obtain feedback on their application from SME decision makers in particular with reference to their current supply chain management thinking.
- Evaluate whether or not the application and description of these tools and theories to decision makers in an international supply chain will alter the SME operations.

1.8 The format of Thesis

There are four following chapters which together complete the thesis. Chapter 2 reviews current supply chain management theory to identify useful methodologies which can be applied to SME's to create more efficient operations. The focus of this literature review is on easy to understand, easy to use and yet powerful techniques.

Chapter 3 then explores the art and science that is research detailing useful methodologies for collecting the data and finishing with a justification of the research method used. Notes on the interviews conducted and analysis undertaken on these interviews are presented in Chapter 4. Finally Chapter 5 summarises the results and derives conclusions based on the relationships identified in the analysis rounding off with ideas for further research.

Chapter 2 Literature Review

2.1 Introduction

Chapter 2 commences by describing the basic principles of supply chain management and then describing its key tools. Superheroes, like supply chains, are responsive to the demands of their environment so section 2.4 discusses the characteristics of responsive and agile supply chains. Without the glue that is effective communication and information in the supply chain, delays and additional costs are incurred, so section 2.5 outlines basic information principles that the SME should utilise. Section 2.6 explores the impact that the Product handling and product design has on the supply chain. With the product defined, the theories relating to sourcing goods and services for the supply chain are then introduced in section 2.7. Dynamic duos and leagues of Superheroes are a staple in comic books, just like Alliances and Partnerships are a staple of supply chains. Therefore sections 2.8 to 2.14 look at the characteristics of supply chain alliances, why partnerships should be sought and strategies that should be used by the SME to instigate collaboration.

Superheroes usually have fanciful tools which help them save the world and exquisite transport which efficiently gets them to exotic locations. The supply chain also needs to have the efficient use of Inventory which helps it service its customers and this is discussed in sections 2.15 to 2.17. Section 2.18 then investigates how Transport and Customs policies impact on the supply chain.

The supply chain improvement methodologies of Lean, the Theory of Constraints and Six Sigma are then discussed in sections 2.18 to 2.21 to give the SME practical tools to improve its supply chain. The concepts of value in the supply chain (sections 2.22 to 2.24) and the need for end customer closeness (section 2.25) then focuses the SME on delivering what the customer wants.

Superheroes perform un-measureable feats, however a high performing supply chain needs to know how it is performing and so Measurement is discussed in sections 2.26 to 2.27. Finally, Supply Chain Risk Methodology needs to be instigated in a supply chain to identify hazards, risks and uncertainties which will be faced by the SME, so sections 2.28 to 2.32 outlines methodology to do this.

2.2 Supply Chain Management Explained

Christopher et. al (2001, p.1) said that getting the right product, at the right price, at the right time to the customer is the key to survival in modern business. Supply chain management provides a framework and strategies to achieve this. Christopher et. al (2001, p.13) further stated for most products the creation of an agile supply chain which was responsive and flexible to customer demands usually requires significant changes to the status quo. Given this, it makes sense to conduct

appropriate planning activities to design a supply chain which is in line with business strategy and customer needs prior to undertaking business. Sharman (1984, p.75) supported this view by stating that a way to achieve greater performance in a supply chain is to design the logistics system concentrating on the flow of materials through the chain to the final customer.

Hout et. al (1990, p.73) identified if a factory is out of balance, poorly planned and without clear reporting, it needs to be balanced, collated and organised so management can see what it is responsible for. This analogy can be extended to identify a disorganised structure can hide activities which produce no profit to the supply chain, which is "waste" in lean manufacturing terms. Jain (2011, p.1) stated SME's often fail to document their business processes. Therefore, SME's management does not truly understand the characteristics of and possible bottlenecks in their supply chain. It does not allow a complete analysis of the supply chain to occur in order to investigate possible automation or labour saving activities. Following on from this, it makes it hard for SME's to discern between value adding and non-value adding activities, thus not being able to add efficiency to their system by removing the non-value adding waste activities. Applying supply chain management principles to the planning activity of a supply chain prior to business commencement will create best practice leading to greater success of the enterprise.

Juttner et. al (2009, p.207) however identified that many in depth business analysis and improvement activities could not be undertaken by SME's as they can stretch their limited resources. This lack of resources can include a lack of budget to make improvements which in turn hinders business development (Lynch (2009, p.165). Calipinar (2007, p.97) stated that one of the activities that needed to occur to aid small and medium sized enterprises participating in supply chains was to reduce the roles and principles of supply chains from theoretical dimensions to applicable and practical techniques. Deb (2002, p.53) went so far as to call for a training policy for SME's in Fiji in supply chain management to cater for the special needs of this sector. Thus the supply chain management techniques proposed for SME's need to be applied to meet their needs while being cost effective, relatively simple and yet powerful enough to give benefits.

But what is supply chain management and how can it add value to a SME's operations? To answer this question, it is useful initially to define what supply chain management is. Klapper (1999, p.1) stated that supply chain management was *"management of all internal and external processes or functions to satisfy a customer's order (from raw materials through conversion and manufacture through to shipment)".* This identifies that supply chain management is not simply an internal activity, but encompasses everything which impacts upon the end customers order. Building on the above definition, Wilding (1999, p.16) stated that the objective of a supply chain is to deliver value

to the customer at a lower cost than competing supply chains. It is of note that Wilding defined value as not only the tangible product features, but included intangible factors such as image, reputation and responsiveness. Value as a concept was defined to have 3 elements as per Feller et. al (2006, p.1):

- It is a subjective experience that is dependent on the context in which it is received.
- Usually value is created by a transaction or exchange through the provision of goods, resources or services.
- Value flows from the customer meaning it is the end customer which ultimately defines what is of value. It can be derived from this that the end customer ultimately defines if the supply chain creates value.

While the customer has typically been the focus of numerous business activities, supply chain management integrates the customer more deeply into business operations.

As businesses do not exist in a vacuum, having a balanced focus on issues both external and internal to the SME is important. This external focus is perhaps needed more in SME's starting up, as the full interrelationship between their organisation and others in their supply chains may not be known. The Six Sigma Forum (2004, p.6) stated that customers have no regard for organisational boundaries, but rather are concerned with the processes in place which lead to their demand being satisfied. Supply chain management can overcome this as it is both a boundary and function spanning endeavour (Brewer et. al (2000, p.78)). Thus by utilising supply chain management a SME can see across organisational and functional issues focusing on what the end customer desires and delivery of the value they desire. One of the key principles of supply chain management is that a process or system thinking viewpoint be implemented with the focus of all parties being on service delivery to the end customer. Isolated decisions cannot and should not be made because all processes are intrinsically joined and linked to all other processes in the supply chain to deliver to the end customer.

Responsiveness is needed to satisfy customer demand therefore a business needs to seek to develop its supply system to be able to match demand. The supply chain strategy implemented to match supply and demand needs to ensure it addresses the balance of efficiency and responsiveness based on its product range, strategy and customer target segments (Chopra et al (2001, p.37)). Chopra et. al (2001, p.27) identified resources and processes must be aligned with all business strategies. Effective supply chain management is a business process which can aid business viability, competiveness and flexibility. However, the supply chain strategy which is put in place needs to

match the business plan, marketing plan, sales plan, financial plan and any other relevant existing business plans. Morash (2001, p.38) stated that the business strategy should dictate the supply chain strategy which in turn advises the supply chain capabilities and combinations which need to be developed. As such the business strategy should ultimately determine the supply chain performance (Morash (2001, p.38).

2.3 Basic tools from Supply Chain Management

Anderson et. al (1997, p.1-12) provided seven principles for supply chain management needed for optimal operations. While they are desirable in any supply chain, they are perhaps critical for a rapid response supply chain. The principles are:

- *Segment customers based on service needs.*
- *Customize the logistics network.*
- *Listen to signals of market demand and plan accordingly.*
- *Differentiate product closer to the customer.*
- *Source strategically.*
- *Develop a supply chain-wide technology strategy.*
- *Adopt channel-spanning performance measures"*

Watanabe (2002, p.18-20) gave recommendations for SME's to implement in their supply chains of:

- *Focusing on the end customer* – Ensure that the focus of their supply chain is on the end customers' requirements and orders and these are communicated to all in the chain.
- *Focusing on cash flow rather than product cost calculation* – There should be a focus on producing according to that which is sold, not what the lowest cost production is. This could be likened to Goldratt's theory of concentrating on increasing throughput, not solely on decreasing operating expenses which can decrease throughput.
- *Recognising that speed (agility) is important* – When competing with global competitors speed is important in all aspects.
- *Reduce waiting times* - Reducing lot sizes can make production more flexible and efficient by removing the three waiting times in production. These are waiting time for tool and die changes, waiting time for available capacity and waiting time due to large batch sizes. Hout et. al (1990, p.77) stated that waiting time should also be minimised in relation to management indecision, physical and intellectual rework and supported Watanabe's call for reduced batch sizes.

- *Integration versus distribution* – One advantage of SME's is that departmental barriers to information sharing are low, in comparison to larger enterprises which may have different systems. Thus SME's are more able to integrate operations and achieve functional success within the supply chain.

2.4 Responsive Supply Chains

To service consumer needs the logistics system must ensure high levels of product continuity from vendors, prevent stock outs through inventory and be able to handle small orders and erratic demand (Shapiro (1984, p.120)). The supply chain must be able to meet varying levels of demand. While demand levelling is a worthy activity to undertake, demand will inevitably fluctuate. Grove et. al (2008, p.1) gave some examples of major supply chain problems of Coors beer manufacturers, these were having to meet seasonal demand, demand surges from sales promotions, introduction of new brands with varying demands, rush orders while fulfilling routine orders and moving all products to the customer before the beer spoils. All of these require a supply chain which is agile to respond to the situation which arises. By satisfying all of the above and having responsiveness in the supply chain a substantial competitive advantage can be gained.

But what is a "rapid response" in a supply chain? Fine et. al (2002, p.70) introduced the theory that each industry has its own speed of evolution, termed "clock speed" and stated the speed of evolution will be different depending on the industry, processes and customer requirements. It should be noted that this definition is not only responsive in terms of pure speed, rather it emphasises flexibility in what the supply chain offers.

The major causes that dictate agility is required were stated by Etienne (2005, p.6) as the customer increasing the quantities demanded, demanding a decrease in the supply response time and a breakdown in the processes that link the supply chain. Any changes in demand and /or supply require changes in the flows and operations in the system that is the supply chain. While a lean supply chain may be agile, in supply chain management theories a lean supply chain differs in focus from an agile supply chain. Christopher et. al (2001, p.6) stated under agility the primary emphasis is on the service level delivered (availability being the critical factor), whereas in lean the primary emphasis is on cost. Christopher et. al (2001, p.11) however stated lean is a powerful contributor to the ability to be agile in supply chain operations. Thus it should be noted the two methodologies are not mutually exclusive.

Being agile requires a business wide capability that embraces organisational structures, information systems, logistics processes and mind-sets (Christopher et. al (2001, p.2). Therefore some tools and

strategies need to be identified to create an agile supply chain for the proposed supply chain. Christopher et. al (2001, p.12) gave a model of an Agile Supply Chain which prioritised continuous waste reduction, standardisation, and pipeline time reduction with demand driven replenishment programs which managed inventory and synchronised operations.

Change in a supply chain can come about as a result of customer demand (e.g. speculative buying or reactionary buying) or be event driven (e.g. regulation, disaster, operational, economic) (Lynch (2009, p54)). Change not managed can move throughout the supply chain often causing a reverberation among processes causing a "bullwhip effect" on inventory and manufacturing (Lynch (2009, p.56)). It should also be noted that change can also alter the magnitude and likelihood of events disrupting or impacting on the supply chain (Lynch (2009, p.240)). Change can also cause psychological effects on employees and partners in the supply chain. Therefore Christopher et. al (2001, p.13) stated supply chain managers need to be change managers by effectively managing change in the ways that relationships between organisations are structured.

Fine et.al (2002, p70) went further when they stated that a company's real sustainable competitive advantage is its ability to design and redesign its value chain in order to continually find sources of competitive advantage over competitors. The Goldratt Institute (2009, p.8) stated there are three critical questions which need to be answered before undertaking any changes which are: W*hat to change? What to change to? How to cause the change?*

2.5 The Importance of the Glue that is Information

A rapid response supply chain is the desired model for implementation in this case study. A basis of the success of a rapid response supply chain is willing supply chain partners who will to share information about sales, orders and inventory (Blackburn (1991, p. 254-255)). The reason for this is a supply chain, like interpersonal relationships requires an exchange of information for coordinated actions to occur.

Mason-Jones et.al (1999, p.2) stated that in supply chains information is often delayed, subject to bias and noise, or may be totally absent. The GFP (2005, p.3) stated that adequate infrastructure needs to be in place for optimal operations. This can be extended to say that to achieve timely and accurate information sharing adequate telecommunication systems and internet access should be present. This is supported by Wilding (1999, p.14) who stated that information technology infrastructure in particular is critical to the operation of agile supply chains. Mason-Jones et. al (1999, p.2) explained the speed of information transfer has been recognised as a key commodity which if handled properly can become a key competitive advantage as it reduces uncertainty

inherent in a supply chain. While it is a competitive advantage, it also connects each process in the supply chain. Lee et. al (1992. p.71) agreed when they stated the effective operational control of a supply chain required the coordination of key data from the different entities involved.

Blackburn (1991, p.264) stated, one of the goals of quick response supply chains was to have smaller, more frequent orders which corresponded to smaller batches between supply chain partners. Blackburn (1991, p.264) explained for optimal operation, information too as well as orders and batches should be exchanged in smaller batches. Mason-Jones et. al (1999, p.3) made the observation it is the quality of the information, not the quantity of information transfer that is the important measure.

An inter-organisational information sharing system can change the power distribution between firms and even internally within them (Gerst (2007, p.12)). This is often a cause of reluctance of some persons and organisations to participate. Thus inter-firm operations needs to be analysed and supply chain relationships developed so trust is present in order to prevent any information based conflicts.

It is important key data is synchronised and its flows are known to prevent repetition of activities, which is a waste of supply chain time and resources. Gerst (2007, p.8) stated one of the major problems associated with supply chain IT systems is a possible duplication of systems and activities. The holistic focus (both internal and external in nature) which supply chain management gives, especially the integration of IT systems seeks to prevent this duplication from happening. Lee et. al (1992, p.71) stated that throughout a supply chain the databases should be ideally linked in such a way managers from any stage in the supply chain can see the information relevant to their role in the supply chain. As such an SME should seek ways they can monitor upstream and downstream operations in their supply chain and seek to give their supply chain partners the same capabilities.

2.6 The Need to Define the Product

Christopher et. al (2001, p.5) stated the agility and leanness in supply chains demanded high product quality. This in turn requires an in-depth knowledge of the product and its characteristics to be present. Nave (2002, p.76) supports this view when discussing supply chain management improvement methodologies because he stated the design of product or service needed to be essentially correct and at its most economical. More importantly to add Value the customer demands Nave (2002, p.76) identified customer demands need to be factored into the product design and the product configurations have to fulfil the functional requirements of the market and customer.

Morash (2001, p.39) stated a supply chain should have a predetermined service menu of capabilities, value added services and attributes. From this menu the SME can choose their customers preferred services and attributes. While different combinations of services will apply, the inputs and capabilities are not unique since they were planned beforehand Morash (2001, p.39). This in depth analysis allows the supply chain to produce tailored and often niche products by knowing what is possible and tailoring its processes to deliver exactly what its clients desire in terms of design, delivery and other logistics. Shapiro (1984, p.122) agreed by stating a supply chain should use the structures and operating policies of their logistics system to deliver what the customers value such as responsiveness, product delivery requirements and availability.

However, this cannot be a static situation as the products and services offered by a supply chain need to continually evolve. Porter (2008, p.1) stated a company may have to face aspiring entrants into the industry who have excess capacity, are hungry for market share, which may in turn force you to increase costs in order to stay competitive in the industry. Porter (2008, p.1) provided the solution of raising the costs of competing by escalating Research and Development expenditures. However, Porter (2008, p.4) went further and cautioned it is important to note these capital expenses alone will not deter entry of potential competitors to an industry if the potential profits are worth the expenditure. This could be extended because if the unique solutions offered by the supply chain are profitable enough they may in fact be copied by savvy competitors. This means the supply chain needs to be responsive and be able to change to offer ever increasing levels of service and efficiency.

In addition to developing perfect products, the product range needs to be decided upon. Porter (2008, p.1) stated substitute offerings can lead potential customers away. Therefore to lessen the threat of this, it is necessary to offer better value through wider product availability. By a supply chain offering a greater variety with broad choice of products and having a large availability of options overall sales will increase while decreasing costs (Etienne (2005, p.10)).

Finally, while the product itself is important, it must be protected within the supply chain. Kohona (2002, p.127) stated packaging plays a vital role in the supply chain to reduce waste such as improper handling and damage, hence improving packaging and handling improves the quality of the supply chain. Therefore both the characteristics of the product and its packaging requirements need to be considered.

2.7 Introduction to Sourcing

Calipinar (2007, p.90) identified one technique used by Turkish SME's is to develop shared operations among SME's to minimise their costs. Goh (2002, p.42) also endorsed the clustering together of SME's to gain operational and transport scales of economies by resource pooling. The GFP (2005, p.3) also recommended SME's to cluster as it would allow them to realise many operational efficiencies characteristics of larger companies such as:

- If they are in complimentary industries or operations it can result in a closer proximity to sources of raw inputs.
- It can increase the availability of suitably customised business services.
- Abundance of clients attracted by that cluster of businesses.
- A presence of a skilled labour force.

The most important point in sourcing as stated by Lynch (2009, p.165) is having a realisation that the suppliers purchased from are not really outside the supply chain but are an integral part of it and hence have a large effect on the entire chain. Perhaps for this reason, Raycraft (2010, p.7) stated the emphasis should be on developing a partnership relationship with the supplier and shouldn't always be on obtaining the lowest cost (within reason). In the supply chain the focus should be on enhancing the current products, to create real or perceived value which can be passed onto the customer, not simply on cost reduction.

2.8 Supplier Selection

One problem SME's may suffer from is not having sufficient financial resources to buy the most advanced systems to allow efficient operations in the supply chain. However, Jain (2011, p.1) identified SME's can gain access to state of the art technology by selecting those systems which have a pay by transaction or pay by user license. In addition, once trust has been developed in the relationship, it may be possible for a SME to utilise their suppliers system. Calipinar (2007, p.92) concluded often SME's are more willing to use supply chains after they begin using their suppliers EDI systems, thus SME's should see suppliers system offerings.

Shapiro (1984, p.125) identified a customer service focused logistics chain should seek vendors who offer supply continuity, full line availability, flexibility in specifications, quality and consistent delivery. Chopra et. al (2001, p.36) agreed by stating responsive supply chains should select suppliers based on speed, flexibility and quality. Thus it can be seen there are definite criteria which suppliers should be evaluated against before being selected. But this evaluation is not a single activity. Lynch

(2009, 196) stated an organisation should never outsource without knowing where and who is involved and without regular follow-up. That is, given suppliers have a large effect on the supply chain; they need to be carefully selected.

Lynch (2009, p.168) revealed the standard supplier and site risk evaluation criteria used by the several leading global 500 organisations:

- Organisation – items such as structure, chemistry, financial management, customers, product compositions and service offering, communication flows, pricing history, interaction, strategy.
- Financial health – measurements such as debt to equity ratio, cash flow and financial ratings.
- Labour practices – health and safety, security and compliance.
- Capability and capacity – space, facilities, adequacy and maturity of resources, after sales service, supply chain risk management technology and techniques. Gerst (2007, p.12) investigated a supply chain information system which failed due to the information technology provider not being experienced enough in coordinating large scale projects in the industry. This demonstrated the provider may have had the capacity, but lacks the capability due to their inexperience.
- Quality systems and processes – track record quality, returns, certification and methodologies applied.
- References – customers, industries, compliance history, awards.
- Brand strength – market awareness and experience.
- Social responsibility – sustainability, green supply chain initiatives.
- Geopolitical issues – political, social, infrastructure, environmental.

This list provides a useful and logical starting point for SME's to analyse potential suppliers to ensure suppliers are selected in line with customer needs and business / supply chain strategies. Choosing an IT partner also requires a specific list of key criteria to be met. Bergkuist et. al (2007, p.27) gave some motivation factors in choice of computing system:

- Cost savings.
- Access to external technical expertise.
- Focus on core activities and competencies.
- Predictable costs.
- A well worked contract.
- Close communication.

- A trustworthy relationship between involved parties.

- A trustworthy relationship between supplier and client.

- The provider's reputation.

- The provider's knowledge of the client company.

- The provider's ability to handle demanded capacity.

- The outsourcing strategy as part of the business strategy.

- The clients control over the core business activities.

- Communication about outsourced IT functions.

- Outsourcing used as a competitive tool.

These two lists will be merged together to give the SME some criteria to evaluate suppliers (see Appendix G)

2.9 Costs in the Supply Chain

While a supplier may be flexible, have a high speed of manufacturing and have excellent quality if their costs are prohibitive, they are of little value to the supply chain and as such the issue of costs needs to be examined. As stated by Raycraft (2010, p.8), defining exactly what cost reductions are needed and how they occur is a critical step and as such the methodology for gathering and recording it needs to be known. A total end to end supply chain view should be taken as to level of costs. Wilding (2003, p.37) gave an example:

> *In one supply chain, in order to reduce costs by 3%, it required manufacturing to increase its costs by 15% and transport to increase their costs by 4% but overall total costs reduced*

Thus it can be seen from this quote, a reduction in the level of overall costs, may increase costs in one area. It needs to be emphasised the quality demanded by the end customer needs to be balanced with costs incurred, including any cost reductions which may correspond to value reduction (Lynch (2009, p.165)). Industry Canada (2006 p.17) agreed on this stating a total logistics cost measure should be used for rapid response supply chains as the total logistics cost viewpoint allows for the evaluation of the efficiency of logistics and supply chain management operations.

