

The impact of Strategic Supply Chain Flexibility on customer retention in the B2B segment.

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Master of Operational Excellence and Supply Chain Management

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Summary

Purpose

As present developments like global competition, rapidly changing technology, and shorter product life cycles have contributed to making the current manufacturing environment an extremely competitive one, organizations face significant uncertainty and continuous change. Traditional manufacturing approaches, such as mass production of a few standardized products, are no longer sufficient competitive weapons by themselves. Customers are demanding a greater variety of high quality, low-cost goods and services.

These market changes, technological development capabilities and customer demands underline the importance of a flexible supply chain which starts at a strategic level, and are therefore expected to have an impact on the customer retention amongst businesses. All the businesses in the supply chain are depending on one another to supply at the demanded rate, for the demanded quality, with high margins to remain sustainable. These changes demand an answer to the question whether commodity manufacturers – who used to focus on mass production and other cost reduction methods to compete – should focus more on flexibility by implementing this on all levels (corporate, organizational and operational) to increase customer retention.

Methodology

In this research there are three entities deducted from the independent variable strategic supply chain flexibility, and operationalised to the there to belonging items in the questionnaire. This same process has been done for the dependant variable customer retention.

As the nature of this research is a deductive research the use of a questionnaire was chosen as the best data collection method for the research survey. The data was gathered at commodities manufacturers only, as manufacturers of complex technological products usually have less choice in suppliers and are much less flexible due to higher research and development expenses.

The level of analyses in this research is on an organizational level, entailing for each organization only one respondent. The research is about strategic supply chain flexibility, and its' impact on customer retention, which means the respondent has to have knowledge of the strategic decisions made by the firm, as well as their direct customers

Results

There are 63 valid responses gathered. The results based on these responses are not uniform. According to the correlations of each of the flexibility dimensions on customer retention two dimensions have a positive relationship with customer retention, only the relationship between Competitive Environment Evaluation (SF1) as a Strategic Supply Chain Flexibility dimension did not statistically show the relationship with customer retention to be significant. Regarding the effect of the Strategic Supply Chain Flexibility dimensions on customer retention in the research model, the data support the other two relationships to be statistically significant. (SF2) Supply Chain Diagnostic Review and (SF3) Supply Chain Development as Strategic Supply Chain Flexibility dimensions have a significant impact on customer retention.

	N	Skewness	Kurtosis	Cron. Alpha Standised Items	Adjusted R ²	Sig. F Change	Set 2 adj. R ²	Set 2 Sig. F Change	t-value set 1	t-value set 2	Conclusion
CRR	8	-1,275	2,132	,910							
SF1	6	-,760	-,032	,879		,486			,701		<i>H1 – Rejected</i>
SF2	6	-1,123	,877	,866		,007		,000	2,773	3,796	<i>H2 – Confirmed</i>
SF3	6	-,570	-,656	,847		,054		,035	1,966	2,156	<i>H3 – Confirmed</i>
SFtot.	18			,947							
Tot.	26				,655	,000	,658	,000			

Discussion

In this study the impact of strategic supply chain flexibility on customer retention is determined by testing the relationship between the three mentioned dimensions of strategic supply chain flexibility with customer retention. The dimensions that are studied in this research are Competitive Environment Evaluation, Supply Chain Diagnostic Review and Supply Chain Development. When these dimensions are tested in a direct one-to-one relationship with customer retention, the results show that only Competitive Environment Evaluation does not statistically have a significant relationship with customer retention.

Conclusion

Concluding to the presented research question, this research shows convincing statistical evidence for a positive relation between Strategic Supply Chain Flexibility and Customer Retention, mainly Supply Chain Diagnostic Review and Supply Chain Development. There is no evidence found to support a direct impact for the strategic decision making process on a corporate level to prove this has a positive impact on customer retention. Possible explanations to this could be, that most of the respondents in this research are not expected to be aware of these corporate decisions, as the respondents are mostly middle management or lower. Another explanation could be that the corporate decision making actually does not directly affect customer retention. Corporate decision making affects the organizational and the operational output which are directly coupled to the customer retention.

However in most organizations any organizational decisions find their roots in a corporate decision output, as well as any operational decisions find their roots in an organizational decision output. So unless the middle management can make strategic decisions without corporate direction, all three dimensions of strategic supply chain management are recommended to be implemented within commodity manufacturing companies to increase their customer retention within the B2B segment.

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1. Introduction

Global competition, rapidly changing technology, and shorter product life cycles have contributed to making the current manufacturing environment an extremely competitive one. Organizations face significant uncertainty and continuous change. Traditional manufacturing approaches, such as mass production of a few standardized products, are no longer sufficient competitive weapons by themselves. Customers are demanding a greater variety of high quality, low-cost goods and services (Pine 1993). Organizations must consequently develop new methods and perspectives to meet these market needs in a timely and cost effective fashion (Koste & Malhotra, 1999).

Technological developments are occurring at a faster pace, resulting in new product innovations and improvements in manufacturing processes (K., Duclos, Vokurka, & R., 2003). Higher competitive rivalries have been stimulated since the introduction of the internet as it has shortened the distance between the consumer and worldwide markets, forcing the competition to take into account other businesses not in their own region, yet competing in their market. Companies must be very innovative to be able to keep up with the rapidly changing customer demands.

Apart from the rapidly changing customer demands, also due to these technological developments in the past years - the consumer is now more aware of the variety in products and prices and demands a higher quality for a lower price. This also forces businesses to continuously improve their processes and output to meet these customer requirements.

This global competition is growing due to these improved communication possibilities, and the possibility of outsourcing production, but also opening new branches abroad. Businesses are now competing on a worldwide scale, products and services must for example be produced or provided with competitive labour costs and product materials that meet the quality requirements of the nowadays more demanding consumer.

Creating flexible organizations is one response to dealing with such challenges. A firm that is flexible and possesses a set of different strategic options can respond effectively to dynamic environments (Sanchez, 1995).