Brewer et. al (2000, p.80) went further and stated cost should be viewed in relation to the customer service level, in that is it is necessary to balance the cost and the service level the end customer desires and receives. While it is one of the supply chain guiding principles, to know your costs (Grove et. al (2008, p5)) and seek to minimise them, excessive cost reduction can make an organisation more vulnerable to supply chain disruptions by making it too lean (Christopher et. al (2004, p.1)). It

should be remembered if you are decreasing throughput in order to decrease costs, you are in turn reducing your ability to create revenue, value and ultimately profit. Lynch (2009, p.43) agreed stating pressuring suppliers to reduce costs may cause the loss of quality and security of supply. Lynch (2009, p.43) gave examples of this occurring, of melamine substitution for milk as a result of cost pressures and the multiple financial failure of suppliers in the auto industry due to unsustainable margins which affected security of supply.

If however cost reductions are needed due to competitive pressures, it is important to ensure your supply chain relationships are mature before approaching suppliers with cost reduction requests (Humphries et. al (2004 , p.16)). Wilding (2003, p.39) supported this when he stated if costs are discussed when starting a business relationship the result can often be conflict instead of cooperation. This has the effect of undoing all the benefits of partnership.

As mentioned earlier the SME may pay a higher price per unit. Jain (2011, p.1) stated one strategy is to continually speak with both new and potential suppliers about volume, price and service needs. This dialogue allows the SME to gain a current snapshot of the environment in which they operate and determine whether or not they are dealing with partners who truly value being part of their supply chain. Lynch (2009, p.165) endorsed the cultivation of alternate vendors to guard against the risk inherent when vendors are consolidated.

Porter (2008, p.1) agreed when he identified powerful suppliers can constrain a business's profits if they charge above market prices. Therefore to offset this it is useful to have standard specifications for products so that a business can move between suppliers. This again necessitates having detailed knowledge of your product, product specifications and your supply chain structure to be able to achieve a smooth transition between suppliers without impacting on service delivery and reliability.

2.10 The Benefits of Partnerships

Lynch (2009, p. 25) recommended organisations in supply chains seek partnerships, due to the inherent flaws of acting opportunistically (in self-interest) which would impact on the success of all in the supply chain. Blackburn (1991, p. 254-255) went further and cautioned having adversarial relationships will block communication. This in turn will block the efficient flow of resources, which in the supply chain is dependent upon efficient and timely communications. Sorte Junior (2011 , p.42) agreed when he identified that focusing on coordination, rather than integration through partnerships and closer working relationships, causes bottlenecks in the supply chain by limiting knowledge sharing which corresponds to a slower pace of development in the supply chain. Gerst (2007, p.8) when analysing the failure of a shared computer system stated, conflicting interests and

mistrust between manufacturers and their suppliers as well as an inability to share operational control explained why the system failed.

In contrast, Blackburn (1991, p.255) stated established partnerships are a medium which cultivates a faster, freer information flow. Juttner et. al (2009, p. 205) identified an additional reason to partner is simply because to repeatedly change suppliers can be a time consuming and costly activity. Hoppe et.al (2001, p.51) went further and identified other advantages to organisations seeking partnerships in supply chains which are:

- *The benefits of one-to-one or next-tier coordination are quantifiable.*
- *Successful one-to-one relationships add value.*
- *Data and information sharing is more immediate and useful.*
- *Relationships with adjacent upstream or downstream companies are more manageable and controllable than those with more distant participants in the supply network.*
- *It may be possible to develop unique added value by working closely with one supplier, developing a unique relationship, a unique product or service, a unique contract, or a unique combination of these. It is harder to do this with multiple.*

In addition cooperative supplier relationships give the commitment of suppliers, simpler sourcing procedures, reduction of stock, higher quality, earlier detection of risky developments, faster introduction of new products, use of suppliers know how, increased information exchange and improved planning opportunities (Blome et. al (2009, p.127)). Another good reason to partner in the supply chain is so that access may be granted across the entire supply chain for increasing end customer satisfaction (Moore et. al (1998, p.26-27)). This is because the logistics of analysing a normal supply chain maybe restrictive due to the fact value chains will be made up of different companies, divisions or at least functions.

Wilding (2003, p.37) quoted an unknown survey by the Society of Human Resource Management which analysed top performing companies. Wilding (2003, p.33) stated the research showed these companies all had:

- Open communication and trust with both internal and external stakeholders.
- An interest in building relationships inside and outside their organisation with those that offer competitive advantage to the business.
- Collaboration support and resource sharing.
- An environment where innovation, risk taking and learning are all promoted.
- A passion for competition and continual improvement.

What this list shows is these organisations all had partnership principles in the forefront to aid them in gaining competitive advantage in their supply chains.

2.11 Single or Multiple Suppliers

The benefits of single sourcing (Blome et. al (2009, p.127) include cost reduction through sourcing, lower transaction costs, higher specialisation, easier sourcing, easier quality assurance, smaller number of suppliers and interfaces, cost reduction through standardisation and cost reduction through bundling. Lynch (2009, p43) cautioned by consolidating supply into one provider there was the risk of greater exposure to risk by being reliant upon only one source, rather than hedging the risk across multiple suppliers. However, Blome et. al (2009, p.132) contradicted this view when they identified risk sources can be better analysed in greater depth with only one supplier than multiple suppliers. Blome et. al (2009, p.130) also stated a higher dependency on one supplier does not mean a higher overall supply risk due to the benefits of partnerships. Partnerships can generate large benefits such as greater cooperation and information sharing.

Lynch (2009, p.157) identified if multiple suppliers are to be chosen, as a risk mitigation strategy, each must have their own independent supply chains as if they have any interdependent links they all may fail together. This is because Blome et. al (2009, p.132) found eventually most multiple sourcing suppliers are not totally independent, due to eventually some raw materials or services being sourced from an oligarchy or limited choice procurement arrangement.

2.12 The Social Skills Needed in Partnerships

Wilding (2003, p.31) identified one of the key items which needs to be focused on in supply chains is the building of relationships within the supply chain. Wilding (1999, p.22) stated building a network (such as a supply chain) requires social skills, empathy and motivation, not just technical ability or infrastructure cooperation. Conflict can arise due to power disparities resulting from having or needing information or resources in the supply chain. Gerst (2007, p.2) stated resource dependency is the dominant reason for having organisational relationships as resources are the primary stimulus to engage in interactions with others. Thus inter-organisational relationships are needed, but can be a cause of conflict.

But what are the relationship variables that need to be in place for this working together? Zomorrodi et. al (2010, p.455) summarised the key principles after a detailed literature review as:

- Trust and commitment.
- Risk and reward sharing.

- Information sharing.

- Communication.

- Relationship specific investment.

- Contract type.

- Conflict resolution and goal congruence.

- Integrated policies.

- Decision synchronisation.

- Mutual understanding.

- Long-term orientation.

- Resource and capability sharing.

- Power and dependence.

- Cooperative norms.

Brewer et. al (2000, p.77) stated effective supply chain management requires partnership and cooperation, because without these, there will be no effort integration towards the key goals of end customer satisfaction. However, there needs to be realisation you may not be the most important organisation to those that you partner in your supply chains (Lynch (2009, p.196)). This is particularly true for SME's.

Zomorrodi et. al (2010, p.452) stated despite diversely different cultures, structures and behaviours there needed to be harmony among supply chain members to achieve the synergy of a supply chain working together. However, Gerst (2007, p.12) stated procurement management is often defined by conflicting interests and power battles. Thus patience, conflict resolution, strategy and negotiation skills are needed in addition to the normal communication flows. Wilding (1999, p.21) stated parties in a supply chain having both IQ and technical ability is not enough to deliver an agile supply chain. A supply chain also needs to have qualities of self-awareness, self-regulation, motivation, empathy and social skills. These qualities correspond to the critical areas for emotional intelligence in persons. Perhaps the reason for this is because business relationships like human relationships are often subject to the previously mentioned power disparities causing conflicts. Gerst (2007, p.12) stated power in business is largely derived from having control over information, supplier relationships and financial resources.

The SME should be mindful social skills can go a long way to building successful supply chain partnerships and can negate their lower relative level of power. Gerst (2007, p.2) stated the power in business can be derived from ones charisma to influence the behaviour of others or the position a person occupies in the communication network. Either of these strategies can be used by the SME

for leverage with their supply chain partners. The SME should therefore actively seek to develop charisma by being a good supply chain partner, while identifying how to communicate strategically.

Raycraft (2010, p.8) introduced that partnerships once the short term gains are experienced, can become strained by the long term linking of cultures, often failing due to conflicting viewpoints. However, by using the supply chain management principle of focusing on the end customer, as well as emotional intelligence, the alliance can be steadied for long term success. Management action within each organisation is important to the successful integration of parties in the supply chain. This can be achieved by altering the culture, to encourage a thinking away from an organisational based viewpoint, to a larger supply chain focus prioritising delivery to the end customer (Lynch (2009, p. 26)).

2.13 The Development of Partnership Relationships

But the question is how does an organisation move from a transactional supply relationship to a cooperative relationship? Christopher et. al (2001, p.2) stated a key characteristic of agile organisations is their viewpoint and "mind-sets." There must be a mind-set in both parties to work together. Therefore, the SME should seek to be the best company it can be to deal with, the ideal supply chain partner, while seeking transactions with those organisations who also seek collaborative relationships.

Wilding et.al (2006, p.15) gave the four steps to the transition from a transactional relationship to a collaborative relationship, which are:

- Step 1: Open Market Negotiations – largely price based discussions.
- Step 2: Cooperation – fewer suppliers with longer term contracts.
- Step 3: Coordination – information link developments such as EDI
- Step 4: Collaboration –supply chain integration, joint planning and technology sharing.

This process can be used by the SME to transform its interactions with other parties from a transactional relationship to a true supply chain partner. It must be remembered that collaboration cannot be expected instantly; indeed going to a customer or supplier and initially demanding collaboration would be foolish (Wilding (2003, p.33)). Humphries et.al (2004, p.5) stated it was through repeated successful fulfilment of expectations and exchange that the willingness to rely on each other occurred. The above four stage process discussed by Wilding is also known as C3 behaviour. Humphries et. al (2004, p.5) defined C3 behaviour (cooperating, then coordinating and finally collaborating) as jointly using resources to achieve harmony in operations. Wilding et.al (2006,

p.14) identified the first stage as cooperation which can be reached through engaging suppliers and customers in longer term contracts and the exchange of essential information. Wilding et.al (2006, p.14) stated that the next stage of co-ordination was exchanging workflow and information to make traditional linkages between partners seamless. Mason-Jones et. al (1999, p.4) identified sharing information would help deliver a more efficient supply chain. For example, Mason-Jones et. al (1999, p.4) stated sharing market sales data could and should be the catalyst for the entire supply chain. Wilding et.al (2006, p.14) identified collaborative behaviours which engaged partners in joint planning and processes achieved results not found in more distant relationships. To a monopoly supplier the benefits of partnerships can be highly attractive and hard to pass up on, despite the profits from opportunism. Humphries (2004, p.16) identified a good place to commence with the last stage of collaborative behaviour was to initially attempt small, simple, co-operative projects which improved efficiencies because these are non-threatening.

2.14 Monopoly Suppliers

The scenario being investigated consists of the purchase and sale of copyrighted material. For legal compliance all comic books must be purchased from the copyright owner, as such there will be a monopoly supplier in the supply chain. Therefore, the monopoly supplier relationship and the effects it will have on a supply chain need to be investigated.

Working with a monopoly supplier can significantly impact on a supply chain. Humphries (2003, p.11) when researching the situation in the UK Ministry of defence noted there was deliberate withholding of supply chain information, insular non integrative practices, commercial opportunism, unrealistic performance expectations and uncooperative product strategies. Humphries (2004, p.14) also identified practices such as adversarial commercial attitudes and practices, inadequate investment in specific assets, inadequate product development, inappropriate performance measures, opportunistically providing poor goods and services and the use of information as a weapon. These reduce the growth of trust and therefore the chances of obtaining equitable outcomes and ultimately collaboration.

 In addition, Humphries (2004, p.15) cautioned there will inevitably be a reduction in freedom of independent action which may affect the perceived quality of the relationship. Therefore, strategies must be implemented to minimise the effects of these limited choice relationships. Wilding et.al (2006, p.5) stated the application of "C3 behaviour" techniques reduced the inherently negative effects of close proximity and limited choice relationships.

Humphries (2003, p.18) through research came to the conclusion managers (in monopolistic environments) should try to synchronise objectives in the supply chain, undertake confidence building activities in the supply chain, pay attention to service and product delivery and measuring performance to support the growth of trust. Lynch (2009, p.165) cautioned that partners should trust each other, but, should also verify their suppliers performance and compliance.

Wilding et.al (2006, p.9) identified opportunism between supply chain partners is dangerous to inter-firm operations and once established is difficult to reverse. To remove it requires a strengthening of the relationship and creation of a reliable business infrastructure. Therefore, when commencing operations it is advised the SME engages in strong relationship building and a reliable value chain to prevent any opportunism entering the supply chain. The SME needs to be careful to guard against opportunism, including not participating in operations with those companies practicing it and not undertaking the practice either. While each business involved in the supply chain obviously wishes to be successful and make money, where one business is succeeding at diminished success to another, it is not true partnership or sustainable in the long term.

Humphries et. al (2007, p.23-24) stated initially you must know where you are in a relationship to allow targets to be set and remedial actions taken to remedy the situation (if needed). It is important to analyse the relationship between the supplier and the customer to know if opportunism is occurring. Lynch (2009, p. 26) endorsed detailed internal controls, checks and balances and oversight as one way to correct self interest in the supply chain. Humphries et. al (2007, p.6) gave five dimensions to be investigated as based on the organisational failure framework devised by Williamson (1975) to gauge the quality of the relationship:

- Creativity – degree of innovation present.
- Stability – uncertainty / complexity / relationship specific investments.
- Communication – quality of relationship communication.
- Reliability – effectiveness and efficiency of operations.
- Value – degree or share of joint relationship outputs.

These are highly relevant to the supplier-customer relationship in the analysed supply chain due to the highly interdependent relationship in a limited choice / monopoly environment between the supply chain partners.

2.15 Introduction to Inventory

A fundamental theory in business is the matching of supply and demand. Christopher et. al (2001, p.1) stated supply chain management attempted to match supply with demand, while driving down costs and improving customer satisfaction. Lynch (2009, p.117) went further in his analysis and stated supply chains are in fact slaves to demand where supply needs to match increased demand and supply needs to be able to be reduced due to a decrease in demand. Thus a supply chain should ideally be able to mirror demand with supply.

Shapiro (1984, p.120) stated if a product isn't available then the customer is unable to make the crucial first purchase. Therefore, it is important to ensure some inventory is in place to avoid the unavailability of materials due to circumstances which cannot be controlled (Lynch (2009, p.238)). Without product availability there is no way for a new supply chain to increase its end customer base. But, while inventory is traditionally put in place to add responsiveness to customer needs and desires, Etienne (2005, p.2) stated it can be a destroyer of supply chain responsiveness.

Inventory is traditionally used as a buffer between demand and supply and therefore has to satisfy two movements, of both increasing and decreasing demand. As Etienne (2005, p.5) stated, inventory is often incorrectly planned with a focus on increasing demand due to the cost of lost sales. However demand decreases also occur and can be just as significant in effect. Decreases in demand are dangerous with large inventory holdings as it delays the time in which the supply system adjusts to demand (Etienne (2005, p.7)). For example, if there are large holdings of inventory when demand is decreasing, some activities (e.g. production or regular purchasing) may need to be temporarily suspended to readjust the inventory level to the new desired level. In addition, Etienne (2005, p.10) stated for industries where product designs are changed frequently, substantial inventory holdings can be disastrous for a company's market competitiveness. This is due to the need to purge outdated inventory before moving onto new product/s. Having to purge inventory can necessitate that inventory has to have the profit margin decreased or even sold below cost to clear it from the supply chain; which in turn can increase the mark-up on other items to recover the lost revenue (Etienne (2005, p.12)). Thus it is important for the SME to understand where in the product life cycle each of their products are. Rogers et.al (1998, p.188) believed that in the future leading companies will manage their logistics based on where their product is in its life cycle, because products require different type of management and support as they progress through their life cycle. This has implications on the supply chain; For example there will be differing requirements for inventory holdings and transport speed for new products as compared to dated/obsolete comic books stocked.

Therefore a pull based supply system is to be sought to minimise inventory holdings and to attempt to balance supply and demand. This is because a pull system makes the end customer the focus of the network and from their order; the flow of information and resources is instigated. Etienne (2005, p.8) stated pull systems represent the pinnacle of supply chain responsiveness. Cook et. al (2005, p.57) stated pull systems generally decreased the material cycle time, minimised inventories and minimised storage space requirements.

This is important because as Hanover (2006, p.27) identified, inventory is a financial drain on the organisation and causes "*waste including quality issues, storage requirements, investments, limiting cash flow and obsolescence".* All these reduce a supply chain's responsiveness, flexibility and efficiently which ultimately affects its viability through increased costs and delays. Baker (2007, p6) added additional costs of increased damage, deterioration, shrinkage, insurance and management costs, as well as the more traditional cost of capital from holding additional inventory. Because of this Etienne (2005, p.2) stated managers should use actions to lower the inventory needed without increasing cost or reducing responsiveness.

2.16 The Inventory Rules

Bowersox et. al (2007, p.151) cautioned demand dependent replenishment required two conditions to be in place. These conditions were procurement should be relatively predictable and constant and the suppliers maintain an adequate inventory to cover 100% of demand (or capacity to deliver as per client demands).

Baker (2007, p.7) stated holding inventory at strategic places in the supply chain can be a buffer to customer demand, however, this also reduces the ability of the supply chain to immediately introduce changes as required by the customers. Therefore, the holding of safety stock inventory at a strategic stage is advised, however, it must be ensured this is at a level as not to delay changes required to match the operating environment. Thus the amount of inventory should be compressed to what is needed. Etienne (2005, p.10) identified inventory compression can allow the business to reinvest those resources recovered from waste in increasing product lines which can lead to such benefits as being able to:

- Offer new products to completely new market segments – by offering both substitution and complementary products.
- Target the same market further by offering them a variety of product options (which has positive marketing effects which may lead to an increase in volume).

Bowersox et. al (2007, p.152) provided three ways to introduce safety stocks into demand dependent replenishment situations. These are: safety time being added in to lead times, increasing the order by a margin for error estimation or by using statistical tools and measures. Due to the requirements of this thesis to implement solutions in a SME's supply chain with limited resources (and potentially limited education levels) simple solutions are being sought, therefore, the last option will not be considered. In addition, by not having operational data to work with, any statistical data would need to be estimated.

What shouldn't be done in inventory management was explained by Lee et. al (1992, p.65-73) who outlined 14 key pitfalls of supply chain inventory (along with their key symptoms) as:

- No supply chain metrics - This can be observed by the symptoms of performance measures not tracked, no attention to measures tracked, incomplete metrics and independent and disconnected sites.

- Inadequate definition of customer service - This can be observed by no measures for response times, lateness or backorder profiles and inadequacy of line-item fill rate measures.

- Inaccurate delivery status data - This can be observed by delays in providing delivery information and inaccurate delivery information.

- Inefficient information systems - This can be observed by the symptoms of delays and inaccuracies of data transfer, proliferation of operating systems for the same function and inadequate linkages among databases.

- Ignoring the impact of uncertainties - This can be observed by no documentation of tracking the key sources of uncertainties and practical information on sources of uncertainties.

- Simplistic inventory stocking policies - This can be observed by the symptoms of static stocking policies, generic and subjective stocking policies and stocking policies independent of uncertainties present. It should be remembered inadequate policies can restrict the supply chain as Goldratt (2007, p.2) went so far as to state: *"The real constraints are usually policies, not procedures or machines!"*

- Discrimination against internal customers - This can be observed by no service measures for internal customers, low priority on internal orders, inappropriate incentive systems and jockeying for priorities among the internal divisions.

- Poor coordination - This can be observed by the symptoms of no coordination between the different supplying divisions to complete an order, independent shipment information and no system information shared among the different internal divisions.

- Incomplete shipment methods analysis - This can be observed by no consideration of inventory and response time effects.
- Incorrect assessment of inventory costs - This can be observed by the symptoms of no quantitative basis for inventory holding cost assessments and omission of obsolescence and cost of re-work.
- Organisational barriers - This can be observed by barriers between manufacturing and distribution and independent performance measures and metrics.
- Product-process design without supply chain consideration - This can be observed by no consideration of manufacturing and distribution in product process design, no consideration in design for customisation and localisation and organisational barriers between design and the supply chain.
- Separation of supply chain design from operational decisions - This can be observed by the symptoms of chain decisions without consideration of inventory and response time efficiencies.
- Incomplete supply chain - This can be observed by the symptoms of focusing on internal operations only and inadequate understanding of the operational environment and needs to immediate and ultimate customers.

2.17 How is Inventory to be Stored or Handled?

In the rapid response system, minimal inventory is sought to be held. As such traditional storage such as warehousing is sought to be minimised in favour of cross docking the incoming comic books from the USA. The theory behind cross docking is to transfer an incoming shipment to outgoing freight without holding the goods in storage. Cross docking allows the consolidation and shipping functions required in a supply chain, while eliminating the need to hold inventory (Paciarotti (2009, p.1). Cook et. al (2005, p.55) stated the benefits of cross docking over storage of product was reductions in inventory, reductions in any storage space required, reduced handling costs, increased inventory turnover and accelerated cash flow.

Cook et. al (2005, p.56) endorsed in any cross docking operation having a check sheet to confirm Poka Yoke (lean terminology for mistake proofing) with a documented series of procedures to follow. Cook et. al (2005, p.57) stated having standardised work items in the cross dock arrangement would enhance operational stability. This would be achieved by documenting and visually posting the steps, estimating the timings and outcomes. Cook et. al (2005, p.57) stated visibility in the cross dock arrangement needs to occur by clearly signed work systems and tickets to track product movements across the cross dock.