Therefore to be able to meet these customer requirements and compete in this tensely competition businesses have to be extremely flexible. This starts at the top of each business, on a strategic level. If the top does not acknowledge the importance of global competition and the requirements of the nowadays end-consumer the rest of the company will suffer the consequences. Of course all flexibility aspects are important for the business to be flexible, thereby meaning also on an organisational level and on an operational level.

Why flexible? The answer to this question is simple; “you can’t plan for the unexpected”, and in many cases, planning actually sets you up to respond incorrectly. You make assumptions about how the world is and what’s likely to happen. Unfortunately, many people try to make their worldview match their expectations, and thus ignore or distort signs that something different is happening. People look for confirmation that they are correct, not that they are wrong. Planning focuses organizational action on specific, anticipated areas, which shuts down improvisation. When people plan, they also tend to “repeat patterns of activity that have worked in the past.” That works well if

things stay the same – but when they change and the unexpected erupts, you are left executing solutions that do not really fit your new situation (Weick & Sutcliffe, 2007).

The following factors combined;

1. The technological developments allowing global competition,
2. The technological developments informing the end consumer about the entire global market,
3. The more and more demanding end consumer higher quality, variety for lower prices,
4. The shortening product-life-time cycles,
5. The importance of flexibility, to be/remain competitive, deliver quality, to an acceptable price for the end-consumer while maintaining/having high margins,
6. The responsibility for the top of the organisation to strategically create a flexible business on all business levels,

underline the importance of a flexible supply chain which starts at a strategic level, and are therefore expected to have an impact on the customer retention amongst businesses - for a retailer for example towards the end of the supply chain - cannot wait too long due to the high end-consumers expectations. All the businesses in that supply chain are depending on one another to supply at the demanded rate, for the demanded quality, with high margins to remain sustainable. This brings me to the following research question;

“What is the impact of strategic supply chain flexibility on customer retention in the b2b segment?”

In this research I will start by explaining customer retention, and how this is a depending variable of supply chain flexibility.

Then I will highlight what flexibility entails, and what the difference is between flexibility, agility and lean.

Thereafter I will continue by explaining flexibility in a supply chain and the three levels of supply chain flexibility and what they entail, as well as the most important aspects of each level and what they each entail. An organization may claim to be strategically flexible but this has to show in the lower business levels as well, being the organisational- and the operational level.

Finally I will bring those two together; the independent variable; strategic supply chain flexibility, and the dependant variable customer retention, to be able to form the propositions (and eventually the hypotheses) for this research.

Exploration to data measurement.

The literature research forms the foundation of the formed hypotheses and the variables of this research will be visualised in the research model. The conduct of the data analysis will be justified as follows;

Research topic.

The research topic is the following;

“The impact of strategic supply chain flexibility on customer retention in the business to business segment”.

The exploration led to this research topic, finds its roots in recent technological developments. As an entrepreneur I have experienced end-consumer wishes, which I could not deliver due to an inflexible supply chain. Lead-times that overdue the consumers wishes, quality that did not meet customer requirements and costs, that did not allow a competitive advantage towards suppliers abroad. I personally witnessed several businesses suffering the consequences of the global competition. This exploration resulted in the wish to find a generally applicable theory to enhance customer satisfaction, in the next link in the supply chain, since we are each other's customers, but merely to satisfy the needs of the end-consumer. This should, in theory lead to higher customer retention, for all the links in the supply chain (Jones & Clark, 1990).

Research objective.

I am not looking for a personal benefit by discovering a way to enhance merely my own situation, but to find a generally applicable theory all businesses should be able to take into consideration with their decision making, for all businesses are somehow a part of a supply chain. To find a generally applicable theory in a field that has already extensively been research, I expected to be able to find the foundation of this generally applicable theory in the existing literature. The research objective is therefore a theory oriented research.

Type of research.

There are two variables in this research topic which each independently have extensively been researched. Strategic supply chain flexibility, as a way to improve flexibility of an organisation and the flexibility of the supply chain as a cooperating chain of businesses to deliver the wishes of the end-consumer. Supposedly should - according to the literature research I cited in this paper (§2.5) – deliver customer satisfaction. However my goal is to enhance customer retention within the supply chain. So I done some research on the existing literature on customer retention (§2.1) which states that customer satisfaction should lead to a higher customer retention. Cooperation within the supply chain to meet the customer demands is therefore necessary to remain competitive. Although both variables separately have been proven to have a high probability of success being;

- strategic supply chain flexibility as improving a flexible supply chain i.e. organization and
- a flexible supply chain as having a positive impact on customer retention.

I therefore expect that strategic supply chain flexibility will show a positive impact on customer retention. The specific research objective can therefore be formulated as a theory-testing research.

Research strategy.

To be able to test this theory, I plan to keep a survey containing all the elements required for strategic supply chain flexibility as stated in the literature, as well gathering the information about their customer retention. A survey is an empirical research strategy in which a single population in a real life context is being selected to test hypotheses on that population. To be able to draw any conclusions on this probabilistic relation an experiment is best, however I cannot find the business or the time to conduct such an experiment, a survey is the second best option.

Selection of instances.

To be able to draw any conclusions on this probabilistic relation I need to find a selection of instances within the theoretical domain of my research. I then need to identify a population of instances within this theoretical framework, to then be able to sample this population. For this research I aim to have a large N of instances.

Conduct of measurement.

To measure this theory testing research I plan to give each variable a measurable scale, meaning a number which represents the value of each variable independently of the other. This is a quantitative research measurement.

Conduct of data analyses.

After having given each variable a value, I can then – after having collected all the data – do a statistical data analyses on this acquired data.

Proposition and conceptual model.

To respond quickly and efficiently to the rapidly changing customer needs in inbound and outbound delivery, support, and services, logistics-/ supply chain flexibility is necessary. Forecasting is never completely accurate, risking overcapacity or lost sales. Variability in demand has always been a problem for many businesses and is only growing as customer needs are changing and product life cycles are shortening. A key issue for companies is how to deal with this growing variability problem. Customer retention is central in this problem. Any firm that strives for flexibility in its supply chain has to start by developing and implementing a strategy to achieve this flexibility in order to have higher customer retention. This forms the bases for my proposition explained in the next paragraph.

Proposition.

Is it entirely impossible for a company to be extremely flexible without any direct involvement of the top? Well, one could suppose the possibility of highly adequate operational and organizational employees who – without direction of the top – are by nature motivated and capable enough to operate extremely flexible. However I think anyone will agree when I claim this is very unlikely and will not occur in most of the scenarios. Development and implementation of supply chain flexibility initiatives are most likely to find its roots on a top management’s level, therefore the following proposition;

“Strategic Supply Chain Flexibility has a positive impact on customer retention”.

Conceptual model

Figure 1. Conceptual model.



2. Literature Research

This chapter contains the theoretical background information on which the research is based and the propositions are formed. All reliable information gathered is used to eventually form the hypotheses and test them in a new environment under different circumstances. First I will start by explaining what the importance of customer retention is, because ultimately this is one of the goals each business should try to achieve. Then I will explain what flexibility entails and the difference between flexibility, agility and lean, because they are much alike but completely different from one another.

The independent variable in this research is supply chain flexibility, because this is expected to have a direct influence on customer retention amongst each directly linked business in the supply chain. All the dimensions of supply chain flexibility will be explained, and their importance to this research. Some will function as control methods (organizational- and operational supply chain flexibility as output variables of strategic supply chain flexibility) whereas other functions as directly related to the research objective (the impact of strategic supply chain management) will form the research methods.

2.1 Customer retention

Customer retention is very important from a financial perspective to the business. Acquiring a new customer is six to ten times more expensive than to retain an existing one (Wagner, 2008). This refers to the end-consumer in the supply chain as well as each company's direct customer within the b2b segment of the supply chain. Especially when the investments of acquiring a customer are higher the importance of retention is higher too. Take for instance a manufacturer who has to adapt his entire production process for his direct customer. Therefore all the links in this supply chain should be aware of the wishes of the end-consumer, because this is the one creating the value in the entire supply chain. A high retention is achieved when the end-consumer is satisfied which on its turn requires the entire supply chain to understand the customers' requirements.

To understand customer requirements it is necessary to define the end-customer set, and group them according to their needs (as opposed to other criteria such as product similarity). Strictly speaking the end-customer is the ultimate consumer, the rest of the supply chain does not receive payment (Jones & Clark, 1990).

Therefore achieving high customer retention within the supply chain, it is necessary to achieve a high customer satisfaction with the end consumer at the end of the supply chain.

Also it is important to understand that customer service encompasses all the points of contact between the customer and the supplier in terms of fulfilment of orders, and includes delivery service, pre- and post-sales services, technical support, financial packages and so forth. *Customer service is the output from the supply system and it results from the combined effect of all functions along the supply chain.* The activities carried out by all functions are important in establishing a desired level of customer service performance. They are also interdependent; if one activity fails, the chain is disrupted, creating poor performance and destabilising the workload in other areas, thereby jeopardising the effectiveness of the supply chain.

To provide higher service level will, without incurring an undue burden of cost, require that all the activities along the supply chain are in balance. To achieve the necessary balance between cost and service involves trade-offs through the chain (Stevens, 1989).

2.1.1 Customer lifetime value

Long-term value is likely to be significant when the following characteristics are present:

1. High marketing expenses to obtain a new customer. When a substantial investment is required to obtain a new customer, the firm may not reap any benefits for a number of years. This situation is likely to occur where switching costs are high (therefore considerable effort is required to obtain a new customer) and where the service involves a high level of interaction between the customer and provider to complete the service (e.g., advertising agencies, professional consulting firms). In these industries, gaining a client often involves an extensive “mating dance.” In many industries, the cost of acquiring a customer, setting up the account and checking credit ratings are so high that the economics won’t work unless the customer stays loyal (Reichheld, 1996).

2. High administration costs to “enter” the customer into the firm’s system. Administration costs include customer approval, collection and system entry of customer information. These costs are present with many membership services including most financial services, business markets where formal linkages are required (e.g., ordering systems), and contract services. Depending on the industry, administrative acquisition costs may not be recovered for three years or more.

3. Relatively low servicing costs. When firms can develop systems to process customer transactions efficiently and effectively, servicing costs are lower. This occurs with many financial services and business markets where large volumes of transactions are a characteristic of the industry.

4. Reasonable margins on sales. It is argued that the longer the customer stays with the firm, the greater the opportunity to command a price premium. The argument is that the customer trusts the firm, values the relationship, and is therefore less sensitive to price increases.

5. High sales volume per customer. As noted earlier, if the firm can segment and target high volume or usage customers, the revenue generated is substantial. In a number of industries, including financial services, the revenue generated from the high volume customers accounts for 70% or more of the firm’s business. Increasing the retention rates among these customers, or increasing their expenditures will be profitable. The key point is that the customer base must have varying spending rates and the volume customers need to be identified. That is, the firm must be able to determine the average profitability per year by customer or segment.

6. *High word of mouth referral.* With many services, particularly those that are primarily experience based (e.g., restaurants) or credence based (e.g., professional services, technical services like auto tune-up), word of mouth may be quite important in generating new business. Services that are high risk, which would include professional services, would also tend to have high impact from word of mouth. In summary, the presence of these factors will enhance the LTV of customers. The individual firm needs to assess the degree to which these factors are present in determining the potential of increasing profits through customer retention (McDougall, 2001).