2.18 Consideration of the Issues for Transport and Customs

Tseng et.al (2005 , p.1661) stated that Transport is of vital importance when considering supply chains, as it plays a connective role among the various processes that deliver value to the end customer. Therefore the transport providers required and the transport itself must be considered in detail when constructing a supply chain. Transport providers typically seek to balance and optimise their costs, efficiency and reliability (Rodrigue (2010 , p. 23); Their relative balancing and prioritising of each will impact on the efficiency, costs and reliability of the connective processes that links each step in the supply chain. Measuring service delivered by transport providers is less easily measured than their costs and should be based on the views expressed by the customers about the scope of services and their reliability (The World Bank (2011, p.4).

Wang et. al (2004, p.11) gave distinct characteristics governing delivery which need to be identified when choosing service providers. These are the volume of deliveries needed, delivery windows, handling requirements, any local restrictions on delivery times and requirements, and the geographical distribution of deliveries. As such any suppliers and services selected need to match the customer's demands.

The GFP (2005, p.2-3) identified automated customs systems such as used by Australian customs (including documentary only clearance) can allow / facilitate trade as it allows an easier flow of goods across borders by reducing the time required at entry/exit of the country. Because SME's may not have expertise and experience on how best to utilise systems and process international trade documentation they can have increased delays and costs. As such, an SME should seek advice on how best to optimise their processes for efficient, timely and cost effective trade. Having an efficient customs clearance and international trade documentation processing system reduces the lead time dimension within the supply chain. Lee et. al (1992, p.71) stated customs procedures need to be factored into strategic product flow planning as customs procedures add to the variability and length of lead time as well as the inventory held in transit. Any imports with a gross value under AUD 1000 into Australia do not attract any GST or duty charges in their imports. As such, SME's with their smaller importations can through more frequent and smaller shipments take advantage of this loophole.

Kamaruddin (2002, p.94) identified by having direct supply to the market and by minimising non value adding costs in distribution savings can be generated by SME's. These two points illustrate the importance of using lean waste elimination principles in transport decisions. This must not just be

focused on transport costs, but also the time element of transport and the inventory level that result from the choice of transport mode.

Lynch (2009, p.215) identified by providing better access to delivery information such as online tracking and delay alerts "Best Buy" improved its supply chain by improving its ability to get the products in time to the right place to sell. While there were variations in delivery, with transparency, these could be identified and the negative effects of these could be mitigated. It is therefore important for an SME to have this transparency with its transport partners.

Jain (2011, p.2) stated the use of third party logistics providers by SME's can allow growth of services or networks without additional investment. That is, by linking with a logistics provider additional competencies and efficiencies can be introduced by more efficient transport and customs clearance operations. In addition, it allows the SME to gain access to expertise and knowledge otherwise not possessed. However, by the outsourcing it must be ensured inventory control is maintained (Lynch (2009, p.165).

2.19 The Lean Methodology

Abdullah (2003, p.18) stated Toyota faced material, human and financial resource shortages after World War 2 so the Japanese car-maker knew they could not compete by copying what other car makers were doing. Given Toyotas international current brand recognition and market share, this rise from disadvantage to global leader can be seen as a recipe for success. Their situation can be likened to many SME's who also face resource shortages. As a result of the challenges faced, Toyota implemented a less conventional way to undertake manufacturing to compete, which has evolved into the Lean Theory of today. Harvey (2004, p.2-3) states in 1996 the world was introduced to "Lean Thinking" in a book written by Womack and Jones which outlined the basics of what lean manufacturing is in 5 steps:

- *Step 1: Specify value.*
- *Step 2: Identify the value stream – line up activities which contribute value, eliminate those which add no value.*
- *Step 3: Create the conditions for value to flow smoothly through the stream.*
- *Step 4: Have the customer pull value from the stream.*
- *Step 5: Pursue perfection – work on improving the responsiveness of the production system to the customer demand for value.*

Poppendieck (2002, p.3) defined lean as a way to understand what value is and to decide what activities and resources are necessary to create the value, with everything else being seen as waste

and eliminated. Grizzell et. al (2007, p4) agreed on this definition when they stated the lean ideology was a relentless pursuit of identifying and eliminating waste in all business processes. This needs to be an on-going process where waste is removed layer by layer in a continuous removal of waste in the system as it arises or is identified. This continual improvement (or Kaizen) is a fundamental in lean methodology because there is always improvement possible in any supply chain. Hines et. al (1997, p.46) stated a supply chain should identify the waste in the chain and find a way to remove where possible or at least reduce the waste. McCarron (2006, p.6) summarised the seven wastes of lean methodology as over delivering on volume, waiting for the work to be ready for the next process, conveyance or transportation ,over processing because of poor design (i.e. not just producing what the customer values), having inventory levels too high, inefficient human motion and having to correct defects. Notably however, McCarron (2006, p. 6) cautioned one shouldn't attempt to eliminate waste in one stage in isolation without first considering the effects the removal of waste may have on other parts of the system. For example, the complete removal of inventory could result in an imbalance or a failure of the other parts of the system in their ability to meet customer demand.

Hines et. al (1997, p.47) expounded on the theory of Mosden relating to operations in manufacturing and stated there are three categories of operations undertaken in business:

- Non value adding – pure waste and unnecessary actions which should be eliminated.
- Necessary but non value adding – wasteful, but may be necessary under the current operating situation. The effects of these should be minimised and often through system changes can be eliminated.
- Value adding – the conversion or processing undertaken creates value.

Lean can also help maximise constraint utilisation by removing waste and hence increasing throughput through the supply chain system. Hanover (2006, p.27) identified in particular a key emphasis in lean methodology being standardised work instructions. These are simply instructions which specify the resources required in each process, the sequence and timing of operations, any actions required and the quality that needs to result from each process. When used correctly these can decrease waste, increase output and standardise quality and as such it makes sense to apply this in the supply chain. Christopher et. al (2004, p.3) identified process control is a way output variation can be reduced. Thus by designing the processes correctly the outcome can be designed and managed by using standardised work instructions.

The 5S's are a powerful tool from lean manufacturing to increase the efficiency and quality of operations. Where possible all organisations and supply chains should attempt to implement these. Moore et. al (1998, p.19) defines the 5S's as:

> *5S is comprised of the activities listed below, which collectively translate to a clean-up activity at the work place. The intent of 5S is to remove the muda associated with clutter and disorganization. Seiri – separate the necessary things from the unnecessary and discard the unnecessary. Seiton – Neatly arrange and identify things for ease of use (a place for everything, and everything in its place). Seiso – to always clean up; to maintain tidiness and cleanliness—to clear your workplace thoroughly. Seiketsu – To constantly maintain the 3S mentioned above, Seri, Seiton, and Seiso. Keeping a clean workplace without rubbish or oil leakage is an example of Seiketsu. Shitsuke – to have workers make a habit of always conforming to rules.*

The 5S's can lead to substantial benefits. Goodyer et. al (2011, p.142) gives five benefits of implementation of the 5S principles for workplace organisation:

> *"Pride and personal ownership of the workplace, Highly visible factory, Clear indication of the commitment to change, Good foundation for improvements and A better working environment."*

Lynch (2009, p.156) suggested in supply chains all members need to be empowered to raise a red flag when inferior quality is detected, as per the Jidoka principle of lean where if a defect is detected the worker has the ability to stop the production line.

2.20 The Importance of Time

Wilding (2003, p.31) identified the time aspect in supply chains needs to being measured and valued and stated inter-process transparency and trust between parties are present in highly successful supply chains. Understanding the time factor in the supply chain allows organisations to gain transparency, which in turn enables everyone to understand what will occur, which in turn allows trust between parties. This includes the end customer trusting the supply chain to deliver.

One of the lean methodology's aims is the minimisation of non-value adding time. Hout et. al (1990, p. 60) noted efficient time use can be a way to gain competitive advantage. Wilding (2003, p.33) stated there are three key criteria which determine if something contributes value adding time, or if it is a waste:

- Whether the subject of analysis is altering the product / service towards the requirements of the end-user.
- Whether the subject of analysis is producing something which the customer is willing to pay for.
- Whether the process is being completed correctly the first time with no requirement for re-work.

Wilding (2003, p.33) endorsed a time based process map is a way to gain transparency into the supply chain and identify if a process is value or non-value adding. Such a map would also serve as a valuable way for any stakeholders in the supply chain to gain transparency as to their role in and the nature of the supply chain as a whole. Time is an excellent measure of a supply chain, as time is a common measure across all supply chains, whereas, cost and price data can be open to interpretation (Wilding (1999, p.17)). Therefore, any value stream mapping should also record the time at each process. Wilding (1999, p.17-20) identified that the aim to reduce the wasted time in the supply chain (termed time compression) has the benefits of improved customer satisfaction, reduced inventory levels by 50-80%, productivity improvements of greater than 50% and increased quality by 60-80%. Blackburn (1991, p.253) termed time compression a *"powerful competitive weapon."* In addition, Wilding (1999, p.17-20) stated the activity of undertaking a time compression project has been seen to have the other effects of:

- Validating and prioritising the change opportunities available to the supply chain.
- Achieving total process visibility through time measures.
- Providing a foundation for a time based organisation, which can be in line with organisational objectives.
- Enabling agility in all systems, which in turn, will improve end customer satisfaction.

Examples of non-value adding time are queuing time, rework time and wasted time due to management indecision (Wilding (1999, p.17)). These can all be seen as being similar to the wastes as defined by lean theories discussed earlier. Etienne (2005, p.7) stated knowledgeable customers place a large emphasis on lead time compression as it ensures means both a quick response to their demands and also a reduction in safety stocks. Blackburn (1991, p.259) stated, quick response in existing operations generally needed a reduction in cycle times. As such cycle times need to be measured and analysed. Bhagwat (2007, p.46) stated total order lead time can be derived by the below equation:

Total order lead time = order entry time + order planning time (design + communication + scheduling time) + order sourcing + assembly + follow up time + finished goods delivery

Etienne (2005, p.8) stated where possible actual lead time should be equal to the lead time demanded by customers. But, this seldom if ever occurs in reality due to resource constraints and product construction times; so due to this time difference an inventory buffer is needed (Etienne (2005, p.8)). But Etienne (2005, p.2) stated inventory itself can have a significant impact in the material flow time present in the supply chain with large inventory holdings slowing down material flow times.

Time and inventory compression improves a responsive supply chain by reducing batch size which compresses time in order processing, order picking and shipping cycles (Blackburn (1991, p.251). Reducing the batch size also streamlines work flow and significantly reduces time lost in value delivery systems (Hout et. al (1990, p.77)). Lynch (2009, p.215) stated by using more frequent but smaller shipments of product coupled with distribution centres situated closer to the client, this allowed "Best Buy" to contract their supply chain.

2.21 The Theory of Constraints (TOC)

Goldratt (2004, p.49) summarised the goal of business was to "*make money by increasing net profit, while simultaneously increasing return on investment, and simultaneously increasing cash flow.*" This was corroborated by Feller et. al (2006, p. 3) who stated profit itself can be seen as a value, which is created by a supply chain. The Theory of Constraints (TOC) methodology provides useful tools which can be readily applied to the rapid response supply chain. Goldratt et.al (2007, p.1-*2)* summarised one of their key theories in a simple sentence as:

> "*TOC is elegantly simple. Throughput (T) is the critical index of performance. Inventory (I) and Operating Expense (OE) are the other two*"
> * ***Throughput*** *(T) is the rate the system generates money through sales, not production.*
> * ***Inventory*** *(I) is the total money invested in purchasing things intended to sell.*
> * ***Operational Expense*** *(OE) is the money spent to turn inventory into throughput.*
>   *All three measures are optimized simultaneously*".

The SME should desire to have throughput increasing while simultaneously decreasing their operating expense and inventory. The SME should never sacrifice throughput for a decrease in operating expense or inventory levels, because all value creation and hence profit comes from throughput.

Calipinar (2007, p.97) identified due to the dispersed nature of the SME's participating in international supply chains and their relative inability to achieve total integration problems such as bottlenecks can arise. Calipinar (2007, p.90) stated there was the need for SME's to remove bottlenecks in order to develop. One of the key principles of the theory of constraints is to manage bottlenecks. Goldratt's theory of constraints (TOC) seeks to maximise a supply chain by making bottleneck process operations more effective by removing waste, maximising throughput, while minimising non-productive time.

The TOC states processes are either a bottleneck or a non-bottleneck; with a bottleneck being a process where the flow through the stage is less than demand. The aim of the TOC is to maximise bottleneck utilisation to cover 100% of demand, as bottleneck output will correspond to system output. Each supply chain will have bottlenecks in it which will constrain the capacity of the system. Not all bottlenecks are due to inadequate infrastructure or resources, but some are due to inefficient processes or poorly trained workers which hinder the efficiency of resources and infrastructure. One important strategy under the TOC to improve the efficiency of a bottleneck is to ensure all quality checks are placed in front of the constraint to ensure all items are of quality items, there is no rework or waste. This can be seen as similar to the lean methodology which seeks waste removal; however, lean seeks this at a system wide level.

The TOC methodology as espoused by Goldratt et. al (2004, p.300-301) is identifying the constraint, deciding how to exploit the constraint, subordinating everything else to maximise the constraint, elevating the systems constraint and going to back identifying constraint (while watching out for inertia).

Grizzell et. al (2007, p2) stated that six sigma requires significant investment in upfront training, time and people to carry out projects and leadership commitment. Additionally, Grizzell et. al (2007, p2) stated some problems may not require six sigma's highly intensive methodology. However, Grizzell et. al (2007, p3) identified the DMAIC problem solving process (a six sigma methodology) as a simple, yet powerful tool which was advocated under six sigma methodology. Grizzell et. al (2007, p.3) stated this model has five stages leading to operation improvements which were to define, measure, analyse, improve and control any problems. Abdul-Razzak et. al (2009, p.550) advocated merging DMAIC with the TOC methodology to gain the benefits of both. Abdul-Razzak et. al (2009, p.550) stated the advantage of using the two methodologies were six sigma solved complex problems which required deep solutions while TOC unveiled any bottlenecks and expanded them. That is, TOC can be used to immediately to stabilise the system and obtain immediate benefits, while six sigma can later go in and reduce the variation or resolve the problem.

Abdul-Razzak et. al (2009, p.550–554) gave a basic and easy to understand methodology merging TOC and DMAIC into a 10 step process of:

- Step 1: Identifying the constraint by looking at the situation to analyse the core problem.
- Step 2: Defining the area following the constraint. While similar to identifying the constraint this involves creating statistical indicators in relation to the constraints and its dependent processes.
- Step 3: Measuring the constraint to ensure it is truly a constraint and the variation is not a result of variation in inputs or environmental conditions.
- Step 4: Analysing the constraint and its solutions. This involves cause and effect analysis and or brainstorming to identify solutions.
- Step 5: Exploiting the constraints involves maximising the constraints efficiency.
- Step 6: Subordinating the constraint involves making the other processes function in such a way to maximise the efficiency of the constraints operations.
- Step 7: Verifying the data. This is added to ensure the solutions proposed are still valid and correct, since subordinating the constraint may affect its operations.
- Step 8: Improving the project involves verifying whether the proposed improvement has had an impact on the area or if another approach is needed.
- Step 9: Elevating the constraint involves the SME looking for the best approach to break the constraints limits.
- Step 10: Controlling and watching for inertia ensures the improvements and modifications are improved over time. This involves maintaining and using the same data analysis tools used earlier.

Abdul-Razzak et. al (2009, p.553) stated their model increases the production of constraints as well as reducing the variation in the supply chain all while a firm has limited resources.

2.22 What is Value in the Supply Chain?

While the concept of value is often used in business and supply chain management literature, what exactly is value from the customer's perspective? This needs to be defined for the SME so they can design their processes to add value as the end customer perceives it. There are several forms of value from the customer's viewpoint. Feller et. al (2006, p. 3) summarised these as:

- The product value – the value provided by the good or service.
- The service value – services that surround the product such as personal care and warranty services.

- The "wow value" which makes the customer successful rather than just satisfied.

Some processes will not directly give value to the customer, but, will add value to supply chain partners thereby increasing their ability to deliver value to the end customers. Value creation is different for business to business transactions when compared to value in business to customer transactions. Feller et. al (2006, p. 2-3) summarised the business to business transaction value as having three parts:

- The technical value which is intrinsic to the resource, good or service being provided.
- The organisation value which is related to the exchange; namely ethical standards, prestige, reliability and association.
- Personal value is the value that accrues to the individuals involved in the business to business transfers such as trust, manager motivation, preferences and feelings of comfort in the exchange.

2.23 The Architecture of a Value Chain

To be successful a supply chain needs to know its processes and how its value is created. Fine et.al (2002, p.70) stated it was the structure of a supply chain which dictated what is made, when, where, by whom and how. Knowing this in itself makes a supply chain more able to respond to factors which may alter the supply chain and hence alter its ability to deliver value to the end customers.

By designing the supply chain correctly, it is possible to design the supply chain to deliver the end customer's exact requirements. Hout et. al (1990, p.60) stated that by having the correct structure in supply chain operations it was possible to execute processes much faster than before. Thus, it can be derived that a prerequisite for efficient use of time is having the correct structure in place.

This is a new enterprise and as such the culture can be designed and implemented from the start. Christopher et. al (2001, p.13) stated a barrier restricting change in existing supply chains is the creating of an understanding of a new system, namely the creation of a customer focused culture. By designing a responsive customer focused supply chain from the start, a strategic advantage over existing competitors will be present. Hout et. al (1990, p.60) recommended a supply chains structure should be designed to enable fast responses rather than emphasising low costs and controls. By knowing the structure of the supply chain, the idea of shrinking the geographical supply chain can be evaluated, this is a risk mitigation activity (Lynch (2009, p.238). In addition, by shrinking the geographical supply chain the benefits of simplifying the supply chain and time compression can be achieved thus improving efficiency.

2.24 Value Stream Mapping

Christopher et. al (2001, p.12) stated real and effective change needs the mapping of and understanding of all relevant business processes. Thus by graphically depicting the structure of the supply chain to understand it at the start of the enterprise, change can be implemented later if needed by knowing how and where to apply change. This was agreed upon by Grizzell et. al (2007, p.4) who proposed starting the process of waste elimination by defining the current state through value stream mapping with value being defined from the viewpoint of the customer.

Hout et. al (1990, p.61) stated one of the reasons to conduct process mapping was the quality of systems is often the reason for sustained competitive advantage rather than its technologies, products or services. Thus it is important to know, see and analyse the quality of the system that is the supply chain. Calipinar (2007, p.93) also advocated discussing the institutions involved in and the channels which exist in supply chains and then displaying these conceptually and systematically. Calipinar believed this would accelerate the development of supply chain management methodology usage among SME's.

Hines et. al (1997, p.51) gave a summary of the process for value stream mapping which will be provided to the SME of:

- Step 1: Study of the flow of processes. This can be started by creating a preliminary analysis of the process then a more detailed recording of all items resulting in a simple flow chart of activities. Following on from this, it is necessary to identify total distances moved, time taken and people involved. All this then needs to be calculated and recorded along with the "5W1H" which is answering – Why does it occur? Who does it? Using what Resources? Where? When? How?
- Step 2: Identification of waste processes (or adding to this the categorisation of value adding, non-value adding and necessary but non value adding).
- Step 3: Consideration whether the process can be rearranged in a more efficient sequence.
- Step 4: Consideration of a better flow pattern involving a flow layout or a transport routing.
- Step 5: Identifying if everything done at each stage is truly necessary and what would happen if tasks were removed.

2.25 Why and How to Get Close to Customers

Womack et. al (2005, p.2) entreated customers and their suppliers to partner together to collaborate on reducing wasted time and total costs in the supply chain. Womack et. al (2005, p.2) gave reasons why it was important for a supply chain to partner with its customers:

- With a deregulated economy consumers have a greater range of choice.
- Information technology is blurring the boundary between consumption and production in that customers are now doing traditionally producer run activities, e.g. entering in orders.
- Social trends are occurring where time and energy are being drained from people and therefore they do not wish to spend long times selecting goods and services. For example, people are working longer hours with longer commuting time and so have reduced leisure time.

What these illustrate is commercial providers should seek a competitive advantage with their clients, by minimising the time the clients need to invest in receiving the value the supply chain delivers. Feller et. al (2006, p.1) stated two critical questions which need to be asked and answered when strategizing value. These are to know who the customers are and what they value. Wilding (1999, p.22) identified to do this and therefore focus on the end customer, which should be the aim of the supply chain, requires high levels of empathy with the customer to truly understand what they desire. Not only is this important for competitive advantage, but a key risk to all supply chains is the lack of information from the market (Juttner et. al (2009, p. 205)). Womack et. al (2005, p.2-4) stated there are six ways to endear your products / services to the customer by minimising their time and effort and delivering their desires (Theory of Lean Consumption):

- *Solve the customer's problem completely by insuring that all the goods and services work, and work together.*
- *Don't waste the customer's time. It is important that all the time the customer is involved in the process is value adding time in their perception.*
- *Provide exactly what the customer wants.*
- *Provide what's wanted exactly where it's wanted.*
- *Provide what's wanted where it's wanted exactly when it's wanted.*
- *Continually aggregate solutions to reduce the customer's time and hassle – Continually evaluate what you can do for the customer to link them in.*

Thus, it can be seen the theory is to analyse and then minimise the customers time spent interacting with the supply chain to obtain their desired product. Womack et. al (2005, p.6) endorsed when conducting value chain analysis, identify what the customers time in the process of service delivery is and measure both the total consumer time and total producer time. As such, this will be a technique recommended to the SME.

2.26 Why Measure

The ultimate goal with this research is to create an efficient and performing supply chain. Sharman (1984, p.77) identified that just designing a system is not enough; the key measures must be identified so priorities for planning and especially control of the system can be gauged. This is because it is critical to know how the supply chain is performing in order to maximise its efficiency and to implement and measure any improvements. As such, Klapper (1999, p.1) stated that performance measures (metrics) should be used to monitor the progress of supply chain initiatives.