2.1.2 Customer satisfaction

It has become relatively common knowledge that marketing managers must understand what their customers' value in order to survive and grow in competitive markets (Slater & Narver, 2000). Yet merely knowing what customers' currently value is clearly not enough because what they value changes (Flint, Woodruff, & Gardial, Exploring the Phenomenon of Customers' Desired Value Change in a Business-to-Business Context., 2002) suggesting that suppliers must also have the capability to anticipate what customers will value. Implying the need for such a capability, market-orientation research calls for marketers to partly focus on changing customer needs (Bernard, Jaworski, & Kohli, 1993).

Understanding the dynamic nature of customer valuing, inherently customer-oriented suppliers would expend effort trying to anticipate what their customers will value in the future in order to facilitate a valuable service exchange throughout an ongoing relationship. The service-dominant logic would suggest that customers are more satisfied with and loyal to suppliers who are able to anticipate their desires well. We refer to this capability as customer value anticipation (Flint, Blocker, & Boutin, 2011).

Research at Texas A&M University and the Massachusetts Institute of Technology (MIT) has identified five components that are critical to serve quality from the customer's point of view (Hansen & Steadman, 1991):

1. Reliability: Delivering as promised, consistently and accurately.
2. Assurance: Product and service knowledge; engendering trust and confidence.
3. Responsiveness: Prompt service; willingness to go the "extra mile" to help; delivery of product or service in a timely manner.
4. Empathy: Giving individual attention to customers; treating the customer with care and courtesy.
5. Tangibles: Physical facilities, equipment; appearance of personnel.

There are several aspects a firm needs to follow to achieve customer satisfaction (Nagel & Cill, 1990);

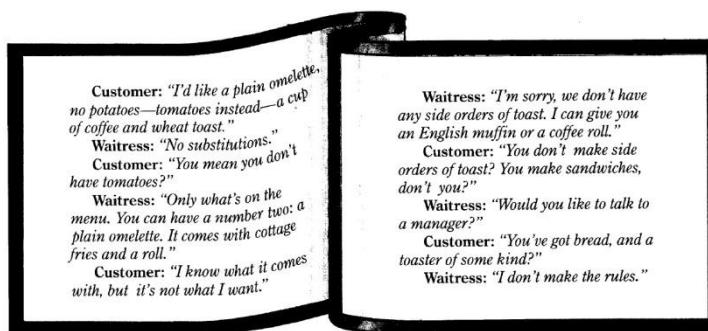
1. Defining customer satisfaction as part of the basic goal of the firm.
2. Positioning customer satisfaction as a strategy within the framework of existing strategies.
3. Integrating conflicting interests within the organisation by stressing customer satisfaction as part of the basic goal of the organisation as a whole.
4. Identifying all the different elements of such a strategy.
5. Designing and planning the organisation structure to accommodate the strategy and its elements.
6. Creating mechanisms such as cross-functional teams which will prevent sub-optimisation of subsystems and enhance the optimisation of the organisation as a whole.
7. Allocating responsibility for the different elements of the strategy to ensure total commitment for optimising the potential of the organisation as a whole.

2.1.3 Customer value anticipation

Customer value anticipation refers to a supplier's ability to look ahead at what specific customers will value from supplier relationships including their product and service offerings and the benefits they create given the monetary and non-monetary sacrifices that must be made to obtain those offerings. From the supplier's perspective, it involves both the processes for anticipating as well as the outcome predictions of product and service offerings that would most likely facilitate value creation by customers. From the customer's perspective, it is their sense that suppliers have such processes and their perception that suppliers are able to actually anticipate their needs, possibly even before they do. (Flint, Blocker, & Boutin, 2011)

Market-oriented firms are encouraged to act on changes in customers' needs (Flint, Woodruff, & Gardial, Exploring the Phenomenon of Customers' Desired Value Change in a Business-to-Business Context., 2002). The concept of suppliers acting on changes is closely related to, if not identical to, supplier flexibility and relationship specific adaptation, both of which address suppliers' reactions to changes in customers' needs (Noordewier, George, & Nevin, 1990).

Figure 2 The flexible waitress. (Feldman, 1991)



Now we have underlined the importance of customer satisfaction of the end-consumer. As this end-consumers behaviour has changed in time and required from the supply chain to deliver high quality fast and cheap, the importance of all the members of this supply chain to each other is underlined. This means flexibility is required for each member to achieve customer satisfaction on the end of the chain. If a business anywhere in this chain does not meet this requirement it will function as a bottleneck in the supply chain and to its direct customer, being the business it delivers its product or service to! This could affect the relationship with its customer and there for lower customer retention. To understand this I will explain supply chain flexibility, and how a business can be part of several supply chains simultaneously.

2.2 Flexibility

In the literature there are many definitions of flexibility to be found, depending on the originating discipline sometimes applicable also in other contexts. From a general point of view, flexibility can be understood as characteristic of the interface between a system and its external environment (Toni & Tonchia, 2005). Another definition of flexibility; Flexibility is required in a system or process so that it is able to respond to change in the system's environment or to a change in the decision maker's perception of reality. (Mandelbaum & Buzacott, 1990) He distinguishes between *State Flexibility and action Flexibility*; the former is the ability to work in spite of changes in the operative conditions (it allows the system to remain ("stable"). The latter is the ability to take action in the face of a change, in a short period of time and with low costs. A third distinguishes between range flexibility and response flexibility. The former is an almost static aspect, typically measured over a long period, with time and cost as elements of friction. The latter is a dynamic aspect, involving the change from one state to another, and is typically measured over a short period and without notable changes in cost (Slack, 1983). **Generally the definition of flexibility might be stated as achieving competitive advantage by having the ability for a business to respond to variations more quickly with lower costs and less impact on the operational system.**

Zhejun Gong chose four flexibility types, i.e., routing flexibility, machine flexibility, labour flexibility, and information technology flexibility, which are basic and independent flexibility types (Gong, 2008). Routing flexibility is defined as the ability of manufacturing cells to handle machine breakdown and finish appointed tasks, machine flexibility is defined as the ease with which a machine can change the process among different jobs, labour flexibility is the ability to change the number of workers, tasks performed by workers, and other worker responsibilities, information technology helps the enterprise to react swiftly to changing markets and can enhance enterprise flexibility by supporting methods that are more flexible.