Santos et al. (2006, p.1) stated true performance measurement requires using the right measurements in the right place to know the health of the supply chain. With this in mind, the Goldratt Institute (2009, p.2) stated the core constraint on many organisations is the system is measured in parts, not as a whole. Therefore it is important any measures put in place measure the supply chain as a whole, not as parts, to get true performance measures.

The right measures at the right time can even foster improvement in the supply chain. Cook et. al (2005, p.57) identified if key performance measures are tracked and then communicated to employees then that in itself can facilitate continuous improvement.

So what characteristics does the measurement system need to have? Grizzell et. al (2007, p5) recommended managers need to take a balanced look at key results measures of an organisation, rather than relying too much on financial measures which provide a historical look at organisational performance. Santos et al. (2006, p.1) went further and identified to really manage the performance of the supply chain demands use metrics based on the organisations strategic goals. Finally, Cai et. al (2011, p.512) identified continually improving supply chain performance requires an analytical performance measurement system and a way to initiate steps to measure key performance indicators (KPI's). But does such a system exist?

2.27 The Balanced Score Card (BSC)

Bhagwat (2007, p.60) stated that the balanced score card methodology represents "*a strategic supply chain management evaluation tool that can be used to monitor and guide specific projects and general performance improvement efforts.*" Rohm (2008, p.2) likened it to putting a mosaic together. A strength of a balanced score card is that it identifies cause and effect relationships. Each action in a supply chain will have a reaction, that is, there will be cause and effect relationships in all business activities (Bhagwat (2007, p.56)).

Brewer et. al (2000, p.76) stated the balanced score card helps firms that have historically overemphasised short term financial goals to utilise other more operational based measures. Grove et. al (2008, p.2) added to the advantages of a BSC when they stated a balanced score card enabled management to measure the key drivers of performance and a BSC puts vision and strategy at centre of management's attention. Brewer et. al (2000, p.91) went further and identified that the balanced score card when used in supply chains:

- Emphasises the inter-functional and interdepartmental nature of a supply chain (when the correct measures are in place).
- Gives a balanced measure that can be used by managers and for all in the supply chain.
- Can allow a truly tailored measuring system for what the firm's goals and strategies are. Balanced score cards can be individually tailored and new measures are only limited by the imagination.
- Can help focus on goals not currently measured or traditionally measured (e.g. by not just measuring historical financial issues).

Grove et. al (2008, p 2) gave four perspectives which need to be measured and together make up the BSC:

- A customer perspective, which defines how our customers see the supply chain.
- An internal business perspective, which states what must be exceled at.
- An innovation and learning perspective, which asks can the supply chain continue to create value into the future?
- A financial perspective, which asks if the supply chain or firm is profitable and financially sound?

While it may seem convenient to copying an existing score card used in another supply chain, the score card needs to be unique and designed to the supply chain being analysed. No two supply chains are alike and therefore a measurement program or control system from another situation cannot be immediately applied to your own supply chain (Lynch (2009, p. 29)). But this is an advantage as the BSC can be truly tailored to measure each supply chain.

2.27.1 The Customer Perspective

The customer perspective asks the customers what they believe the firm must do successfully (Brewer et. al (2000, p.83)). This is done by measuring those aspects of the supply chain that the customers value. Santos et al. (2006, p.2) endorses that firms measure the performance as defined

by the customer metrics which should consist of evaluating the supply chains forecast accuracy, market share and quality (conformity %). Santos et al. (2006, p.2) then recommended measuring logistics performance (from a customer perspective) by examining on time delivery and damaged shipments. Bhagwat (2007, p.49) also endorsed the measuring of logistics by examining on time delivery alongside number of faultless deliveries.

Brewer et. al (2000, p.86) stated the relative customer order response time shows how the customers perceive relationship between customisation and response. The relative customer response time is the time from order to end customer delivery, which is then compared to competing supply chains. This measure would also start to measure the responsiveness of the supply chain. Bhagwat (2007, p.46) also discussed the need to measure the service level delivered compared to competitors and overall customer satisfaction.

Bhagwat (2007, p.45) stated that to measure customer satisfaction a supply chain needed to measure customer query time, its flexibility to deliver exactly what the customer requires and post transaction service. By these measures the flexibility the supply chain delivers can be gauged. Christopher et. al (2001, p.2) defined flexibility as a key characteristic of an agile organisation.

2.27.2 The Financial Measurements

Financial measures must be seen as the checks and balances to ensure the viability of the enterprise (Brewer et. al (2000, p.90-91)). Success in the other three measurements on the balanced score card can be irrelevant if the financial side of the supply chain is not in order. Santos et al. (2006, p.3) stated that when measuring financial perspective, the following need to be examined:

- Sourcing efficiency by measuring the total material acquisition costs.
- Warehousing efficiency by measuring the cost of carrying inventory. Bhagwat (2007, p.50) endorsed a more comprehensive measure of the total inventory cost which encompasses all costs relating to inventory.
- Logistics performance should be measured by total logistics costs.
- The traditional accounting process measures such as cash flow, EBIT, income, return on investments (ROI) and return on assets.

Brewer et. al (2000, p.90) stated that examining the cash to cash cycle is also an important measure as it gives the average time to transfer money spent into revenue. Brewer et. al (2000, p.90) endorsed when measuring the financial aspects, it was important to measure customer sales growth and profitability per customer. The reason for this, Brewer et. al (2000, p.90) identified as it was

desirable to always be increasing the base of profitable customers while ignoring unprofitable sales opportunities.

One key proviso is that the financial measures put in place need to be those measures that will lead to increased financial performance by the supply chain Bhagwat (2007, p.56) . Some financial measures can be emphasised which are to the detriment of customer service or operations. Etienne (2005, p.15) stated, the overall responsiveness of a company could be measured by how fast it can convert market opportunities to profit. That is summarised in the Net Conversion Cycle (NCC) equation which is used to illustrate the ability to sustain strategic development. Etienne (2005, p.15) stated the equation is:

NCC = DI + DR + DP

Where: DI = Days Inventory, DR = Days Receivables and DP = Days Payables

While days payables and days receivables are largely defined by the market norms, inventory is the one driver which can be used to maximise the NCC equation through inventory turns (Etienne (2005, p.15)). Increasing inventory efficiency has the effect of increasing the speed at which the supply chain can convert market opportunities to profit.

2.27.3 The Internal Perspective

The internal perspective asks what must be done by the supply chain to meet and exceed the end customer's needs (Brewer et. al (2000, p.83)). Brewer et. al (2000, p.84) stated there were four key performance attributes which should be added to measure this:

- Quality orientated measures, for example, scrap rates.
- Time based measures such as throughput or total cycle time.
- Flexibility measures such as the changeover time or yield time between products.
- Cost measures broken down into the cost per unit or the percentage of non-value added costs.

Santos et al. (2006, p.3-4) identified three key internal business process perspectives which also need to be measured:

- Sourcing measures such as supplier on time delivery, material inventories, material quality and supplier cycle time.
- Planning measures such as % of order delivered according to plan, schedule changes and Bill of Materials accuracy.

- Delivering and storing measures such as finished goods inventory turn and stock keeping units held.

Brewer et. al (2000, p.87) introduced the idea that supply chain cycle efficiency can be measured by the ratio of total value added time in the supply chain divided by total time in the supply chain. The goal of this measure should be the total value added time is 100% (or as close as possible to it) of all time in the supply chain.

As discussed earlier, total lead time can give an idea of the responsiveness of the supply chain, with a shorter lead time being more desirable to clients. Therefore the total supply chain cycle time should be measured. Bhagwat (2007, p.46) stated the total order lead time can be derived by the below equation:

Total order lead time = order entry time + order planning time (design + communication + scheduling time) + order sourcing + assembly + follow up time + finished goods delivery

2.27.4 The Innovation and Learning Perspective

The innovation and learning perspective of the balanced score card defines what needs to be done to retain and excite customers (Brewer et. al (2000, p.84)). Santos et al. (2006, p.4) defined two key measurements which could show the innovation and learning perspective:

- Innovation can be measured by the ratio of new product development to total products (often expressed as a percentage).
- Social responsibility can be illustrated by the amount spent on social program investments in relation to revenue or turnover.

Given the SME being analysed will consist of a sole operator, the additional measurements which would be applicable when staff are employed, such as their personal development, are not investigated here.

2.27.5 Implementation of the Balanced Score Card (BSC)

Like most theoretical tools the actual implementation of a balanced score card can be fraught with perils. Santos et al. (2006, p.5) gave a way to implement the balanced score card metrics consisting of six steps:

- Step 1: Use the business model and strategy to define business goals.

- Step 2: Use the business goals to identify the KPI's (performance measures) which should be used.

- Step 3: Implement the performance measures.

- Step 4: Use the scorecard to verify the goal achievement / rectify KPI.

- Step 5: Use metrics to track progress against goals.

- Step 6: Analyse the progress and defined goals to confirm the firms strategy is being implemented.

This process aligns the implementation with the firm's organisational strategies and goals. Rohm (2008, p.1) stated that performance measurement on balanced score cards should measure what is wanted to be improved or achieved, not what currently is. Rohm (2008, p.4) stated the real value of the BSC is the continuous self-enquiry, in depth process of discovery and analysis that results from it being used correctly. A BSC should be seen as not just a measurement tool, but a tool used to identify what is occurring by examining trends and movements in metrics. The Six Sigma Forum (2004, p.7) stated, when correctly implemented and used, it would focus attention on variations in performance against targets set, therefore it allows for prioritisation of projects and opportunities against objectives and strategies.

While there are specialist computer programs available, Bhagwat (2007, p.58) identified balanced score cards had been applied and used in 3 SME's in practical situations by being maintained on spread sheet computer programs. Spread sheet programs are now a standard feature on nearly all computers, therefore are a perfect measurement tool for the SME.

Bhagwat (2007 p.59) when analysing the real world application of balanced score cards to SME's identified three key failures from BSC implementation. These were, firstly the failure to include long term measures. Secondly, the failure to communicate intent of and contents of balanced supply chain score cards. Finally, the BSC implementation failed to include the key performance drivers and identify cause and effect relationships. Cai et.al (2009 , p.513) clarified this point when they stated that the BSC failed to allow in depth quantitative analysis of cause and effect relationships or ranking among hierarchical relationships. While this can be seen as a failure of the system, it is unlikely an SME would have this analysis as a priority or possess the ability to conduct the in depth quantitative analysis. Cai et.al (2009 , p.513) did state that the BSC could describe business processes well and allow communication of performance, which is exactly what is being sought for this supply chain.

It is of importance that in any implementation the intent and contents of the BSC be communicated to all stakeholders. In addition, the BSC needs to show the long term trends of the key performance

drivers that the strategic plan dictates. Finally the results of the BSC need to be able to identify the causes of and effects that occur as a result of strategic business decisions. With every action to change a step in a supply chain, there will be effects on other processes. As such, the balanced scorecard and any metrics should be used to not just measure, but to truly understand the supply chain.

2.28 The Risks of International Trade

While SME's have barriers to international operations simply engaging in overseas trade can be perilous. It is critical SME's in particular due to their lower resources base are made aware of the risks before any undertaking. For example, Lynch (2009, p46) stated using contract manufacturers in third world countries which have poor infrastructure, political instability and little regulation invites problems. Therefore further investigation into the nature of international supply chains is needed. Sourcing globally introduces five major risks into the supply chain as per Wilding (2006, p.2):

- There is the risk the total cost of purchase may be much higher than first anticipated. For example, duty, warehousing, transportation, inventory and lost sales all add to the cost of the product provision to the end customer. These costs may vary from each shipment to shipment and all these costs need to be factored into the total cost.

- Having a long (geographically speaking) supply chain with a substantial lead time from order to product delivery is more likely to be less responsive as a local or shorter supply chain. This in turn increases both risks to the supply chain reliability and increases costs to the supply chain through longer lead times. Vernimmen et.al (2007 , p.209) agreed further stating that a lengthy supply chain both in distance and number of participants can make it very difficult to guarantee a reliable lead time.

- There are risks to the product quality and process execution within the supply chain due to the large distance between participants. For example, there can be large and substantial information transfer problems due to differing systems, languages, time-zones and cultures.

- Valuable know how may need to be given to suppliers who could in turn use this to sell to other potential competitors.

- There can be a risk to long term supply due international incidents, trends and cyclical disruptions.

While a difference in competitive advantage between regions leads to trade, differences in regions can also interrupt the flow of goods, services and information. Goh (2002, p.38) stated that different

rates of trade, economic and logistics development can and does hinder the flow of goods and information between processes in the supply chain.

In addition, Lynch (2009, p43) identified international trade often meant relying on unknown infrastructure, with corresponding exposure to domestically unknown risks such as social issues, health hazards, loss of corporate memory and the loss of ability to inspect the supply chain processes at will. Complicating this Lynch (2009, p.57) stated, the risk contributors to supply chains often vary according to the geographical level of development. For instance in developed countries some of the risk contributors will be supply chain availability, the cost and quality of labour, regulatory concerns and the reliability of suppliers. Contrasting this, in emerging economies the supply chain typically has to contend with infrastructure issues, currency fluctuations, commodity shortages, access to transportation, limitations caused by terrain and weather. As such, it needs to be understood that the process of sourcing internationally can open up new risks to the supply chain which Australian and New Zealand SME's may not be familiar with and may not have historically faced. Adhikiari (2002, p.104- 105) when investigating SME's supply chains in Nepal added other barriers of:

- Geography and natural resources – These can hinder flow of information and products and demand increased costs through most resource intensive transport or requirements to import resources from other regions/countries.
- Economies of scale – Smaller markets may hinder access to resources / partners and to investment in production or infrastructure.
- Government institutional support – Inadequate levels of government support can hinder the supply chains competitiveness. This resourcing does not necessarily need to be financial but can be information based or related to regulatory compliance.

International supply chains result in the exchange of money from one currency to another. Therefore, one important concern for international supply chains is currency instability (Goh (2002, p 39)). Currency fluctuations can result in variability in the costs of both the products transferred and the costs of purchasing transportation services.

Simply having differing governments can introduce a multitude of varying laws and regulations applicable to the supply chains operations. If there are restrictive laws and regulations present, it can interrupt the ability of a supply chain to efficiently move products or information accurately, efficiently and/or quickly (Goh (2002, p 39)). Political instability in any of the countries of trading

partners can also cause disruptions and/or introduce uncertainties into the supply chain (Goh (2002, p 38)).

In addition, if there is a lack of co-ordination between different transport and logistics providers then excessive documentation and poor connectivity between processes can result; in the supply chain this causes longer transit times, delays and increased costs to the participants in the supply chain (Goh (2002, p 39-40)). Not only is the co-ordination of logistics important, but inadequate or out-dated logistics infrastructure hardware (technology, systems or facilities) and software (including the manpower and knowledge to run the system) anywhere in the supply chain could lead to a slower, less responsive/flexible and less productive supply chain (Goh (2002, p 39-40)). Wilding (2006, p.1) stated that success sourcing products using international supply chains requires high levels of transparency, that is knowing what is coming and proactive relationships between everyone in the supply chain. Blackburn (1991, p.252) gave an example where several organisations in the consumer apparel mail order industry prospered (while their competitors floundered) by introducing systems which allowed their customers to know in real time when and where their orders were, that is giving customers the additional value that comes from transparency. Baker (2007, p.6) stated that in international supply chains there is a tendency to increase inventory (and hence its costs) for three reasons. Firstly, the lead time from order placement to delivery is longer. Given that safety stock often increases in a square root relationship to lead time, this longer lead time can lead to much higher inventory levels. Secondly, there is the possibility of increasing variation in the lead times due to the length of the supply chains. Thirdly, the economics of long distance travel means there are often economies by ordering larger quantities.

This increase in inventory increases costs to the supply chain. Wilding (2006, p.3) stated the measures to mitigate the risks in global supply chains need six capabilities, which are:

- To analyse and predict the total cost from source of supply to end user. This includes factoring in the inventory holding cost.
- The need to have a joint information sharing system which would reduce double entry, duplication of information processes, mistakes and inconsistencies. This would also necessitate agreement on how information on such items as orders is to be sent or received and when.
- Total product identification and compliance which facilitates fast and accurate handling of product between members of the supply chain.
- Real time information needs to be obtainable on the exact location of products within the supply chain. Including testing for and predicting possible disruptions to goods flow.

- Developing supplier quality and accuracy while reducing cycle times and developing timely deliveries by identifying possible improvement programs to enhance supplier reliability. This can usually be gained by evaluating historical performance.

If possible the development of a shared information platform between all users in the supply chain for instant visibility to all in the supply chain of the current performance.

2.29 The Need for Supply Chain Risk Management

Grove et. al (2008, p5) stated a supply chain needed to be flexible and gave one definition of flexibility as having a short cycle time with reliability in delivery. This definition is important because it states flexibility has a basis of reliability, in fact a short cycle time without reliability is counterproductive. In order to have reliability a supply chain must be resilient to disruptive events. Christopher et. al (2004, p.2) stated, a resilient supply chain has risk management as one of its strategies with a culture of risk and quality awareness through internal and external risk management. As such, supply chain risk management methodology will be discussed.

When creating new supply chains the exact characteristics of risks which will be present are often unknown. Christopher et. al (2004, p.1) stated, risks have increased in supply chains due to increased complexity as a result of market volatility, outsourcing, globalisation and single point sourcing. Risks to the supply chain are often increased by businesses becoming leaner by reducing their safety stocks. Zsidisin et.al (2009, p.4-5) identified some of the risk categories faced by SME's in supply chains when they stated the dimensions of:

- *Disruptions to the supply of goods or services, including poor quality, which cause downtime and consequent failure to satisfy the customer's requirements on time.*
- *Volatility in terms of price may result in difficulties in passing on price changes to the customer and potentially have consequences in lost profit.*
- *Poor quality products or service, either upstream or downstream, may impact on the level of satisfaction of the customer with consequences for future revenues and possibly more immediate claims for financial compensation.*
- *The reputation of the firm, often generated by issues not directly related to the supply chain itself, may pose risks.*

While so far the aim has been to increase efficiency, Christopher et. al (2004, p.4) stated any savings in efficiency should be reinvested in risk mitigation strategies. Thus a balance between lean operations and risk mitigation should be sought. The aim of this is to ensure a sustainable, reliable and efficient supply chain.

Rohm (2008, p.2) endorsed that an environmental scan should occur to identify internal and external threats and opportunities which can drive strategy. As such, the SME should continually apply supply chain risk management analysis activities to identify these. The reason for this is the risks to the supply can and will evolve over time (Lynch (2009, p.85)).

The risk assessment for a supply chain should not focus on facilities and functions, but, should move beyond this by analysing value, flows and processes (Lynch (2009, p. 235)). This in turn necessitates knowing what resources and processes create value in the supply chain and how the supply chain flows.

2.30 Risk Triggers

While identifying and predicting supply chain risks may be achieved by techniques such as data mining and failure mode effect analysis as shown by Dani (2009, p.59-64), these techniques require training. In addition, by not having operational data to work with, any statistical data would need to be estimated. Given the limited resources, knowledge and education levels in SME's a more simplistic, yet just as powerful tool is sought. A brainstorming process can identify risk triggers for factors internal and external to the supply chain which may introduce risk or possible failure. Merging the independent works of Asbjornslett (2009, p.27) and Lynch (2009, p. 34) gives internal factors which need to be considered. These are: staff factors, brand and reputation, strategy factors, management and organisation, maintenance factors, human factors, information factors, operational factors and technical failures / hazards.

Asbjornslett (2009, p.27) and Lynch (2009, p. 34) continued with external factors which need to be investigated. These included: environmental factors, political and societal factors, infrastructure factors, legal factors, market factors and economic and financial factors.

Each of these can be expanded upon to identify applicable risks and threats, as is shown in Appendix F.

2.31 Risk Mitigation

Lynch (2009, p.111) stated that risks should be DNA'd (that is Defined, Narrowed and Acted upon). This tool was selected as it is easy to comprehend and it has an easy to remember title. Juttner et. al (2009, p.209-215) outlined a practical supply chain risk management approach for SMEs consisting of eight steps spread out over three phases as per below:

Phase 1: Supply Chain Risk Identification

- *Selection of the supply chain for analysis* – concentrating on supply chains that are highly uncertain or of high strategic importance to the businesses.
- *Supply chain mapping* – mapping the processes, resources and flows present.
- *Identification of relevant supply chain risks* – Lynch (2009, p.242) stated SMEs should use intelligence, knowledge, experience, opinion and monitoring to identify the risks the supply chain may face.

Phase 2: Supply Chain Risk Assessment

- *Supply chain risk mitigation, measure and assessment.* For SME's a scale of 1-10 is deemed to be enough for both consequence and probability of risks, with the existing mitigation measure effectiveness being low, medium or high (Juttner et. al (2009, p213).
- *Analysis of the supply chain risk portfolio* – analysing the entire supply chains risk profile by sorting all risks in probability and impact order.

Phase 3: Supply Chain Risk Mitigation

- *Identification of mitigation of actions* – brainstorming session was suggested to identify actions. It was stated by Juttner (2009, p.214) a prescribed list could be counterproductive by not identifying some options.
- *Assessment of mitigation options* – assess the list to see what actually works.
- *Decision on mitigation actions and action plans* – matching what is possible and communicating it with stakeholders / supply chain partners.

This model can be seen to match the DNA model. While the above process may give a way to identify, analyse and possibly mitigate risk, it is not enough. The most important step in addressing risks is to take action! There must be an organisational and supply chain wide priority placed on addressing risks. Lynch (2009, p.243) stated the supply chain risk management system needs to be enabled and integrated into business processes and strategy.

So how to manage risk? Wagner et. al (2009, p.280) stated two ways to manage risks and their effects on the supply chain:

- "Effect orientated risk management" where negative effects are accepted and cannot be removed at the source for other reasons, however, negative effects are minimised, limited in effect or mitigated.
- "Cause orientated risk management" where the root causes of the negative process are removed or eliminated where possible. Grove et. al (2008, p.5) stated that one of the key

aims in supply chain management should be to find and fix the root cause of problems. Hence supply chain risk management should fix the problems where possible.

These two are generally used in conjunction applying the appropriate method and response the risk identified. Once risks have been identified they must then be addressed. While insurance may be taken out and protect against immediate financial losses on assets, insurance will not safeguard against lost earnings, time lost in service delivery or protect your reputation (Lynch (2009, p.196)). This reputation can be to the customers, to partners (or potential partners) in the supply chain or regulatory authorities. For example, having a poor reputation with regulatory authorities can lead to increased inspections or paperwork requirements which cause time delays and increased costs for inspections and storage.

2.32 After a Supply Chain Disruption

There was a missing step in the model proposed by Juttner et. al (2009, p. 209-215) for risk management by SME's. The extra fourth step should be evaluating the risk management process. This is an important step the SME should undertake because unfortunately some risks may affect the supply chain in an unexpected or unforeseeable way. Lynch (2009, p32-33) listed some questions which should be examined in a situation where there has been a disruption to the supply chain:

- Who should have detected this issue?
- What factors allowed this to go undetected and how did it happen?
- When did the issue occur?
- Why did existing practices not anticipate or detect the situation?
- Where else was there potential for a similar issue?
- Was it an isolated incident or was it systemic?
- How widespread was exposure?
- What triggers or early warning signs could have detected the incident?

The organisation must be quick to respond to answer these questions after an incident, not only to safeguard brand and image to the end customer, but, to minimise disruption to the supply chains long term viability. By doing this, any negative outcomes can be learnt from and the supply chain can become a constantly evolving and learning entity. In addition, while following the three step model of supply chain risk management, there must be continual analysis of the risk management system to ensure all risks are satisfactorily mitigated or addressed.

Chapter 3 Methodology

3.1 Introduction

Chapter 3 commences its analysis by investigating the two main methods of research which are qualitative and quantitative research in section 3.2. The five types of qualitative research design are then summarised in section 3.3. Section 3.4 then analyses the characteristics of properly designed case study research. In Section 3.5 methods to collect information which can be used for research are explored. The different kinds of interviews are identified in section 3.6, with section 3.7 following on by detailing practical interview techniques to ensure accurate data collection. Finally section 3.8 justifies the research method chosen based on the methodology identified earlier in Chapter 3. Due to personal and confidential data being collected it is important that ethical considerations are then explored in section 3.9. Section 3.10 identifies the research value of the study and target audiences who will benefit from the research. Chapter 3 rounds out in section 3.11 by exploring the limitations of the research.

3.2 Qualitative and quantitative research

Prunkun (2010, p.55) identified that there are two main types of research which are Qualitative and Quantitative Analysis, with a hybrid approach combining the two being possible in certain circumstances. Prunkun stated that quantitative research can only be undertaken when the researcher has a measurement instrument or tool which can lead to observations. Prunkun identified that quantitative research is most applicable when there are large data sets that can be examined, there are previously developed and tested measurement tools that are applicable to the subject being evaluated and when the researcher is comfortable dealing with primarily numerical data.

Prunkun (2010, p.55-56) stated that qualitative data analysis has the potential to expand knowledge by suggesting tentative causal relationships. Prunkun explained qualitative data analysis as a process where the researcher will examine the data and form a judgement on relationships through a process of analysis. Prunkun (2010, p.56) stated that qualitative research was best used when the research is aimed around exploring ideas, behaviours and thoughts, with an in depth knowledge required on an issue or topic with very little published knowledge on a topic being available.

3.3 Five Type of Qualitative Research design

Bouma (2000, p.90) stated that there are five basic types of research design being the case study, the longitudinal study, the comparison study, the longitudinal comparison study and the experiment.

Bouma endorsed that the decision as to which research design to pursue needs to be related to the research question being asked.

Bouma (2000, p.91) stated that studying a single case or entity is studied is the best approach for answering a research question of "what is going on". Chetty (1996, p.82) supported this and stated that Case Studies can be used to answer the how and why questions that may be the subject of research. In addition, Eisenhardt (1989a, p.534) stated that the case study when applied correctly was a research strategy which would allow an understanding of the dynamics present in a particular setting. This can also take the form of an exploratory case study which has the purpose of generating further research objectives for the future.

Bouma (2000, p.95) recommended conducting a longitudinal study for determining if there has been a change over time in certain variables. The longitudinal study involves the comparison of two or more case studies of the same entities with a period of time between the case studies.

Bouma (2000, p.98) stated that the comparison study is best for analysing the relationships between variables. This is done by comparing case studies of different entities with the focus on the relationships between the variables being studied. This was supported by Chetty (1996, p.76) who stated that multiple case studies can be used to allow cross case comparisons to be made.

The longitudinal comparison study can be used to determine if the relationships between variables change over time (Bouma (2000, p.103)). This is done by conducting comparison studies and then conducting longitudinal studies on these to determine if there are changes in the relationships in the different entities being studied.

The last type of research design identified by Bouma (2000, p.107) was that of conducting experiments. This type of research design is used to determine the effect that a change in one variable has on another, usually designed around proving (or disproving) a hypothesis.

Bouma (2000, p.113) summarised the optimal choice of research design into a series of questions. If determining what is happening (and why) needs to be answered then a case study should be used. If the aim is determining if there has been a change in a variable then a longitudinal case study should be followed. When the aim is to determine if two variables are different then a comparison study should be undertaken. To determine if two variables are different over time then a longitudinal comparison should be undertaken. Finally, if the aim is to determine if an independent variable is causing a change in the entities studied over time then an experimental design should be followed.

3.4 The Case Study Explored

Philliber et. al (1980, p.63) stated that case studies should ideally have a sample size of one with the reason to do this being to examine the entity and variable being studied in as much detail as possible. Philliber et. al (1980, p.64) explained that researchers can gain more depth and detail by analysing one case more thoroughly rather than spreading the same effort over multiple cases. Gray (2011, p.9) agreed by warning that as the number of cases are increased that there is a trade off with depth and breadth possible.

One limitation of the case study is that by having a sample size of one, the results cannot be generalised and as such results are dependent upon the case being studied (Philliber et. Al (1980, p.65)). As such it is possible any relationship observed in the case study analysed may only exist in that entity and may not be evident of the greater population. As such, having used only one case study means that relationships cannot be derived for the whole population with any certainty (Philliber et. Al (1980, p.66)).

3.5 How to collect Information?

Gray (2011, p.12) stated that qualitative data collection usually takes the form of interview transcripts and notes. Bryman (2004, p.312) stated that the reason for this was interviews were not as disruptive or as costly to the interviewer or respondents as long term direct observation. Ziniel (2010, p.4) supported the use of research interviews to gain an insight on thoughts, intentions, opinions and explanations.

Once the data has been collected from the interview, it needs to go through a process to extrapolate ideas and useful information. Initially, the data then needs to be *described* (Gray 2011, p.15-18); which is summarising the data into the context, establishing the intentions of the subject, important, cause and effects relationships and processes. Gray (2011, p.18-26) stated that the data then needs to be *classified* which is to convert the data into categories with reference to the literature having been reviewed on the topic. Lastly there needs to be connections made between the aforementioned categories into logical relationships, causal relationships, explanatory relationships and chronological relationships (Gray (2011, p.27-29)). Bouma (2000, p.90) supported this advocating investigating the variables to discover if there is a causal relationship, a relationship in which the variables are merely associated or if there is no relationship between the variables. When analysing information a limit identified by Bryman (2001, p.165) when thematic coding is undertaken was there can potentially be a bias towards identification of themes based only on phrases, words or the way information is told.

3.6 Determining what kind of Interviews should be undertaken

There are three main types of interviews which are unstructured, semi-structured and fully structured interviews. Ziniel (2010, p.5-6) explained a unstructured/informal conversational interview as an interview with no predetermined set of questions, with the questions emerging from the context of the conversation. This format should be used when the interviewer is part of the context and the respondent is interviewed multiple times with each subsequent interview building on the previously discussed context. The strengths of this type of interviewing is the interview can be directly matched to respondent, its gives the opportunity for flexibility and highly relevant questioning. However, it has weaknesses in that it can be less systematic and is often hard to compare between respondents and has a greater time commitment needed to collect and analyse data.

Ziniel (2010, p.7-8) described semi structured interviews as interviews where the main questions are thought out beforehand, but these are used as a guide only. All respondents are asked these questions in the same order with the questions being worded in such a way that open ended answers ensue. Ziniel stated the strengths of this type of interview are it allowed an easier comparison of answers as all questions are answered. It does however constrain the naturalness of responses of respondents and may not relate the interview to each investigated entity the same. Eisenhardt (1989b, p.546-547) successfully used Semi structured interviews in qualitative data analysis when analysing strategic decision making.

Ziniel (2010, p.9-10) stated standardised/fixed response interviews are interviews with questions and answers thought out beforehand, with the respondents choosing an answer from the listed options. Ziniel defined the strengths of standardised fixed response interviews as they make it easy to analyse data as all responses can be directly compared with ease and many questions can be asked in a short time. However, they have the weaknesses that respondents must fit their answers into the categories listed; interviews can be viewed as impersonal and having to choose from options can distort what the respondents really mean.

3.7 How to Interview

Interviews however face problems. Boyce et al (2006, p.3-4) gave four of these which follow. Interviews can be prone to bias because the interviewers and respondents can have agendas. They are time intensive to conduct, transcribe and analyse, to properly conduct an interview the interviewer needs training and generalisations about the population are not usually able to be made due to small sample size and no random sampling of the greater population.

Boyce et al (2006, p.4-7) gave a six step method for conducting interviews. The first step outlined was to create a plan by identifying what is needed, from whom and to ensure that ethical guidelines are created. The second step is to develop ideas as to what to say when starting and concluding the interview and plan will be done during the interview. The third stage is training of data collectors namely practicing using open ended questions, confirmed the understanding of ethical issues, introducing the objectives and reviewing data collection techniques. Next, data must be collected by setting up interviews, getting consent of the respondent, summarising the key data following the interview and verifying the information given. After the interview the data needs to be transcribed and reviewed. Finally findings must be disseminated, including gaining feedback from the respondents and stakeholders.

Zorn (2008, p.1) gave some practical techniques for correctly running semi-structured interviews such as warming up the respondents to make them comfortable, focusing on developing rapport and using broad open ended questions to elicit further information. Zorn also advised the use of probing questions to gain examples, including the strategic use of silence to encourage respondents to continue talking. Finally Zorn advised at the end of the interview asking the question of whether there was anything further the respondent wishes to add to ensure no critical information had been missed.

Ziniel (2010 p.11) stated that bias in interviews is the difference between what the respondent says and the truth. Ziniel (2010, p.12) stated that there are four sources of bias in research interviews which were the interview questions, the respondent themselves, the interviewer and the interview situation. As such consideration and effort needs to be placed on eliminating these.

Ziniel (2010, p.14) stated that to avoid bias from questions it was important ask respondents to think aloud and give feedback if their appears to be a problem with any of the questions. Ziniel (2010, p.16) stated that to avoid bias from respondents it was important to ensure privacy so they could freely discuss the topic, make sure the respondent knows the reason for the research and how important their honest answer is. Ziniel stated it was very difficult to avoid any unintentional bias from respondents. Ziniel (2010, p.19) stated that important to read questions exactly the same to each respondent, record answers the way it was said, to at all times behave professionally, probe non-directively and give neutral feedback. Ziniel (2010, p.37) stated that to minimise bias from the interview setting it was important to use the interview method, i.e. phone, internet or face to face preferred by the respondents, in a setting that enhances privacy and minimises potentially disruptive environmental issues. Bryman (2004, p.318) stated it was important that the interviewer recorded how the interview went, where the interview was, any feelings about the interview and the setting.

3.8 Research Methodology Justification

To complete the research successfully, the correct conditions need to be in place. Six conditions were outlined as needing to be in place for a successful research project were described by Howard et al (1996, p.36-39) which were:

- There must be access to and availability to the necessary information
- Opportunity to pursue the desired research design
- Adequate time in which to complete the research
- The technical skills needed must be available to the researcher
- There must be adequate financial support to the research being undertaken
- The risks involved in undertaking the research must be tolerable

The research involves three major areas of research of the areas described by Blaikie (2000, p.83), which are *describing* what is happening in the SME's proposed supply chain, *understanding* why it will be happening the way it will be and seeing the *change* (and if so how) in the supply chain by application of best practice theory.

To achieve the aim and objectives of this research it is necessary to gain an in depth understanding relating to the usefulness of the theories applied; especially if they would be practically applied in an SME's supply chain. There is not a single reality that will be useful for all supply chains, or indeed it seems unlikely that all facets of theory will be useful; therefore the ontology states that qualitative measures should be used to determine what is useful. This was supported by Khan et. al (2009, p.141) who used semi structured and unstructured interviews as this type of research allowed for ideas and thoughts to flow more freely. Content analysis was also used by Khan et. al (2009, p.141) during and after the interviews to identify any recurrent phrases or emphasised ideas. As such content analysis will also be used after interviews to identify key concepts, ideas and points of emphasis given in feedback by interview participants.

Next if the Epistemology is examined, it will be required that the interview participants tell us if the theories yield useful information. This is required because there are no other suitable tests that can be can use to determine it. Throughout the research there is the danger as stated by Gray (2011, p.27) that: *"Subjects may not provide a true account of the reasons behind their behaviour."* This could be an issue, particularly when a participant's managerial decision-making processes are being questioned. This will be considered during the interviews keeping watch for any visual and verbal cues which may identify any possible deception, if possible. To minimise the likelihood of it occurring there will be a policy of not judging answers that is all information being graciously and thankfully

received. In addition, the benefits that are accruing to the respondents will be emphasised to them, which is the respondent is receiving training in and application of state of the art theory to their potential supply chain.

Each participant in the interview will be questioned at different times independent of each other to prevent any possibility of "groupthink" occurring. Additionally to prevent any bias on the part of the researcher, the questioning is to consist of open ended questions, with no leading or pointed questions being asked.

The case study selected is that of a potential supply chain, run by a new SME, which will import comic books from the USA to customers in Australia. The SME will seek to deliver excellent customer service by servicing comic book enthusiast's needs offering more value than traditional bookstores. This will take the form of organising delivery to the customers door (via the postal network), express delivery to the customer as soon as available in the USA and the addition of a comic book protective cover which most comic book enthusiasts must purchase separately.

The nature of this case study is a free form design, in that like many new businesses a new supply chain is being created based on a perceived gap in the market. Each year, new businesses and new supply chains are created by SME's who simply have a good idea and may fail, not because of the product, but because of a lack of planning due to the nature of the business and the supply chain design. Howard et al (1996, p.24) stated that one benefit of conducting a research study is to the researcher as it can generate knowledge in the career path the student wishes to follow. This is the last benefit of this research as it directly relates to the researchers career goal of ultimately becoming involved in increasing the efficiency and competitiveness of SME's in their supply chains.

3.9 Ethical Considerations

Gray (2011, p.205) listed five ethical issues that must be considered during research. These are Informed Consent, Confidentiality and Anonymity, Minimising of Harm (to both participants and researchers), Truthfulness (avoidance of unnecessary deception) and Social Sensitivity (to age, gender, culture, religion, social class etc.). These points were supported by Bryman (2001, p.479-484) and Burns (2000, p.17-22).

In order to ensure that full consent is given the participants will be given a copy of the final research prior to submission to ensure no confidential information is printed in error. Prior to the interview, the participants will have the nature of the research verbally explained and will be verbally asked for their consent.

To ensure the confidentiality and anonymity of participants, there will be no names of persons or organisations mentioned in any of the research. In addition no specific locations in the supply chain will be mentioned other than regions or cities to maintain anonymity. The participants will be provided with a copy of information recorded from their interview to ensure they consent to all information they provided being printed. This will also have the benefit of ensuring accuracy of information obtained. All transcription will be undertaken by the researcher only and as such no confidentiality agreements will be required.

In order to ensure a safe and relaxed environment for the participants and the researcher all interviews will be conducted away from any workplaces in an informal setting. This has the benefit of making the participants more relaxed. Polite, professional and appropriate communication with each of the interview participants will be used. During all communication, including participant selection, efforts will be made to avoid any bias or reference to any social, cultural or demographic characteristic.

At all stages full disclosure will be given to the participants, so they are fully aware of the purpose of the research and how what they say will be used. This will involve during the interviews asking the participants if they have any questions and giving full and honest answers.

3.10 Research Value and Target Audiences

SME's are the backbone of the economy. Efficiency and resilience in their supply chain benefits all those who rely on their goods and services (or are partnered with them in service delivery). By introducing techniques, tactics and tools to SME's which can be easily used by them economy wide benefits could be seen. There is a Chinese proverb which says *"Give a man a fish and feed him for the day, teach a man to fish and feed him for life a lifetime".* Using this principle, the following thesis wishes to move beyond the presentation of supply chain principles to the SME based on one case study, but to instead create a toolkit and an understanding of the principles and how they can be applied. As such, the SME can implement a new high level supply which will be continually improving using best practice supply chain management principles in turn creating a sustainable competitive advantage.

There are two major target audiences for this research. The first target audience is supply chain decision makers and managers who control, shape and manage the day to day operation of supply chains. They focus on the efficient running of the supply chain and addressing any disruptions. This research aims to identify useful aspects of theory relating to optimising a new supply chain in terms of efficiency, responsiveness and resilience.

The second target audience for this thesis is supply chain researchers. Peck et.al. (2003, p.23) highlighted there is an absence of research on supply chain risk identification and assessment. By undertaking this research, further information can be gathered in this growing field; notably whether it would be valued and used by SME's in a new supply chain. It will illustrate if further studies on supply chain risk management are warranted and of benefit to supply chains. This will be gauged by measuring the perceived benefits given to decision makers/managers. The proposed application of best practice theories to SME's, if valued by the SME, can develop the justification for further research into whichever theories are termed useful by the SME.

3.11 Limitations of the Research

There are three major limitations foreseen in this research. The first limitation is that due to the detailed nature of qualitative research there are a limited number of interviews which are able to be undertaken by one researcher. By selecting respondents who are familiar with the supply chain in question however, it is possible to gauge the applicability of the theories to the relevant SME's supply chain.

The second limitation is there are time limits on the research. As such the theory will only be applied to a case study of one new international supply chain. While such a sample size is not acceptable to gain 100% confidence in the results, it can serve to justify the research and further applications and research can be generated from the results collected.

Finally, the research has attempted to apply principles which will assist to develop an optimal supply chain with best practice measurement, risk management and efficiency while working with a word count limit. As such certain details relating to each theory had to be omitted. Therefore each theory had to be summarised for inclusion within this thesis and couldn't be discussed in detail as to its place in SME's supply chains. If each theory is decided upon as useful by the SME this can justify further research and application of each theory (including in more detail) to SME's supply chains.

Chapter 4 Analysis

4.1 Introduction

Chapter 4 undertakes an analysis on the interview conducted with the two decision-makers from the SME. Initially Chapter 4 in section 4.2 presents general notes on the interview to allow reproduction and to confirm that best practice interviewing techniques were used. Section 4.3 then presents a summary of the main points discussed in the interview. In section 4.4 chronological links which were identified in thematic coding analysis on the interview is presented, with section 4.5 completing the chapter by discussing causative and explanatory links identified.

4.2 Interview Notes

Both Interviews were carried out on the 3rd of January 2012. There was a sample size of 2 interviewed from the one entity (the SME analysed), which is the key decision-makers from the SME that is instigating the supply chain and planning its operation. The two respondents were interviewed separately one after the after by the researcher. The second interview was conducted immediately after the first interview to ensure that there was no transfer of ideas between the respondents which could lead to bias.

The interviews were conducted in a private dwelling in the lounge room. The researcher and the respondent were the only two persons in the room. The location was planned for comfort with both respondents being well rested, with food and beverages supplied. The environment was free from noise, with a comfortable temperature and medium light levels. Both respondents were asked if there was anything that could be done to create a more comfortable environment to which both respondents replied no and confirmed that they were comfortable.

Both respondents declined to have their interviews tape recorded and stated that they wished to see the formal results before publications to ensure no confidential planning about the enterprise was given away. The literature review had stated that to press for a recorded interview may indeed introduce bias to the interview and that even if the interview were not tape recorded valid conclusions could still be gained. Prior to the interview both respondents were provided with the aim and objectives of the research, the reasons for the research and why their honest responses were needed. Both respondents were assured of confidentiality and their personal privacy. Their answers to the questions were handwritten by the researcher and were read through by the respondents at the completion of the interview to confirm their validity and to ensure that they were not going to disclose potential suppliers and/or personal details. At the conclusion of the

interview both respondents were asked if there was anything further they wished to add or amend, to which both replied no.

During the interview, probing questions were used and periods of silence were used when the respondents were answering questions. Emphasis was placed on neutral responses to the respondents' answers with the researcher paying particular attention to verbal and non-verbal communication sent to ensure no leading was given with regards to preferred responses. At all times professional and polite communication was used.

Both respondents appeared at ease during the interview, with no signs of deception evident. Both respondents appear to answer all questions fully and did not appear hesitant to hold any information back. They appeared at ease and comfortable and did not show any signs of stress during the interview. At the conclusion of the interview, both were thankful for the information given to them and were thanked for the opportunity to interview them.

4.3 Interview Summary with the decision-makers

The interviews started by discussing with the participants the nature of the research to be undertaken. The interview then confirmed assumptions made about the supply chain which had been used for modelling. The respondents were then asked about their current supply chain techniques applied, with the relevant application, as summarised in Appendix A was presented section by section to the interview participants, with their feedback requested.

When the nature of SME's usage of supply chain management methodology was discussed, both respondents stated it was not a business improvement methodology they would have normally selected. However, after the discussion on its benefits and principles, they both stated the principles were logical, understandable and applicable.