2.2.1 Agility

Agility has been defined as "the ability to cope with unexpected challenges, to survive unprecedented threats of business environment, and to take advantage of changes as opportunities" (Zhang & Sharifi, 2000). A more detailed definition is "agility is the successful exploration of competitive bases (speed, flexibility, innovation pro-activity, quality, and profitability) through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment" (Yusuf, Gunasekaran, Adeleye, & Sivayoganathan, 2004). Organizations with supply chain agility can better respond to unforeseen events. Moreover, agile supply chains are inherently more market oriented because they are better able to synchronize supply with demand (Swafford, Ghosh, & Murthy, 2008). Also, the need for agility in a supply chain is driven by mass customization, the ability to deliver customer-customized products at or close to mass-production costs (Swafford, Ghosh, & Murthy, 2008).

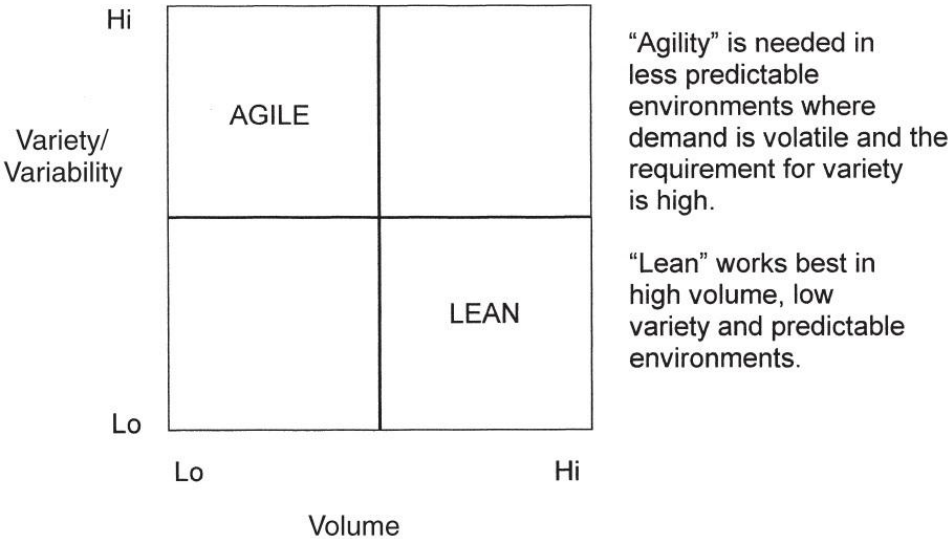
Agility is a business-wide capability that embraces organizational structures, information systems, logistics processes, and, in particular, mindsets. A key characteristic of an agile organization is flexibility. Indeed, the origins of agility as a business concept lie in flexible manufacturing systems (FMS). Initially, it was thought that the route to manufacturing flexibility was through automation to enable rapid change (i.e., reduced set-up times) and, thus, a greater responsiveness to changes in product mix or volume (Christopher, 2000). Later, this idea of manufacturing flexibility was extended into the wider business context (Nagel & Dove, 1991) and the concept of agility as an organizational orientation was born.

It seems flexibility and agility are the same, however the main difference is that agility is a measure of reaction time, speed and flexibility is a measure of reaction capabilities. In this thesis I will further proceed with flexibility aspects, thus the capabilities of reaction for a firm internally or as part of its supply chain.

2.2.2 Lean

Agility should not be confused with leanness. Lean is about doing more with less. The term is often used in connection with lean manufacturing (Womack, Jones, & Roos, 1990) to imply a “zero inventory” just-in-time approach.

Figure 3 Agile or Lean (Christopher, 2000).



2.3 Supply chain flexibility

Supply chain flexibility is a way to respond quickly and efficiently to the rapidly changing customer needs in inbound and outbound delivery, support, and services. Logistics-/ supply chain flexibility is therefore necessary for achieving the needed customer satisfaction at the end of the supply chain.

Flexibility is necessary because forecasting is never completely accurate, and risks overcapacity or lost sales. Variability in demand has always been a problem for many businesses and is only growing as customer needs are changing and product life cycles are shortening. A key issue for companies is how to deal with this growing variability problem.

Supply chain flexibility can provide a sustainable competitive advantage by enabling the manufacturer to please customers by improving product offerings and service while simultaneously reducing costs (Davis, 1993). Reducing these costs is a very important approach on supply chain flexibility, and will therefore separately be explained as an output of three supply chain flexibility aspects in the paragraph (economic supply chain flexibility).

From upper management perspective, the ultimate aim of Supply chain management is to attain high levels of customer satisfaction (Morgan, 1996). This entails developing a cluster of capabilities that enables the company and its Supply chain partners to customize its products and services to meet individual customer needs (Wheelwright & Sasser, 1989). This is the strategic approach on supply chain flexibility and will be extensively explained and this will form the independent variable in this thesis.

To achieve supply chain flexibility it is necessary for all businesses to collaborate within the chain. Any business functions as a link in the supply chain, but can – at the same time – be a part of another supply chain as well. Take for instance a supplier of a certain type of plastic, which delivers to a manufacturer for electronics and one for medical supplies. Two different supply chains that this supplier needs to collaborate with. In the next paragraph I will explain this further.

2.3.1 Vertical- vs. horizontal supply chain collaboration

The fundamental problem in any supply chain system is efficiently matching supply with demand. Because supply and demand are uncertain, we must make use of various buffers, including safety stock, safety lead time, and safety capacity, to facilitate this matching problem (Hopp, Irvani, & Lu Xu, 2010). Taken the last example in the previous paragraph about the plastic supplier, this means he has to take measures to be able to remain flexible to both customers by collaborating with them.