The interviews then commenced a discussion on the nature of International Trade. The interview participants admitted, while having identified some of the issues of international trade, they hadn't considered all points, in particular the large impact currency fluctuations could have on their supply chain viability. Strategies to overcome the fourteen obstacles to SME's conducting international operations were then discussed. Some of the obstacles had been informally considered / thought about, however some of the obstacles identified were a surprise. Both respondents agreed the strategies presented were useful and were implemented with a view to overcoming some of the challenges presented to the SME.

One of the respondents had a history where daily risk management audits had to be completed as part of their employment. The process of supply chain risk management methodology discussed was virtually identical to the risk management process they used. The value of the supply chain risk management process, as per the respondent, was it focused on operational and financial risks, which are not well done in their personal experience in operational risk management. They stated the other risks, such as environmental and human orientated risks had taken priority in their practical application. The other respondent had no experience with risk management, having previously had experience in purchasing, inventory management and production and so had very limited exposure to risk management (other than for health and safety). As such, this person found risk management training useful. Both agreed with the point raised in the theory that efficiency should be balanced with risk management. As such, both agreed that especially in the start-up phase risk management principles need to be applied, especially since they were unfamiliar with the risks of daily operations in their supply chain. Both agreed that without prompting to possibly introduce a risk management process, unless relating to Health and Safety compliance, no risk management process would have been implemented.

In the aims of creating a continuously improving and learning organisation, a set of questions to ask after a supply chain incident was given to the respondents. Both participants stated they believed this would add to their knowledge and strengthen their supply chain by learning from any mistakes or disruptions, while making them more aware of any deficiencies in the process.

When the respondents were questioned with regards to their sourcing policies, both had already sought to implement single point sourcing. They agreed with the supply chain management principles of partnering where possible with a single supplier and agreed with the reasoning behind doing so. Both stated they actively sought partnerships with their suppliers and from the theory applied the four stage model to move from a transactional relationship to true collaboration with their suppliers. Both had not seen the four stage model to take suppliers from a transactional relationship to a full collaborative relationship prior to the interview.

Each participant had their own priorities as to which supplier they would use. These were based largely around the cost and service dimensions. When presented with the Supplier Selection Table (Appendix G), they stated they would have evaluated some of the list, but not all. They both believed the supplier selection list gave a good summary on aspects they should evaluate prior to selecting a supplier. Both respondents also agreed that defining the product was a good point they wouldn't have considered in depth and so sought to complete the product definition to assist with supplier selection and value definition. Neither participant stated that they had analysed the role packaging

would play in their product delivery, along with its service delivery and quality implications. This was simply not considered, however, thinking of the implications of inadequate packaging, both respondents now consider this as an important point.

Perhaps the most important theory raised, that both respondents immediately reacted to and asked "Why don't more businesses do that?" was the theory relating to customer closeness by Womack et. al (2005, p.2). They immediately understood the customer relationship benefits and sought to reduce their end customer involvement in the supply chain to value adding processes only. Both respondents reacted to and immediately understood when they were shown the Customer Time in the Service Delivery Process diagram (Appendix E).

Inventory principles were then discussed with both respondents. The items discussed were the reasons for holding inventory, the pitfalls of inventory management and the complete costs to holding inventory. While both respondents had considered inventory and the need to hold it, they had fallen into some of the pitfalls of inventory management namely simplistic stocking policies, incorrectly assessing inventory costs and process / product design without supply chain consideration. After reviewing the theory both respondents approached their inventory management differently, seeking to avoid the 14 pitfalls of inventory management and both desired inventory minimisation. This would be emphasised as they realised they were operating in an environment where their products, while they won't spoil, they will lose their attractiveness to the customer over time. A demand or pull based system was applied to minimise inventory, with replenishment of stocks and purchasing itself based on end customer demand. Lastly, the theory of inventory introduced to the participants was that effective inventory management could have so many positive effects on their business and entire supply chain, which they both agreed with.

After discussing the trade-off between inventory costs and transport costs the participants sought to measure total logistics costs as an entity rather than separating transport costs and inventory costs. Both wanted to minimise costs, but, their aim was changed to minimising total logistics costs rather than trying to decrease transport costs and inventory costs independently. As such, by explaining the key theory of total logistics costs to the participants, it started the respondents towards a system thinking method where they started to see the interrelatedness of all items in their supply chain.

When asked about their transportation ideas / policies, both participants stated they had given these items little attention. Both stated they would not have naturally sought out a customs broker or freight agent to consult about the optimal logistics system for them. When they were told about the concession on duty and GST for goods imported that were under AUD 1000 in value, they were

surprised, found it interesting, and stated it would be *"significant to planning shipments."* This in itself started the participants thinking about reducing their batch sizes. As this point, it was opportune to introduce the theory of batch sizes namely that smaller batch sizes increase efficiency and reduce wasted time. Both participants saw the benefits of smaller batch sizes and stated that they would seek to use this in their supply chain flows.

Both respondents stated they would not have initially had such detailed measurements in place in the business. Their focus would have been on financial based measures, not those operational in nature. Part of the reason for this was due to their lack of knowledge / understanding as to what to measure, how to measure it and how to display it. Both respondents stated they wouldn't have considered measuring innovation, customer service or the internal operations without this research. They found all recommended measures to be useful and sought to implement the BSC as recommended. In particular one respondent stated that they especially liked the fact they could measure their SME's / supply chains social investment, which was going to be one of their priorities. They stated by it being added to measurement, they could add this to their marketing products and by being able to measure it, they could report it to customers. They believed this would be a priority for some of their customers who would pay more because they did this.

The SME's stated that they had not considered their information flows. They had believed information flows would evolve over time; they had not considered pre-planning or mapping of information flows. The interviewed persons were then shown The Proposed Information Flow diagram (Appendix D). After seeing the need for effective communication within their supply chain they believed the mapping of information flows was logical and would be a technique applied, to maximise efficiency and improve communication. When questioned to as whether or not they had reviewed how cash flow would work in the supply chain and shown the Cash Flow diagram (Appendix C), both respondents stated this had been considered due to its importance.

However, had they considered how value will flow in the supply chain? Both participants had a concept of value to the end customer and had considered how they could better service their customers. They had not been introduced previously to the theory on the three levels of value. They stated that while the explanation of value was useful, they had intuitively already applied the three concurrently when considering what they would offer to the end customer. However, following on from lean theory of value to the seven wastes, both stated that this theory was a logical starting point for increasing their supply chain efficiency. Both saw the outputs from value stream mapping (refer Appendix B: Value Chain Mapping Application) and stated that these could be very useful and informative if applied; but they definitely needed the knowledge and steps to conduct this analysis,

without which, it wouldn't be attempted. After having been presenting with the time compression theory, both participants wanted to minimise waste time as well as other waste, due to the benefits of time compression.

The interview participants were then instructed on supply chain management theory relating to bottlenecks, both from the lean theory of increasing their efficiency through waste removal and from the theory of constraints bottleneck theory. Both respondents stated they would now prioritise the maximisation of the bottlenecks efficiency. While both participants would have sought to rectify bottlenecks within their supply chains, they stated they wouldn't have had the tool of a systematic method to address it as supply chain management theory gave them.

The underlying theme of all discussions with the interview participants over all questions; was while points of each had been previously identified and thought of, they would not have received the detailed, comprehensive analysis that occurred during the application of theory during this research project. They also would have lacked some of the systematic tools which can be applied to situations to identify issues, analyse them and then mitigate or eliminate them. What this showed was that there was substantial scope for SME's in new supply chains to apply supply chain management principles in the creation and implementation phases to increase their supply chains starting efficiency.

4.4 Chronological Links Identified in coding analysis

On the recorded transcript coding analysis was undertaken to determine chronological links between events. The below were determined as a result of this analysis:

- Both respondents had not conducted research into the risks of international trade prior to planning their supply chain.

- After discussion of the fourteen obstacles to international trade, both respondents had their planning altered and actively sought to mitigate or minimise these obstacles.

- Both respondents had not conducted research into the risks and obstacles that an SME faces when participating in international trade prior to planning their supply chain.

- Both respondents had not intended to have a formal risk management as part of planning their supply chain

- Neither respondent had considered packaging of the product when planning their supply chain operations.

What this thematic coding analysis showed was a worrying lack of planning on the part of the SME, particularly with regards to its lack of planning for the risks inherent in international trade. The question stands as to whether supply chain management theory when applied to the supply chain of a SME will alter the chains operations. One way to see if this will occur is to analyse the actions of the decision-makers after they have been presented with the supply chain management tools and theories. A thematic coding analysis when applied to the interviews identified the below:

- As a result of training given in supply chain management inventory theory the respondents' viewpoint on inventory holdings and inventory management was altered.

- Once the interrelationship between inventory and transport costs were considered by the SME, both respondents sought to change their measurement to total logistics costs.

- Both respondents after having had balanced scorecards explained to them sought to implement these in their SME.

- Both respondents after having had the lean methodology theory of the seven wastes explained to them sought to implement these in their SME.

- Both respondents after having had value stream mapping explained to them sought to implement these in their SME.

- Both respondents after having had balanced scorecards explained to them sought to implement these in their SME.

- Both respondents after seeing the customer closeness planning diagram wanted to use it as a key strategic tool because they believed it would be a source of competitive advantage to their business.

- Both respondents sought to apply the bottleneck theory of TOC because they believed it would allow them to increase efficiency.

- Both respondents had no knowledge of any methodologies to take the SME from transactional relationships to cooperative relationships with suppliers, however after a methodology was introduced both respondents sought its implementation in the SME's relationships.

- When the comprehensive list of supplier selection criteria that was identified in the literature review was presented to the respondents both wanted to implement this.

What these showed is that for the theories presented in the literature analysis there was a clear intention by the SME decision makers to apply these to their supply chain.

4.5 Causative and Explanatory Links Identified in coding analysis

On the recorded transcript coding analysis was undertaken to determine causative and explanatory links between variables and to find why things had occurred the way they had in supply chain design. The below viewpoints that the SME believed were determined as a result of this analysis:

- Supply Chain management was not a business improvement methodology that the SME decision makers considered because they did not know what it was (That is the respondents did not know its benefits and how it worked).

- Risk management was not considered as part of the SME's planning because of limited exposure to the techniques and a lack of knowledge about the risks inherent in international trade.

- The respondents had not considered balancing efficiency with risk management as part of the planning activity because they had not considered risk management an important part of their business unless it had to do with Health and Safety compliance.

- Single point sourcing was sought by the respondents as they believed it would allow better working relationships with their suppliers.

- Supplier selection occurred with priority to cost and service levels because this is what the respondents believed were the most important dimensions

- The respondents' view of supplier selection was altered by the literature review summary on key criteria for suppliers as they believed it gave important characteristics suppliers should have not previously considered.

- Neither respondent had considered packaging of the product because their emphasis had been on the product itself and they did not consider the important implications packaging could have on service delivery

- While the respondents had considered customer time in service delivery, they had not planned it as a competitive advantage or diagrammatically because they had not considered it of importance

- Simplistic stocking policies were implemented in the SME's supply chain because of ignorance as to alternate inventory management techniques

- The SME had incorrectly assessed the cost of holding inventory and inventory processes because they did not know the true cost of holding inventory.

- Inventory policies and procedures had not been considered by the SME in detail because they did not understand how they could impact on customer service and cost levels.

- The respondents did not consider the impact that product design could have on their supply chain because of not knowing that this was an important item to be considered.

- The respondents had not considered the impact that their product being time sensitive may have had on their inventory and distribution arrangements due to a lack of knowledge

- Transport cost reduction and inventory cost reduction were sought as independent of each other because the respondents did not understand the interrelationship between the two.

- Both respondents had not considered transport policies and arrangements prior to planning their operations as they believed the product was more important to the SME.

- Transport policies and procedures had not been considered by the SME in detail because they did not understand how they could impact on customer service and cost levels.

- Both respondents sought financial measurements only due to a lack of knowledge of what else to measure in their operations.

- The respondents had not considered information flows at the planning phase because they believed they would evolve naturally over time

- The respondents had not implemented information flow mapping because they did not have techniques or knowledge on how to map it.

- Both respondents stated that they had considered the importance that cash flow would have in their operations because of its importance to operations

- Neither respondent had considered mapping of cash flow because of a lack of knowledge as to how to do it

- Because of the emphasis placed on customer service by the SME the concept of adding value to the customer had been considered.

- Neither respondent had considered mapping value because of a lack of knowledge on the subject

- Neither respondent had considered time compression because of a lack of knowledge on the subject

- Both respondents wouldn't have used a systematic tool to manage system bottlenecks because they didn't have any methodology to do so

- Both respondents sought further information on supply chain management because they believed it could increase the efficiency of their SME.

These points explained why the SME had developed its supply chain the way it had. It can be seen however, that a large number of the derived beliefs all arose from a lack of knowledge as to how to best optimise their supply chain. Thus the techniques of supply chain management can be seen to offer large benefits to the SME. When the respondents were shown the application of supply chain management techniques to their operations, the below beliefs were derived from their comments:

- The respondents believed the supply chain risk management system outlined was beneficial to the SME because it ensured that operational and financial risks were considered.

- The respondents believed the supply chain risk management system outlined was beneficial to the SME because it generated a comprehensive list of risks that wouldn't have otherwise been generated for decision-making.

- Both respondents sought to apply the set of questions that the theory uncovered as needing to be asked after a supply chain incident (risk management) because they believed it would allow their operations to become more resilient.

- Both respondents after seeing the customer closeness planning diagram wanted to use it as a key strategic tool because they believed it would be a source of competitive advantage to their business.

- Once the benefits of reduced batch sizes were discussed both respondents sought to implement this technique because they believed it would deliver cost savings and improved customer service.

- After having had the balanced scorecard methodology explained to them, both respondents sought to implement it as a measurement methodology because they believed it would allow other key aspects of the supply chains operations to be measured.

- The respondents believed that the theory of the seven wastes was a useful methodology because it would allow over time the systematic increasing of efficiency.

- Both respondents now considered mapping value important because of its ability to graphically portray what the customer's value and where it is created.

- Both respondents sought to apply the bottleneck theory of TOC because they believed it would allow them to increase efficiency.

From the above, it can be derived that the application of supply chain management techniques once explained correctly will change the behaviour of the SME's decision makers with regards to management of their supply chain.

Chapter 5 Conclusions

5.1 Introduction

Chapter 5 is the most important part of the whole research. Chapter 5 commences in section 5.2 by identifying how each of the objectives were satisfied by the research undertaken. The important points from the research including important conclusions which need to be taken from the research are also discussed in section 5.2. Section 5.3 concludes the chapter and the thesis by giving the reader various follow up research options which could and should be undertaken to further the use of supply chain management by SME's.

5.2 Conclusions

The first objective of this research was to explore the specific supply chain concerns for SME's. What the literature review showed was SME's did not apply supply chain management well, while facing disadvantages in their supply chains when compared with larger organisations.

The next objective was to describe the key theories of supply chain management applicable to SME's. The key theories of supply chain management which are applicable to SME's were then derived from a literature analysis with an emphasis on easy to understand and yet powerful techniques. This is important because of the limited resources that SME have when compared to larger organisations. This was a wide ranging exercise and covered topics such as alliances, sourcing, transport, inventory, risk management and measurement.

The third objective was to summarise and explain usable theories which can be given to SME's to improve their supply chains. Due to the word limit constraints and time constraints the key elements of each technique identified in the literature analysis was summarised and presented in this thesis.

These tools and theories were then applied to the international supply chain analysed. Both the disadvantages the SME faced, the nature of global trade and relevant supply chain management theory was then applied to the proposed supply chain. The data was presented with the aid of the information supplied in the Appendixes. This was subsequently presented in a semi structured interview to two participants who are in control of running the proposed SME. The aim of this was to obtain feedback on their application from SME decision makers in particular with reference to their current supply chain management thinking. The interviews clearly demonstrated while the new SME would have considered some of the principles and ideas raised, they would not have normally comprehensively planned or measured their supply chains. In fact what the coding analysis showed was that the SME had committed some fundamental mistakes when planning their supply chain; The

cause of these mistakes was largely not having the knowledge about the best way to set up their supply chain. Notably, despite the current volatile financial climate, the SME also would not have had a comprehensive supply chain risk management program in place. After the application was discussed with the respondents, they showed a clear willingness to adopt all supply chain management techniques presented.

The last objective was to evaluate whether or not the application and description of these tools and theories to decision makers in an international supply chain will alter the SME operations. When the interview was analysed, it was made quite clear that the SME would fundamentally alter and improve their supply chain. The SME's decision makers demonstrated adoption of the techniques presented and identified that they would be further studying supply chain management to increase their operational efficiency.

As such, this research has clearly shown SME's need to be educated on their supply chains. Both interviews also showed there was the willingness to apply techniques to improve their supply chains; However prior to the interview they had no idea from what source to gain information on their supply chains had naturally considered it as an important business improvement methodology. Given the importance of small businesses to the economy, more research is needed on the best way to apply each technique and communicate each technique to small and medium sized enterprises. This however is contingent upon the summarising of theory to useful applicable techniques as called for by Calipinar (2007, p.97) and that training is provided with attention to the special needs of the SME in supply chain as called for by Deb (2002, p.53).

5.3 Ideas for Future Research

This research should not be viewed as standalone results in itself. It is perhaps better seen as a priming case study which raises more questions than it answers. This is due to numerous causative and chronological relationships it has suggested which need to be proven or disproven.

Initially quantitative research would be of benefit to determine if the identified relationships are characteristics of the SME population as a whole, or if unique to this case study. A longitudinal study should be undertaken on the SME analysed in the case study to determine if the viewpoints of the respondents changes over time.

Several comparison studies are also needed. The comic book industry due to copyright restrictions that exist on its products means that monopoly suppliers exist. As such, it should be investigated to see if other SME's not subject to copyright sourcing requirements apply similar sourcing policies when selecting supply chain partners.

The focus of the SME investigated was on customer service. However other businesses apply cost minimisation as a priority over customer service. As such, the research undertaken should be applied to a cost prioritising SME to see if the same relationships with supplier selection and supply chain management priorities will still exist.

Finally, the identified relationships also suggest a plethora of experiments. Each of the stated causative and chronological relationships could be investigated as hypothesises to see if these variables can be used to increase the efficiency of SME's supply chains.

Glossary

AUD	Australian Dollar
AUSFTA	Australia & United States of America Free Trade Agreement
Austrade	Australian Trade Commission
BSC	Balanced Score Card
CEO	Chief Executive Officer
DHL	DHL is part of Deutsche Post DHL – An Express Freight Provider.
DMAIC	A Six Sigma methodology tool consisting of five stages: Define, Measure, Analyse, Improve, Control
EBIT	Earnings before interest and taxes
EDI	Electronic Data Interchange
GFP	Global Facilitation Partnership for Transportation and Trade
GST	Goods and Services Tax
IT	Information Technology
IQ	Intelligence Quotient
KPI	Key Performance Indicator
NCC	Net Conversion Cycle
OECD	Organisation for Economic Co-operation and Development
Poka Yoke	Lean terminology for mistake proofing
PO	Post Office
ROI	Return on Investments
SME	Small and Medium Sized Enterprises
SMS	Short Messaging Service. A text messaging service for mobile telephones
TNT	Thomas Nationwide Transport – An Express Freight Provider.
TOC	Theory of Constraints
UNECE	United Nations Economic Commission for Europe
UPS	United Parcel Service – An Express Freight Provider.
UK	United Kingdom

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Appendix A: Application of Theory to the SME's Supply Chain

Supply Chain Management

The application of supply chain management will give the SME the following benefits by altering its supply chain:

- A focus on the end customer being the most important party, in that the end customer service levels are the ultimate definition of value.
- An explanation of where in the supply chain and how much inventory is required to be held.
- A knowledge that to truly deliver to your customers you must cross organisational and functional boundaries to identify and deliver what the end customer values
- The ability to identify and integrate policies and procedures which will be developed for efficient, cost effective and responsive operations.

Often one of the failures of SME's is their lack of focus on operations directly outside their control; As such it will be stressed to the SME that their entire supply chain needs to be mapped, understood and have its efficiency maximised. This includes identifying and analysing how their suppliers handle their orders (including who they order from) as this will impact on their ability to service the end customer.

An International Supply Chain

The proposed supply chain is created around delivering comic books from their USA producer to Australian consumers with the focus on door to door deliveries. But does the SME that proposes to undertake this really understand the risks? Has it, or would it naturally consider the total cost of purchase? The total cost of purchase needs to be considered and known by the SME to evaluate sources of supply. This is not simply the price paid for the goods in the USA, but the inventory held, transport needed, packaging required, customs compliance fees, etc. It must also be emphasised to the SME that the focus should be on the end customer, with the total costs which go to make up the product being viewed in relation to the value they deliver to the end customer. One mistake often made is while cost reduction can lead to a business being lean, being too lean, can lead to a decrease in agility and hence ability to respond to customer demands.

The lengthy supply chain generally corresponds to a less responsive supply chain, where considerable time, effort and resources are needed to move products from one end to the other. In addition inefficient processes will increase time, effort and resources needed. As such the SME needs to ensure that it has considered the ways to maintain and enhance the supply chains

responsiveness. Therefore the SME will need to promote speed in operations, such as ordering in advance of requirements and focusing on cash flow rather than cost.

The distance between supply chain partners and processes can also introduce additional risks to the execution of the processes that make up the supply chain. An order may get misplaced or lost, time differences may mean delays in crucial business decisions and differences in culture or language can hinder clear communication. Therefore the SME needs to consider how information will be shared and communicated.

Dealing with unknown and unfamiliar parties combined with a long distance relationship generates a lack of visibility into what is happening within each stage of the supply chain. Thus transparency needs to be introduced through measures such as obtaining real time information on the status of each order. This again should be identified by selecting suppliers on their ability to support this transparency.