Collaboration in supply chains as a business strategy is now getting increasing attention at business leadership level. In most cases, collaboration seems to imply vertical integration on both ends of the supply chain, that is, collaboration with suppliers, dealers/ retailers. Although Horizontal collaboration (that is between supply chains) is sometimes mentioned, old business model of competition with peers still holds. There is substantial reduction in system inventory leading to reduced working capital requirement. Horizontal collaboration also improves fill rates, a result counter intuitive to the well understood concept of higher inventory needed to improve service levels. Also increasing demand uncertainty benefits of horizontal collaboration (Wadhwa, Kanda, Bhoon, & Bibhushan, 2006).

In the example of the plastic supplier who is vertically involved in two supply chains, this could mean collaborating with other suppliers in other supply chains to achieve a mutual goal. However the focus still lies on the vertical supply chain collaboration. Yet even within this vertical supply chain collaboration there is a distinction to be made between upstream and downstream collaboration.

2.3.2 Upstream supply chain collaboration

Firms are using effective supply chain management to support their multiple manufacturing goals such as flexibility, cost, quality and delivery (Wacker, 1996). In today's competitive and uncertain environment the flexibility of supply chain is crucial in satisfying customers' changing needs. Improvement solely on manufactures capabilities is not enough to address the needs of the flexible supply chain. Upstream activities of the supply chain will play a vital role in determining the flexibility of the supply chain (Ndubisi, Muhamad, Hing, & Ayub, 2005).

2.3.3 Levels of supply chain flexibility

As I have stated in the introduction, the present, highly competitive, manufacturing climate is characterised by increasingly sophisticated consumers that demand customised products and short lead times. Many companies that have previously relied on order winning through low cost standardised production have had to become more flexible in order to compete (Stevenson & Spring, 2007).

Flexibility requires inter-organization data sharing in a supply chain (Golden & Powell, 1999). Understanding supply chain flexibility is important for several reasons Alberto De Toni distinguishes four different approaches for flexibility;

- Economic approach,
- Organizational approach,
- Operational approach,
- And the Strategic approach.

2.3.4 Economic approach

Flexibility is hereby measured in terms of a u-shaped cost curve, set out against the (production) output. When the u-shaped line flats-out it is considered the marginal costs are low and the output is relatively high. Before this stage is achieved the line goes downwards meaning the output is relatively low and higher marginal costs. This means the company has a low flexibility rate. Vice versa when the line surpasses the flattened u-shaped curve causing relatively high costs with the associated output, resulting in high marginal costs and thereby again resulting in low flexibility in terms of the economic approach. (Stigler, 1939)

All dimensions of flexibility have a direct effect on the financial results of the firm, because a company that is not flexible cannot deliver to full satisfaction of the customer, but will also cope with higher production costs, inventory costs, or vice versa lost sales, unnecessary machine routing costs etc.

This means that flexibility at the strategic-, the organizational-, and the operational *level* must be achieved to be able to achieve economic flexibility. This is one of the characteristics of flexibility – to create the value the end consumer wishes while creating economic value in the entire supply chain simultaneously. Therefore I will distinguish the remaining approaches as levels of flexibility rather than approaches.

2.3.5 Organizational approach

Organizational flexibility is the ability to reconfigure the supply chain to meet customer service/demand requirements (K., Duclos, Vokurka, & R., 2003). Organizational flexibility has the goal of achieving flexibility through best business practice, organizational structure and workforce culture, a means for the company to respond adequately to customers unexpected needs (unpredictable demand).

There are two dimensions composed by which the organisation can more quickly respond to its environment (K., Duclos, Vokurka, & R., 2003);

- Resource Flexibility
- Coordination Flexibility

2.3.5.1 Resource flexibility

Resource flexibilities can be characterized through three dimensions of resource 'use' applicable to product competition (Sanchez, 1995):

1. Resource flexibility is greater when there is a larger range of alternative uses to which a resource can be applied. In the context of product competition, this dimension of resource flexibility reflects the range of different products which a resource can effectively be used to develop, manufacture, distribute, or market.
2. Resource flexibility is greater when the costs and difficulty of switching from one use of a resource to an alternative use (i.e., from one product to another) are lower.
3. Resource flexibility is greater when the time required to switch to an alternative resource use (i.e., from one product to another) is lower. Implicit in this dimension of flexibility is an opportunity cost of delay in responding to product opportunities.

2.3.5.2 Coordination flexibility

Barnard maintained that 'the creative side of organization is coordination' (Barnard, 1938), and Andrews suggested that the essence of coordination is the 'way in which subdivided functions and interests are re-synthesized' (Hambrick, 1980). In the context of product competition, coordination involves processes that (Sanchez, 1995):

1. Define the firm's product strategies in terms of which products the firm intends to offer and which market segments it will target;
2. Configure chains of resources the firm can use in developing, manufacturing, distributing, and marketing its intended products to targeted markets;
3. Deploy (i.e., 're-synthesize') resources through organizational structures that support the firm's product strategies.

Table 1 Organizational Approach.

Organizational Approach	
Resource Flexibility	Resource flexibility is greater when there is a larger range of alternative uses to which a resource can be applied. In the context of product competition, this dimension of resource flexibility reflects the range of different products which a resource can effectively be used to develop, manufacture, distribute, or market.
	Resource flexibility is greater when the costs and difficulty of switching from one use of a resource to an alternative use (i.e., from one product to another) are lower.
	Resource flexibility is greater when the time required to switch to an alternative resource use (i.e., from one product to another) is lower. Implicit in this dimension of flexibility is an opportunity cost of delay in responding to product opportunities.
Coordination Flexibility	Define the firm's product strategies in terms of which products the firm intends to offer and which market segments it will target.
	Configure chains of resources the firm can use in developing, manufacturing, distributing, and marketing its intended products to targeted markets.
	Deploy (i.e., 're-synthesize') resources through organizational structures that support the firm's product strategies.