The UNECE were quoted by the GFP (2005, p.2) as stating that there were fourteen obstacles to the internationalisation of SME's. All of which need to be identified and addressed prior to any successful operations; these were defined as:

1. SME's can suffer from a lack of entrepreneurial, managerial, supply chain management and marketing skills. This lack of supply chain management knowledge can be countered by on-going supply chain analysis. In addition to this, the SME staff can attend courses, research at the library or online and network, for example, join the Chamber of Commerce. In addition, notably for accounting and tax compliance, the skills of a knowledgeable accountant familiar with the needs of SME's should be sought.
2. Bureaucracy and restrictive regulations/policies can prevent the SME's expanding into international operations. The USA and Australia currently have the AUSFTA in place which removes many of the barriers to trade between the two countries.
3. SME's can have a lack of accessibility to information and knowledge. Again, this can be countered by this supply chain management project, attending courses, researching at the library or online, networking and joining the Chamber of Commerce.
4. SME's can have difficulties accessing financial resources and having a lack of capital. This is harder to correct, however, by the SME consciously recognising this situation priority can be given to mitigation of its weaknesses. By utilising the supply chain management principles of waste elimination, time compression and inventory compression, greater

resource efficiency can be gained which improves both ROI and cash flow; this ultimately improves the usage of the financial resources available.

5. Having a lack of access to technological resources and knowing how to optimise their use can be a frustrating reality for SME's. This can be countered by using their suppliers IT systems (which also gives integration with the suppliers). Also by selecting pay per transaction inventory, accounting and supply chain systems gives the SME access to state of the art systems without unnecessary up front financial outlay.

6. Because of a lack of non-conformity in standardisation, a lack of quality awareness and a lack of mutual recognition schemes, the SME needs to implement quality control and measurement activities. Quality should also be verified (by visual inspection) on receipt of all products. The SME needs to seek to develop relationships with high quality suppliers, focusing on value delivered to the customer, not primarily on cost minimisation.

7. There can be product and service range and usage differences between countries and markets. Luckily for the SME in question the specification of comic books is relatively standard; however the size and product composition may vary. By using a local supplier familiar with local demands for mail packaging and comic book protective covers, the only variability consists of the comic books sought internationally. As such initially there is only one point of review for ensuring compliance with local (Australian) customer demanded quality. However, if any other items are imported, the SME needs to ensure that what is ordered will match the domestic demand prior to importation.

8. Language barriers and cultural differences. For the SME in question, the CEO has wide experience dealing with persons from varying cultural backgrounds. All suppliers for the SME are from English speaking countries, with similar culture and values, similar levels of economic development and legal systems (with only small differences present). As such, the variability from language barriers and cultural differences has been kept to a minimum for initial supply chain operations.

9. There are inherent risks in purchasing abroad which will be discussed more in detail later, therefore, it is critical the SME has an active risk identification and management process in place.

10. Competition of indigenous SME's for purchases in the foreign markets can be countered by seeking to develop strong customer and supplier relationships and by being a good partner to deal with. Thus having a strong partnership.

11. Inadequate behaviours of multinational companies against SME's and a lack of government supporting programs for SME's can hinder the SME. These cannot be completely guarded against. However by identifying them, steps can be taken to be the ideal customer, such as giving correct information, accurate payments and invoicing, done with integration to strengthen relationships with both suppliers and the end customers. In addition, by making the product unique, by diversifying its composition and logistics makeup to create maximum value demanded by the customers; the customers will become locked into the products the supply chain delivers. The SME should make full use of and seek government supporting programs such as those offered by the Australian Taxation Office and the state / national governments.

12. SME's can become bamboozled by the complexity of trade documentation including packaging and labelling needs. Advice needs to be sought by the SME from a customs broker / freight forwarding agent regarding documentation and optimal methods of shipping. This needs to be an on-going process as the rates, logistics offerings by each transport operator, border regulations, shipping technologies and freight providers will change over time.

13. The SME's ability to trade can be hindered by a lack of government incentives to commence international trade. In reality, the current situation is quite the opposite, there are currently government supporting programs such as the AUSFTA and Austrade who actively promotes Australian businesses to undertake International trade.

14. Inadequate intellectual property protection can expose SME's to risk. While in this case the SME is not giving away its intellectual property, its suppliers possess intellectual property; therefore for long term operations it must act ethically and attempt to protect its supplier. Doing this will enhance the SME's reputation among current and potential supply chain partners. As such the SME should uphold its obligations under any agreements or contracts, act ethically, report any illegal behaviour and in general guard the intellectual property of its supply chain partner as though it is its own, as it is the intellectual property of the supply chain.

Risks

Purchasing internationally means that a supply chain is no longer just subject to risk in its own country, but exposed to the other risks which exist in those other countries. To counter this, the SME needs to identify, plan for and where possible mitigate any negative international trends or events.

Increasing market volatility, outsourcing, globalisation and single point sourcing have all served to make the international business community a risky place to operate, especially for any new small enterprise. All of the above and many other risks can lead to disruptions in resource supply, volatility of prices and poor quality of products. These in turn can damage the reputation of the SME with its customer and supply chain partners. In addition, the proposed SME in the supply chain is not familiar with the industry, its suppliers or its customers and therefore a greater degree of caution in initial operations is needed to protect the SME's and supply chains scarce resources. The resources concerned are not just the financial resources, but also the SME's time and reputation. This risk mitigation should not just consist of insurance which may address the financial losses, but not the reputation or time lost and is therefore inadequate.

An important point which will be emphasised to the SME is efficiency in the supply chain needs to be balanced with the relevant incurred risks. That is, the supply chain must be made resilient to uncertainties as well as being efficient. Resilience will be implemented in this SME by making risk management a central part of the supply chain operations and strategy, making it lean and agile by seeking efficient processes, while making it stable through well thought out processes and procedures. This in turn will minimise output variability by utilising standardised work instructions, pipeline time reductions, pull through the supply chain based on demand and attempting to synchronise operations with supply chain partners through information sharing and partnerships. Notably by having actual demand pulling production and units through the supply chain will give the benefits of reduced inventories and reduced cycle time which will allow a more responsive and efficient supply chain.

A methodology of supply chain risk analysis is to be introduced to the SME to help identify and mitigate the risks. It needs to be stressed that a complete approach such as conducting "DNA" on the risks should occur (define, narrow and address all risks). These is needed to ensure the crucial step occurs of following up to either remove the risk at its cause, or if that is not possible/feasible steps are taken to mitigate its effects. Risk management needs to be emphasised as being central to the supply chain, at least as important as efficiency improvement measures to ensure there is a balance between risk and cost minimisation. The SME needs to have the systematic risk management methodology presented to them, so they have a usable tool. The above was given by Juttner et. al (2009, p. 209-215)

Phase 1: Supply Chain Risk Identification

- Selection of the supply chain for analysis – concentrating on supply chains that are highly uncertain or of high strategic importance to the businesses.
- Supply chain mapping – mapping the processes, resources and flows present.
- Identification of relevant supply chain risks – Lynch (2009, p.242) stated businesses should use intelligence, knowledge, experience, opinion and monitoring to identify the risks.

Phase 2: Supply Chain Risk Assessment

- Supply chain risk mitigation, measure and assessment – for SME's a scale of 1-10 is deemed to be enough for assessing both consequence and probability of risks, with the existing mitigation measure effectiveness being low, medium or high (Juttner et al (2009, p213).
- Analysis of the supply chain risk portfolio – analysing the entire supply chains risk profile by sorting all risks in order of probability and impact.

Phase 3: Supply Chain Risk Mitigation

- Identification of mitigation of actions – brainstorming session was suggested to identify actions. It was stated by Juttner (2009, p.214) that a prescribed list could be counterproductive by not identifying some options.
- Assessment of mitigation options – assess the list to see what actually works.
- Decision on mitigation actions and action plans – matching what is possible and communicating it with stakeholders / supply chain partners.

There is a phase four which needs to be added, which is evaluating the efficiency of the risk management tool. Initially in operations the SME may normally fail to identify all risks, therefore, the above tool is to be given to the SME for its protection to guard against previously unknown risks. Over time the nature, magnitude and consequences of risks will change or adapt. Therefore, whenever any change is implemented several important questions need to be asked by the SME such as: What will be changed? To what? Is the change justified by the problem? Is the direction good? Will the solution solve the problem? Or cause other problems? What could go wrong? How and who will implement it? And, Are the necessary processes and resources in place to achieve the change? This is important not only for the success of the change, be it risk based or efficiency based, but also to ensure the SME's supply chain system is positively impacted upon.

The SME will over time become more efficient by becoming a constantly learning organisation, learning from its operations and hence continually evolving. The SME should seek to also learn lessons from any risks that cause an effect on the supply chain. After any incident which causes

disruptions to processes or loss, the SME needs to answer the questions discussed in Section 16.4 (in order to become more resilient).

By answering all these questions the SME can learn from failures or incidents to prevent where possible future occurrences.

Procurement

There is a fundamental choice whether to purchase resources and services from a single supplier or multiple suppliers. The SME is completely reliant upon supply chain partners for all the resources which go into delivering the final product to the end customer. Due to the nature of comic books, sourcing from the copyright owner is required. There are however a few options of comic book suppliers, each who offer unique products varying in brands and hence titles and stories. The supplier selected by the SME prior to this analysis advertised the fact that they had a customer service centre tailored to meeting demands of SME retailers and wholesalers. The supplier also actively stated they sought to partner with their customers. The supplier for this comic book supply chain is situated at three sites in the USA, with Australian orders primarily dispatched from their west coast facility. Many of the risks in dealing with the USA are already known to the SME due to the similar culture, language and values of both countries (USA and Australia). There are also similar logistics infrastructure and risks/challenges to business. However, due to the time zone difference, it does necessitate much of the communication will have to be via delayed means (or EDI/Email), thus there will be a loss of the time dimension in the supply chain due to the delay in communication exchange.

There were multiple options as to suppliers, from various locations, for the mail packaging and protective comic book sleeves. These potential suppliers were located both locally and internationally, however, a review of the manufacturing activity suggested a majority of production for these items was concentrated in Chinese factories. As such, while purchasing from multiple suppliers may seem a risk mitigation strategy against the failure of one supplier, realistically each suppliers supply chain is likely to be integrated upon several upstream factories in China. Due to the importers relevant lack of expertise in dealing with international trade, it was decided to leave the liaison activities with the ultimate creator overseas to an intermediary (namely the local wholesaler). By sourcing locally, while a higher cost per unit may immediately be paid, it shortened the lead time from order of comic book sleeve and mail packaging substantially due to local stocks being held by the wholesaler. That is, the local wholesaler could offer supply continuity, availability, inspect able quality and consistent delivery given the initial low scale demand. Flexibility was also possible as this

wholesaler was able to arrange for the custom printing onto the mail packaging. In addition, by using a local supplier for these items it removed a lot of the uncertainty inherent which would occur with the SME having to deal with an unfamiliar country, infrastructure, with cultural, language and time-zone barriers. To increase the efficiency of the supply chain and assist the local supplier with their planning, smaller order quantities will be placed with the local supplier to ensure sufficient stock is always available.

All three input items were to be sought from single sources due to the benefits over multiple suppliers. These were explained to the SME as:

- Cost reduction can be achieved by having an increased purchasing power over the supplier as the larger quantities exchanged between only two organisations allows a certain economy of scale to both parties.

- Easier sourcing occurs by having the single supplier for each item as it is immediately known who to go to, how and when to obtain the items, making it quicker to obtain goods and services. Thus, there is no need to try to find suppliers, tender or conduct other supplier evaluation activities.

- There is easier quality assurance. By having constant deliveries a relationship is built up which will allow easier quality assurance by having well defined expectations known by both parties, better communication is possible about quality and a history of quality between the two parties. In addition, the supply chain can have an actual expected quality level which has been derived from previous physical exchange.

- A small number of information interfaces are present. By having fewer suppliers there are less communication flows needed and contact points for both parties quickly become known and familiar.

- Bundling of products is made easier. For example sourcing both the mail packaging and comic book protective covers from one supplier means two of the three items required for delivery to the customer are delivered to the cross dock facility at once.

- An overall lower transaction cost. Purchasing from the single supplier often allows lower costs per transaction.

The use of single suppliers also allows the forging of partnerships which can give the further benefits of data and information sharing (where trust is present) which improves operational supply chain efficiency. This can also allow the development of unique value adding relationships. For example, this could be exclusive release or pre competitor release of upcoming issues of comic books.

It needs to be stressed to the SME that it is important until a certain maturity in its partnerships is developed; cost reductions are not to be aggressively pursued. A certain level of trust should be built up so the supplier realises any significant requests for cost reductions are not for the SME's own benefit, but, for the benefit of competitive advantage to the end customer leading to greater revenue (or are required due to competitive pressures in the industry e.g. a price war). In addition, each organisation will have different visions, skills, attitudes and usually difference methods of information exchange (addressed later). The SME should seek to be the best partner they can be in the supply chain by attempting to do the following:

- To attempt to integrate into the suppliers system (where available), this in turn makes them easier to deal with by saving the suppliers having to enter data into their systems. A way this can be done is by data entry into the supplier's website for the order placement of comic books.
- To have well thought out and developed information and communication flows focused on removing waste communication and delivering information how it is required, to whom it is required and when it is required. Since a rapid response model is being created, information is to be exchanged in smaller amounts. One way this can be practically done is estimated order quantities will be created prior to the final order to give the supplier an idea of total volumes needed. While the suppliers, due to their size, will have no problem with the initial quantities, it will demonstrate a desire on the part of the SME to integrate.
- To always pay on time.
- To be a seemingly overall low maintenance customer by having well developed systems which clearly communicate needs to all suppliers at the time of end customer order.

Partnering with suppliers gives considerable benefits, but, how can this be achieved? There is a four stage model which will be given to the SME to take the supplier from a transactional relationship to a collaborative relationship. These stages need to be explained to the SME in detail. The key to achieve each new integration level is to start each step slowly with low resource involvement by the partner. Over time by repeated successes, trust will be built and then that stage will become the norm. These successes need to be communicated and pre-planned.

Initially the time of processes needs to be defined so that both parties know what will need to happen and when. There needs to be the trust of both parties to commit to this timeline and the corresponding transparency to illustrate the successes. When all three are present in sequence, the successes can be achieved, then communicated and will lead to a development in the relationship.

This is particularly important for the monopoly supplier (comic book supplier), with whom, there is no option to change to another supplier, unless the entire product range is changed. Therefore it is important the SME attempts to build this relationship by attempting to remove any mistrust and applying social skills such as empathy, conflict resolution, self-awareness and motivation. These are especially needed as initially the SME will not be the most important customer to the suppliers. While the SME lacks the power of other customers relating to resources and finances, it can make up for it by charisma (through application of their social skills) and well thought out information and communication flows. The fact that opportunism may occur, especially against an SME by a larger supplier in the supply chain, needs to be watched for and as such the SME needs to periodically evaluate the relationship they have with their supplier. Thus the relationship should be reviewed on the basis of five criteria which are creativity, stability, communication, reliability and the equal value sharing of outputs.

To guard against and highlight if opportunism is occurring the SME should also speak to potential suppliers. This will allow the true market prices to be known and if necessary give alternate suppliers in the case of failure of the primary supplier. Finally prior to using any suppliers and to select suppliers they need to be investigated based on their abilities to deliver the demanded customer value. A table was generated for the SME to analyse the multiple criteria required and is displayed in Appendix F.

The suppliers selected allow the SME to define its service menu of capabilities by the ways the suppliers or SME? can add or offer extra value to the end clients. Therefore, the suppliers also need to be evaluated in relation to the product implications and whether they can deliver the demanded value. Hence, before suppliers can be selected the product specifications need to be known, so how the suppliers can successfully supply the needed goods and services can be evaluated. Items which need to be considered for the product features are:

- The facts – minimum/maximum/average weight and size – glossy or newsprint – hard or softcover. The size and weight of the comic books needs to be known before the mail packaging and protective covers can be knowingly purchased.
- Quality.
- Assembly requirements and processes.
- Ease of Production.
- Serviceability.
- Cost and service implications of the design.
- Order sizes available.

- Configurations.
- Does it meet customers' requirements?
- Delivery requirements.
- Packaging requirements.

It should be noted the end customer ultimately defines the value of the comic books which arrive in their letterbox and as such the total value in the product needs to be known. As such, one key factor in the supplier selection needs to be the value they offer, not just the cost.

An important strategy that should be given to the SME with regards to procurement is that if clustering was possible it should be undertaken. Clustering can allow a SME to realise greater economies of scale by networking and sharing operations with other businesses who consume the same products. It can also allow, as well as lower cost through economies of scale and resource pooling, a greater availability to suitably customised services and products to be used as inputs.

Customer Closeness

In addition to partnering with suppliers the SME should and will seek closeness to and partnership with the end customer. This allows the SME (and thus the supply chain) to empathise with the end customer, which allows the supply chain to identify and deliver upon the solutions demanded. Customers, like the businesses that service them have been subject to increasing social change. There is now often a greater choice of products. In addition, information technology has evolved to the point where end customers have been doing traditional business activities such as ordering via websites. In addition, customers have less time due to a busier lifestyle and less leisure time. It is important the supply chain delivers the quantity the customer wants, in the response time they desire, with the variety of products wanted, at the service level required, at the price level wanted and with the desired innovation level. The supply chain needs to ensure it will deliver all of these.

Womack et. al (2005, p.2) proposed a lean consumption methodology for supply chains which will be activated in the SME. This has the six basic rules as per theory. The aim of doing this is for the supply chain (and the SME) to move beyond just servicing the customer, but to satisfying and succeeding with the customer. This allows the supply chain to differentiate itself from its competitors by minimising the customers time in the value chain, freeing up the end customer to conduct other activities.

There were the additional aims to differentiate the product by the speed in delivery from the USA to the customer's mailbox, the care taken in packaging and the delivery reliability. This will generate

trust in customers there will be no stock outs (as may occur in stores) and customers know they will get their products as soon as available. This is in contrast to stores who may have out-dated comic books which they will clear before stocking new comics. In addition, stores may sell out of new popular comics meaning those who aren't available to secure their copy by visiting the store as soon as it is available (e.g. shift workers, mine workers or people out of town) may miss out.

Inventory

To guard against stock outs, inventory needs to be held to buffer demand variations and the fact that supply will take some time to source the product. This demand will be both increasing demand and decreasing demand.

While antique comic books may be highly valuable and collectors may seek out unique comic books to complete their collections, most comic book enthusiasts seek the latest issue. As such, if large holdings of previous issues are present they may need to be sold at a reduced profit margin to clear the stock. As part of the product strategies of the SME comic book subscriptions will be sold. Thus, most demand is previously known, with the exception of internet purchases which are seen as a secondary strategy. Previous issues / back dated issues are held in stock by the supplier in the USA and can be ordered as needed. Locally, it was decided for the SME to hold a small stock of previous issues to show the product range, for website purchasing and also to sell complete collections (of all back issues to the current issue).

Based on the fact most demand is envisaged to be coming from regular subscriptions a demand dependent supply system was selected. This requires that procurement must be predictable and relatively constant and the supply chain partners hold the relevant inventory / capacity to cover end customer demand.

There will always be fluctuations; especially in website sales due to seasonal demand and market trends therefore some safety stock will be held. This is particularly important as website sales are seen as being the first purchase method for customers. These customers will then receive the items in the special packaging with attached advertisement of mailbox subscriptions to select the SME for further purchases. For the demand dependant supply for this SME it was selected to increase the order by a safety margin to guard against order estimation errors, extra sales or quality issues. Nominally this order quantity was set at subscription demand plus 5; as this was envisaged as the level which could be cleared at normal profit reasonable quickly, but without being such a large investment. While this method may seem relatively low-tech, in comparison to data mining and statistical analysis, it was important to give the SME some idea of the principle. Data mining and

statistical analysis is recommended, however, given the knowledge the SME must absorb at the start of operations and the tools they must already use, it will be delayed. In addition, by not having operational data to work with, statistical data would need to be estimated. This level was set with the proviso that over time the impact of this quantity of 5 is known and the quantity is adjusted up or down as applicable to minimise inventory holdings, while maximising service levels.

Given the large cost of lost sales, the SME was eager to initially hold large inventories of comic books to cover against lost sales. The true costs of inventory were emphasised to the SME. They were summarised as: waste, quality issues, storage requirements, investment/capital held, and its effect to limit cash flow, obsolescence, increased damage, deterioration, shrinkage, insurance and management costs. In addition, it was explained to the SME management that the holding of inventory did not allow a wider product range to be held which would give greater value through a wide range of choice to the end customer.

The SME was given the 14 key inventory pitfalls for it to be mindful of what to look out for and not to undertake.

Transport

It is envisaged that at a later time the supply chain may be a distribution network for magazines, newspapers or other printed products, in addition to comic books. As such, it is important that the SME pre-negotiates logistics services to safeguard delivery options and know solutions available (in terms of time and cost) for future development needs. In addition, transport activities can be one of the seven wastes (under lean methodology), therefore it is important it is analysed so non value adding activities are minimised.

Transport providers need to be selected on the basis of volume, delivery windows, handling requirements, returns, local restrictions and geographical distributions of providers. Comic books have a relatively high value to weight ratio, so airfreight is feasible. In addition, quicker airfreight services are possible through using dedicated small parcel services such a UPS, DHL and TNT who have dedicated networks. This in turn reduces time in the supply chain (and cost) through dedicated networks not requiring external liaison (all internal within one organisation, hence one point of contact is possible). These services also have online tracking, which gives transparency of order status in addition to their high level of speed at reasonable costs. At weights less than 35 kilograms, purchasing courier type services from the USA is more cost effective and quicker than airfreight or ocean freight shipping (due to the minimum charges on these modes of shipment). It should also be noted that the comic book supplier currently has an account and strong logistics integration with the

courier provider UPS. Because they already have an integration with UPS, using another supplier would introduce another liaison for the SME, thus introducing another communication flow in the system, complicating the supply chain. However by integrating with the existing relationships time can be saved by utilising the current strong working relationship. In addition, the larger volume shipped by the supplier can expect to give them lower shipping rates than the SME would be able to obtain by sourcing its own rates. Finally, by using the suppliers transport provider increased integration with the supplier can be achieved while their larger volume gives economies of scale and speed. This can be seen as a case of the SME using the clustering principle with the supplier.