2.3.6 Operational approach

Operation flexibility the number of products which have alternate sequencing plans and the heterogeneity variety of the plans used without incurring high transition penalties or large changes in performance outcomes (Koste & Malhotra, 1999).

This means the ability of a manufacturing system to adapt to changes in the environmental conditions and, in the process, requirements. (Stigler, 1939) This definition is important, since for the first time it takes into account both the exogenous and the endogenous nature of manufacturing flexibility. Internal uncertainty is not independent of external uncertainty; it is sufficient to mention supply and integration with the suppliers: the uncertainty of the supply (external) also has consequences on the uncertainty of operations within the firm (in terms of quantity and quality of the materials to be processed). (Toni & Tonchia, 2005)

Operation flexibility involves changing the actual sequence of operations performed (Koste & Malhotra, 1999). The operational perspective focuses on the detailed systems and procedures to ensure an efficient operation of the supply chain. Typically, a company should measure the performance of the supply chain in terms of inventory investment, service level, throughput efficiency, supplier performance and cost (Stevens, 1989). To measure the efficiency of the operation there are two aspects distinguished; volume flexibility and mix flexibility.

2.3.6.1 Volume flexibility

Several developments have led to the emergence of volume flexibility as a key competitive strategy. Volume flexibility is defined as the ability of an organization to change volume/capacity levels in response to changing socio-economic conditions profitably and with minimal disruptions. (Jack & Raturi, 2002)

Volume flexibility allows organizations to respond quickly and efficiently to both increases and decreases in aggregate demand levels. An organization that can change production volume for only a single part is less flexible with respect to a second organization that can change production volume for its entire product line. The time required to change the output level is a possible transition penalty. Performance outcomes for volume flexibility could include production costs, quality levels, or system profitability (Koste & Malhotra, 1999).

This implies that the manufacturing system is productive even at low levels of utilisation. The principle behind volume flexibility is depicted in the figure 2 (Miltenburg, 2003).

Figure 4 Volume flexibility based on cost curves (Miltenburg, 2003).

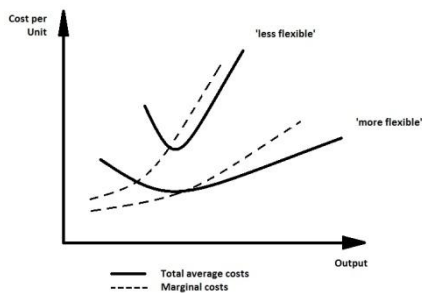


Table 2 Volume Flexibility.

Volume Flexibility		
	Capacity Adaptation Possibility	The firm can change product volume for its entire product line.
	Capacity Adaptation Consequences	Changing the production volume can be done within reasonable cost expenses, quality loss and time loss.

2.3.6.2 Mix flexibility

Mix flexibility facilitates a broad product line that improves a firm’s competitive position (Kekre & Srinivasan, 1990). The number of products provides a strict numerical count of the end items manufactured by an organization. The heterogeneity of products provides a broader insight into the range of mix flexibility, and has proven empirically useful in assessing this dimension (Fernando, Suarez, Cusumano, & Fine, 1996). Consider a firm that produces 30 very similar products and another one that produces 30 products that are very different from one another. Although the amount is identical, the latter firm requires a higher degree of skill and expertise to create its product mix, and is thus more flexible with respect to the first. Transition penalties could include the time or cost required to change the product mix, while productivity or quality levels are possible performance indicators.

Table 3 Mix Flexibility.

Mix Flexibility		
	Mix Adaptation Possibility	The firm can produce several non-identical products.
	Mix Adaptation Consequences	Changing the production mix can be done within reasonable cost expenses, quality loss and time loss.

2.3.7 Supplier flexibility

Knowledge sharing has immense potential to create expedient opportunities and thus retain greater value for supply chains. Knowledge management can be used as an effective approach to achieve knowledge sharing and decision synchronization among supply chain partners. (Saxena & Wadhwa, 2009).

In a supply chain, the suppliers’ flexibility is considered as a tool to cope with the environmental uncertainties. Flexible suppliers are capable of supplying/processing other jobs in addition to the one for which they are the original supplier. In a cluster of flexible suppliers, it is expected that flexibility of suppliers be utilized more expressively through better control of the supply chain (Chan, Bhagwat,

& Wadhwa, 2009). Suppliers' flexibility enables the buyer to respond to changes in market demand during the short life cycle of the product (Schuster, Bassok, & Anupindi, 2002).

The choice of your supplier does not end at which one, but also how many for each product, and where. Having multiple suppliers in closer vicinity has several advantages in line with flexibility;

- to minimize the internal production structure of large firms,
- to reduce their capacity constraints,
- implementation of JIT,
- reduced freight cost,
- reduced transportation lead-time,
- reduced uncertainty through better control,
- strategic virtual integration with a close synchronization between buyer and supplier in a supply chain,
- transfer of technologies,
- concurrent engineering application in integrated supply chain, etc (Chan, Bhagwat, & Wadhwa, 2009).

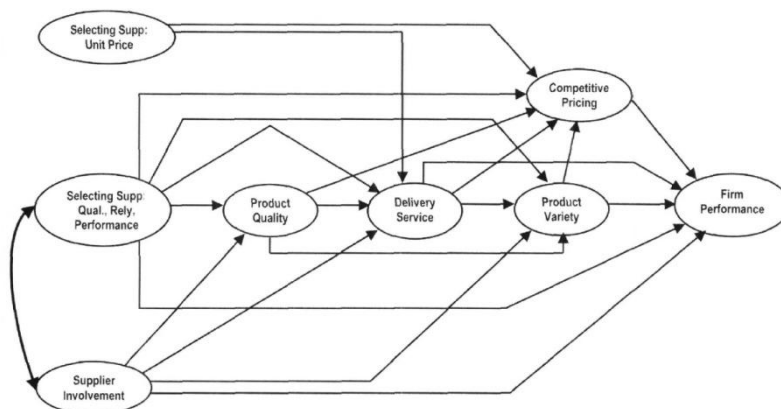
2.3.7.1 Supplier selection

Higher levels of customer satisfaction (i.e. competitive pricing, product quality, product variety, and delivery service) and firm performance result from selecting and evaluating suppliers based on their ability to provide quality components and subassemblies, reliable delivery, and product performance. Also involving suppliers on product development and continues improvement teams has an even greater positive impact on firm performance. Selecting suppliers solely based on their unit price has no proven positive impact on customer satisfaction or firm performance. (Tracey & Tan, 2001)