It should be noted that even if express freight services were a more expensive option, the increased inventory turnover which leads to increased cash flow may negate additional expenses. As such it is important that the total cost of logistics is measured not the transport or inventory costs only in isolation. This point needs to be understood by the SME because there is often an inventory and transport cost trade-off where reducing the cost of transport, e.g. shipping by ocean freight, will increase inventory costs, thus actually increasing total logistics costs. Supply chain management theory also calls for frequent, smaller shipments which gives time and efficiency benefits to the supply chain. In this case having smaller shipments is beneficial because import shipments under AUD 1000 value, do not attract duty and GST costs on entry into Australia.

The principle of cross docking will be presented to the SME to minimise the space needed for storage and distribution of product (in addition to its inventory compression and time compression benefits). But where should the cross docking site be? There are various techniques to obtain the optimal site for storage of product to service the end customers in Australia. However, due to the limited resources of the SME, this enterprise will be run out of a garage literally; Therefore undertaking analysis on the best location for storage / cross docking operations is not applicable, as no external site or provider will be sought.

Packaging

Packaging is important as it allows efficient, quick and safe transport. In addition with quarantine clearance at the borders into Australia, using incorrect packaging (e.g. wooden or straw) may delay or hinder border processing and introduce additional costs. The comic book supplier is familiar with Australian Import Regulations as they already dispatch cargo to Australia and hence are familiar with complying with requirements.

Comic book collectors take care of their investments. Comic books like other printed material are vulnerable to tearing, moisture, light, heat, theft and damage due to manual handling. When the

comic books are sent from the USA they are sent in cardboard boxes with airbags to protect, in addition the comic book bundles are sealed in plastic to protect against moisture. Once received, the SME should seek to immediately protect the comic books and hence safeguard their quality. After a visual quality inspection, the comic books should then be placed into the protective sleeves (these sleeves protect against tearing, folding, moisture and manual handling). Due to the possible damage caused by rough handling during postage, to the end customer's, stiff cardboard envelopes are to be used when posting to the end customers. These also protect against tearing, folding, moisture, light, heat and notably theft by protecting the contents from view.

While both the protective comic book cover and stiff cardboard envelope come at extra cost, they protect the quality of the product; and in relation to perceived customer value they show concern for the product being delivered to the end customer. Thus the end customers can be certain they will receive their comic books in the best possible state, something the customers will associate with and appreciate.

<u>Measurement</u>

The aim in measuring the supply chain is to measure the whole supply chain, not just its parts. It is important the SME has appropriate measures in place from the start so it can know its performance, know the health of its supply chain and communicate to stakeholders when, where and why improvements are required.

The primary measurement tool that will be explained to the SME the BSC (Balanced Score Card). The most important point is that the BSC must match the SME's strategy of being responsive to and delivering extra value to its customers. The BSC can be used to measure the entire supply chain in a tailored way. Over time measurements can change as the business strategy changes. The BSC due to its adaptability and its ability to measure goals not traditionally measured is beneficial over more traditional financial measurement systems.

The BSS has four main areas:

1. A customer perspective which defines how the customers view the supply chain.
2. An internal business perspective which states what must be excelled at to succeed.
3. An innovation and learning perspective which asks if the supply chain can continue to create value into the future.
4. A financial perspective which asks if the firm is profitable and financially sound.

The SME needs to have a model of how to implement the BSC. The implementation of the BSC will follow the method outlined by Santos et al. (2006, p.5) who gave a way to implement the BSC metrics in line with organisational strategies and goals:

1. Use the business model and strategy to define business goals.
2. Use the business goals to identify the KPI's (performance measures) which should be used.
3. Implement the performance measures.
4. Use the scorecard to verify the goal achievement / rectify the KPI.
5. Use metrics to track progress against goals.
6. Analyse the progress and defined goals to confirm the firms strategy is being implemented.

Each of the four perspectives previously outlined needs to have measures attached. The measures suggested for the customer perspective measurement based on the business strategies of responsiveness, value adding for the customer and flexibility are: percentage quality conformance, percentage damaged shipments to end customer, time for end to end and customer query time. The internal business perspective measurements suggested are cost per unit, supplier on time delivery, supplier cycle time, supplier quality, inventory held and total value added time versus time in the supply chain. The innovation and learning perspective should measure the ratio of new products introduced versus total products (to show product range development) and social responsibility programs financed versus total profit. The financial measures are the checks and balances which ensure a business is financially viable as well as delivering on customer service and responsiveness. The financial measures suggested are the total logistics costs; total cost per unit, total profit, ROI, base of profitable customers and importantly how fast the supply chain can turn opportunities to profit by using the NCC (Net Conversion Cycle).

The purpose of the BSC is not only to provide a snapshot of what is, but also to illustrate how the business is moving towards its goals. Also, over time the BSC will map out the evolution of the supply chain. The practical entry and use of the BSC will be achieved by utilising Microsoft Excel.

In the theory section of this thesis, three key failures were identified in SME usage of BSC. These need to be explained to the SME, so they avoid these mistakes. The three failures as per theory need to be explained to the SME. Finally, what needs to be stressed with the BSC is its aim should be to understand the supply chain not just to measure it.

The Information Flows

An efficient supply chain requires efficient communication between parties. In the theory analysis a mapping of information flows as well as other processes was endorsed. This is important as the mode and method for communicating with supply chain partners and conveying the customers' needs should be known. Thus the importance of any breakdown in technology can immediately be known.

From the above list, it can be seen the information technology infrastructure which needs to be in place for communication across the supply chain is a website (for order entry), emails, computer to SMS interface, a landline phone, a SMS/ text messaging capable phone and a printer (for labelling of mail). Logically also, a return mailbox (a PO Box for confidentiality of storage location for comic books) is needed.

Each customer and each supplier should answer the following questions: What information is required? When is it required? Who in that organisation should it be sent to? How should it be sent? Why is it needed? The aim of this last question is to identify the important items which need to be exchanged.

For the SME to communicate with its supply chain partners the following contact points need to be defined for accounts, operations, new sales, orders and returns and quality queries.

Given that delays in payments, in particular, can hold up operations in the supply chain, it important information relating to this is updated. How will payment be done? How will orders be given and handled? What are the notification methods of transfers?

Value and Value Chain Mapping

The SME should ensure that they understand value to the end customer. This should be designed into the supply chain and value stream mapping should occur to understand when, where and how in the processes that make up the supply chain value creation occurs. As such the SME will be educated on value and what it is.

The first point which needs to be communicated to the SME is that value creation is a subjective experience. That is exactly what the end customer wants, where they want it, how they want it, when they want it is what must be delivered. It is also generally an exchange and it is the end customer who ultimately defines what value is and if the supply chain delivers it.

There are three types of value which can be delivered by a supply chain. The first type is value to the end customer. The three levels of value to the final customer need to be explained. The second type of value a supply chain can create is the value that can accrue in business to business transactions. Next, the three levels of value which occur in business to business transactions needs to be explained to the SME. Finally, the third value that to that can occur in a supply chain is value delivered to shareholders / owners. While this generally is in the form of profit, it could also be having a share in a reputable firm. The aim of introducing these concepts to the SME is so that they can understand if what they do is of value to the end customer, their supply chain partners, or if it is wasting scarce resources.

The Seven wastes as per McCarron (2006, p.6) need to be communicated to the SME so they are aware of what is wasting their valuable resources in their supply chain. In order to clearly identify in the supply chain if a process is a value adding process or a waste, a method of analysis needs to be given to the SME. One way to do this is to graphically depict the supply chain through value stream mapping. Value stream mapping consists of 5 steps as defined by Hines et. al (1997, p.51) and should be given to the SME as a tool for improvement. It should be emphasised that all processes need to be classified in value stream mapping as Non Value Adding, Necessary but non value adding and Value Adding activities.

Standardised work instructions will be implemented in the supply chain process where possible in conjunction with mistake proofing to minimise process variation and increase quality. This is being done to ensure the situation is highly visible and to illustrate the SME has a clear commitment to quality through mapped processes and a general better level of working conditions. These can be applied within the proposed cross dock operations where the comic books once received from the USA, will immediately be processed and dispatched to customers via mail. Within the cross dock area, the 5S's methodology should also be applied by the SME to optimise the facility efficiency. The 5S's methodology from Lean as summarised in the theory, should now be explained to the SME.

By the SME having well mapped out processes, bottlenecks in the system can be identified and investigated, so that mapping can occur. Bottlenecks will develop within any system so the SME needs to have strategies to manage the bottlenecks. This is important to be addressed early as Chatur (2006, p.4) stated if enough constraints are put in a system inaction results. The theory of constraints (in conjunction with the six sigma methodology as outlined by Razzak et.al (2009)) will be introduced to the SME to allow the SME the ability to expand the constraint and manage the system for optimal operation.

Of all the wastes, emphasis needs to be placed on the removal of wasted time as this will increase customer service, decrease inventory, increase productivity, increase human resource efficiency while freeing up capital. Value stream mapping must also have a time based process component visible due to the large benefits time compression can have for the supply chain. Eliminating non value adding time is a way to reduce cycle time and as such the SME needs to be up skilled on what value adding time is and how it can be graphically identified. The SME should seek to reduce lead time. Lead time is given by the below equation:

Total order lead time = order entry time + order planning time (design + communication + scheduling time) + order sourcing + assembly + follow up time + finished goods delivery.

By reducing the batch size, the queue time in the supply chain can be decreased which in turn decreases the lead time. It is also possible to reduce movement time through eliminating unnecessary movement, improving synergy in operations and by using faster shipping methods.

Appendix B: Value Chain Mapping Application

Subscription Club Joined by End Customer	Orders Placed with the SME via website

Customer Details received by the SME

Customer needs received, identified and processed

Customer needs (order) sent to Customer to confirm

Customer needs printed onto order form (Used as Kanban including label)

Customer needs (order) sent to supplier in USA	Customer needs (order) sent to Local Supplier
Pro-forma Invoice received from supplier	Pro-forma Invoice received from supplier
Payment Advice sent to supplier	Payment Advice sent to supplier
Order confirmed by supplier	Order confirmed by supplier
Supplier gives estimated availability date of order	Supplier gives estimated availability date of order
Supplier gives tracking details after order completion / shipping	Supplier confirms as okay for collection
Order tracked via UPS website	

```
┌─────────────────────────────────┐                                    │
│ Order status sent to end        │                                    │
│ customer including              │                                    │
│ advice of pending withdrawal    │                                    │
│ from their credit card          │                                    │
└─────────────────────────────────┘                                    │
                │                                                       │
┌─────────────────────────────────┐      ┌─────────────────────────────┐
│ Comic Book Received and a       │      │ Mail Packaging and          │
│ Signing of Proof of             │      │ Protective Covers           │
│ delivery for receipt of comic   │      │ Collected                   │
│ books                           │      └─────────────────────────────┘
└─────────────────────────────────┘
                │
┌─────────────────────────────────┐
│ Comic Books Checked for Quality │
│ and Placed into Protective      │
│ Sleeves                         │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Payment Withdrawn from End      │
│ Customers Nominated Credit card │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Information from order form     │
│ transposed (via label) onto     │
│ mail packaging                  │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Receipt from end customers      │
│ payment via Credit card put     │
│ into Mail bag                   │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Appropriate Comic book put in   │
│ the appropriate Mail bag        │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Stock comic books put into      │
│ Storage                         │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Giving of mail items to postal  │
│ services, with clear labelling  │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│ Delivery notification to each   │
│ end customer via email or SMS   │
└─────────────────────────────────┘
```

Category of Action		
	🟨	Value Adding for Customer
	🟧	Value Adding for Business to Business Transactions
	⬜	Non Value Adding but Necessary

Appendix C: Cash flow Diagram

Cash to USA Supplier	Cash to local supplier

Cash to transport provider (UPS via supplier)

SME

Cash from End customer

Cash to postal service for delivery to end customer

Supply Chain Timeline

Cash flow out of the SME

Cash flow to the SME
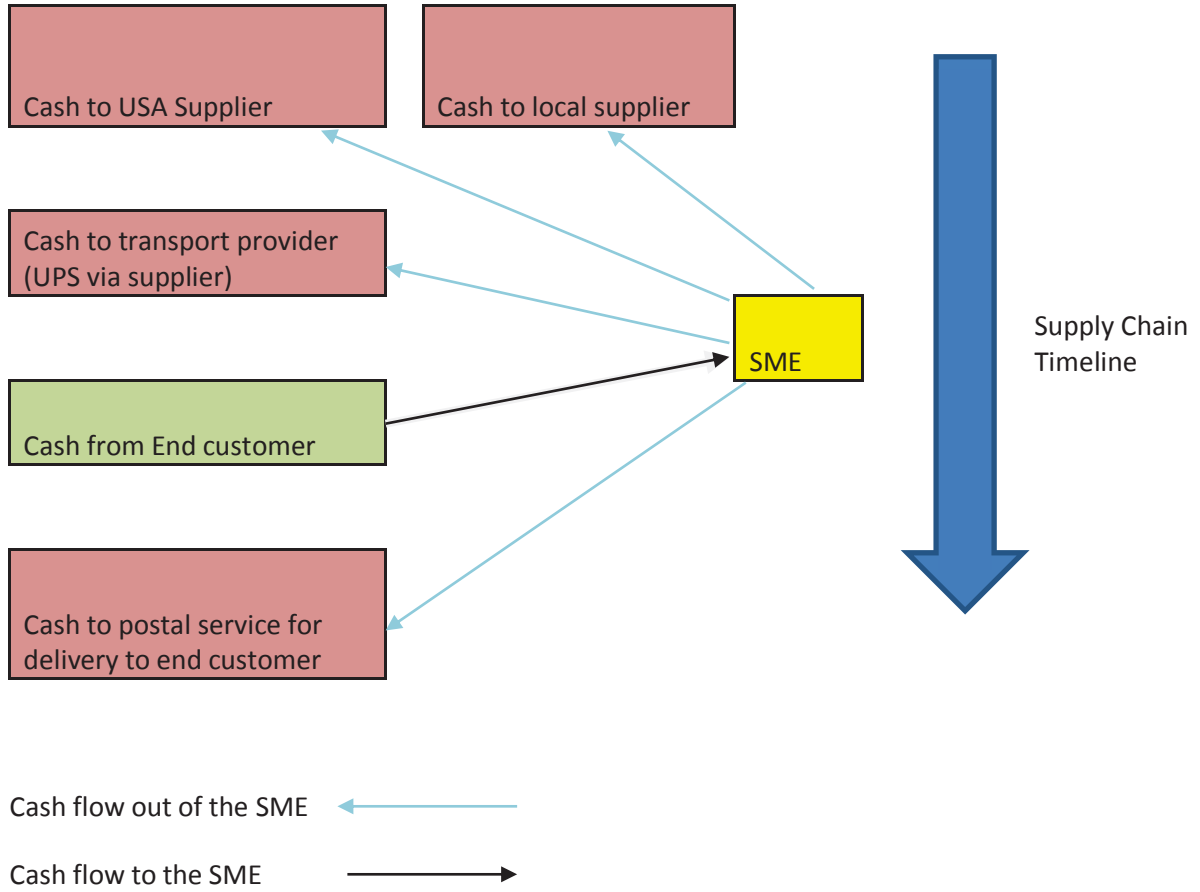
Appendix D: The Proposed Information Flow

End customer joins the subscription club

Customer details received by the SME

Customer needs received, identified and processed

Customer's needs (order) sent to customer to confirm

Customer needs printed onto order form (including label)

Customer needs (order) sent to supplier

Pro-forma invoice received from supplier

Payment advice sent to supplier

Order confirmed by supplier

Supplier gives estimated availability date of order

Supplier gives tracking details after order completion / shipping

Order tracked via UPS website

Order status sent to end customer including advice of pending funds withdrawal from their credit card

Information from order form transposed (via label) onto mail packaging pending arrival of comic books

Receipt added to the appropriate mail bag

Signing of proof of delivery for receipt of comic books

Giving of mail items to postal services, with clear labelling

Delivery notification to each end customer

Supply Chain Timeline

Appendix E: Customer Time in the Service Delivery Process

Traditional Store Retail

Action	Time
1. Customer attends shop	2 Minutes
2. Customer goes to shelf	30 Seconds
3. Customer finds comic, reviews it and decides to purchase	15 Seconds
4. Customer completes shop purchase	1 Minute

Subscription Using Proposed Supply Chain

Action	Time
1. Customer joins the club (ONE OFF)	5 Minutes
2. Customer reads SMS / Email / mail (voluntary if read)	15 Seconds
3. No response needed	0 Seconds
4. Customer receives advice of pending funds withdrawal (voluntary if read)	15 Seconds
5. Customer receives shipment advice (voluntary if read)	15 Seconds

Appendix F: Sample Risk Identification for the SME's Supply Chain

INTERNAL FACTORS	
Staff Factors	Human Resource Failures
	Lack of Availability of Skilled Labour
	Loss of Staff (Resignations)
	Lack of Ability to Attract Skilled Labour
	Sexual Harassment / Discrimination
Brand and Reputation	Product Recall
	Quality Issues
	Obsolescence of Products
	Rumours
	Slander
	Poor Customer Satisfaction
	Customer Service Failures
	Incorrect Marketing / Advertising
	Human Rights Abuses by Suppliers
	Negative Media and Publicity
Strategy Factors	Product not Being Marketed Correctly
	Supply Chain Strategy not Matching Business Strategy
	Incorrect Marketing Strategy Leading to Lack of Growth
	Incorrect Operational Strategy
	Localised Measurement Tools not Promoting Correct Behaviour for Business Growth
	Lack of Innovation
Management and Organisation Factors	Incorrect Management of Staff
	Incorrect Management Shape
	Incorrect Measurement and Control Measures
	Incorrect Physical Location for Assets
Maintenance Factors	Increased Maintenance Needs
	Lack of Availability of Maintenance Staff
	Incorrect Maintenance Policies / Calendar
Human Factors	Criminal Acts such as Theft of Resources
	Terrorism or War
	Product Tampering
	Workplace Violence / Bullying / Discrimination
	Piracy of Comic Books
	Fraud
	Health Issues of SME staff
Informational Hazards	Incorrect Information Flows
	Inefficient Information Flows
	Incorrect Information Recorded
	Incorrect Information Transfer Between Supply Chain Partners
	Theft of Confidential Information, e.g. Credit Card Details

	Loss of Customer Information, e.g. Technical Failure or Fire
	Loss of Operational Information Needed to Operate Supply Chain, e.g. Technical Failure or Fire
Operational Issues	Errors Made in Designing the Supply Chain
	Increased Costs
	Delays in Production
	Disruptions in Supply
	Opportunism by Suppliers
	Incorrect Products being Stocked
	Products Being Discontinued by Suppliers
	Failure of Partnerships or Alliances
	Sourcing Failures
Technical Failure / Hazards	Spam Mail
	Computer Viruses
	Hackers or Malicious Damage or Theft of Information
	Security Vulnerabilities in Webpage
	Computer Hardware issues, e.g. Failure of Printers or Computer
	Computer Software Issues, e.g. Failure or Vulnerabilities in the Software
	Insufficient Capacity to Handle Workload
	Obsolescence of Technology
	Compatibility of IT Systems with Supply Chain Partners

EXTERNAL FACTORS	
Environmental Factors	Fire
	Natural Disasters
	Pollution
	Dust
	Water Leaks
	Insect / Pest Infestations
	Pandemics or Epidemics
Political Factors / Societal Factors	Is it possible to move this list all up one space?
	Government Policy
	Imprisonment of Staff, Clients or Suppliers
	Lawlessness / Civil Disorder / Riots
	Regulatory Changes
	Customs / Quarantine Policy Changes
	Migration
	Change in Consumer Tastes / Fashion
	Demographic Changes
Infrastructure Factors	Logistics and Network Investment
	Supplier Investment in Infrastructure
	Logistics Network Failures or Deterioration

	Supplier Infrastructure Failures or Deterioration
	Postal Network Upgrading or Deterioration
Legal Factors	Cross Dock Facility Failures
	Lawsuit
	Corporate Governance Issues
	Misconduct Resulting in Illegality
	Accidents
	Noncompliance with Tax Law
	Noncompliance with Border Laws
	Noncompliance with Copyright Law
	Noncompliance with Ratings of Publications
	Increased Tax and Legal Audits
Market Factors	Increased Inspections on Shipments by Border Authorities
	Decreased Average Selling Price for Industry
	Level of Competition
	Change in Consumer Requirements
	Change in Service Levels Offered by Competitors
Economic and Financial Factors	Increased International Demand from Suppliers
	Currency Fluctuations
	Economic Decline
	Economic Collapse
	Lack of Availability of Credit
	Interest Rate Increases
	Increased Bank Fees
	Increased Tax Rates
	Bankruptcy
	Increasing Costs of Inputs
	Global Warming (Carbon) Tax

Appendix G: Suppler Selection Table

Evaluation Criteria	Supplier of Comic Books	Supplier of Packaging
Communication Ability		
Financial Health		
Labour Practices		
Capability and Capacity		
Quality Systems		
References / Are they trustworthy?		
Brand Strength / Reputation		
Social Responsibility		
Geopolitical Issues		
Availability		
Similar Strategies		
Are they interested in relationship building?		
Are they interested in collaboration?		
Passion for Excellence / Improvement		
Cost Level		
Flexibility – can they deliver large and small batches?		
Speed – are they responsive too or above speed demanded by customer?		
Do they have the technical expertise?		
Do they have predictable costs?		
Do they fit with business strategy of outsourcing?		
Will they control our business or us theirs?		
Can Databases be linked? Do they have transparency into the order status?		
Are they interested in our company?		
Are they interested in end customer satisfaction?		