2.3.7.2 Selecting and evaluating suppliers

Effective purchasing is an important element of supply chain management and a source of superior firm performance. Selecting and evaluating suppliers grounded in the criteria of quality, delivery reliability, and product performance enhances the four dimensions of customer satisfaction (price, quality, variety and delivery) and firm performance. Involving them in the supply chain by way of participation on product design teams and in continuous improvement programs enriches the firm's delivery service and overall firm performance (Tracey & Tan, 2001).

Figure 5 Path model tested (Tracey & Tan, 2001).



2.3.7.3 Information system clustered suppliers

A cluster of suppliers are several suppliers for a specific product/service, delivering to an organization (buyer). The suppliers are clustered together, meaning they are all linked into one online data-sharing system which gives them the possibility to work together. The buyer can see online which supplier can deliver as well as the suppliers being able to deliver products to each other to realise a more flexible supply system.

One important mechanism for coordination in a supply chain are the information flows amongst its members. These information flows have a direct impact on the production scheduling, inventory control and delivery plans of individual members in the supply chain (Lee, Padmanabhan, & Whang, 1997).

One downside has to be considered when viewing the information sharing system. There are real-time information sharing systems available across the supply chain, but it may not always be truly real-time. The more the time-delay is, the less flexible the information sharing will be.

In today's business environment, organizations have to focus on moving information and products quickly through the entire supply chain. The faster that parts, information, and decisions flow through an organization, the quicker it can respond to customer needs and orders (Chan, Bhagwat, & Wadhwa, 2009).

2.3.7.4 Multiple suppliers (routing flexibility)

Multiple suppliers create more flexibility in the supply chain for the organisation and the suppliers, because it enables the buyer to attain his product from another supplier if the first cannot meet the demand.

From the buyer's (organization) view, the supplier's flexibility can be understood: if a buyer has alternative supplier/s to process the same operation/product then they have the flexibility to get the operation done from an alternative supplier. When an alternative supplier (or suppliers) is available to process a given product, then flexibility is present in the suppliers (Chan, Bhagwat, & Wadhwa, 2009).

"Flexibility allows switching of production among different plants and suppliers, so that management can cope with internal and external variability" (Chen, Egbelu, & Wu, 1994).

One downside however is that the buyer must take into consideration that if the supplier does not meet the breakeven point he might be forced to look for another buyer who can meet this breakeven point. Also the supplier will not appreciate a reduction of supply to another supplier merely for flexibility reasons. The buyer could then choose to have a single supplier assisted by a second supplier, as a fall back option. The buyer has to take into consideration the possibility of higher production costs due to smaller batches production.

2.3.7.5 Upgrading the flexibility level of the present supplier

An alternate solution would be to upgrade the flexibility with the present supplier(s). It has been considered that suppliers possess flexibility to process more than one product/operation for the buyer (Chan, Bhagwat, & Wadhwa, 2009).

Table 4 Supplier Flexibility.

Supplier Flexibility		
Information Sharing Flexibility	The firm has an online, real-time information sharing system to coordinate the information flow amongst the supply chain members.	“Real-time” meaning without time-delay, if there is one day delay, for example that reduces flexibility, because there is one day uncertainty!
Routing Flexibility (Multiple Suppliers)	The firm has alternative suppliers to process the same operation/product.	Having more than one supplier for each product/operation, creates more flexibility, because the firm can fall back on the other supplier, when the first cannot deliver.
Clustered Suppliers	The firm uses multiple suppliers clustered together to process the same operation/product.	“Clustered” meaning they are all linked into one online data-sharing system which gives them the possibility to work together.
“Upgraded” Suppliers	The suppliers possess flexibility to process more than one product/operation for the firm.	

2.3.7.6 Dimensions of supplier selection for customer satisfaction

There is a contention in the relationship between supplier and customer that while forecast change is inevitable, a supplier desires stability. From a customer’s perspective the flexibility to change on short notice is preferred over firm plans that cannot change as the market or competition changes. However, suppliers seek certainty, long lead times and limited forecast changes. Clearly customer and supplier interests may not be fully aligned. At the root of their differences can be a supplier’s focus on controlling costs with stable plans and lead time, while the customer may have the “luxury” of making changes to forecasts without concerns that prices will increase (Zylstra, 2006).

To demand from customers to adapt to the wishes of the supplier is not an option, businesses must adapt themselves to the wishes of the customers, and at the same time remain profitable. There lies a role for the managers, they must find a way to adapt the supply chain to achieve these two objectives.

Supply chains used to be viewed, at least by some managers, as “necessary evils.” As a result, the mindset for supply chain managers revolved around reducing costs, by reducing inventory levels, taking advantage of economies of scale in shipping, optimizing network designs, reducing volatility in demands, and so on. By and large, these improvements were invisible to companies’ *customers*, provided that they did not result in longer lead times, more frequent stock outs, or other degraded service. By the end of the last century, however, the purpose of the supply chain had begun to change as some firms discovered that supply chains could be a source of competitive advantage, rather than simply a cost driver (Max & Snyder, 2011).

The role of the manager lies in finding the right supplier to achieve customer satisfaction and to remain profitable for its own organisation. There are four dimensions of supplier selection for customer satisfaction; price, quality, delivery service and product variety (Tracey & Tan, 2001).

2.3.8 Integrating the supply chain

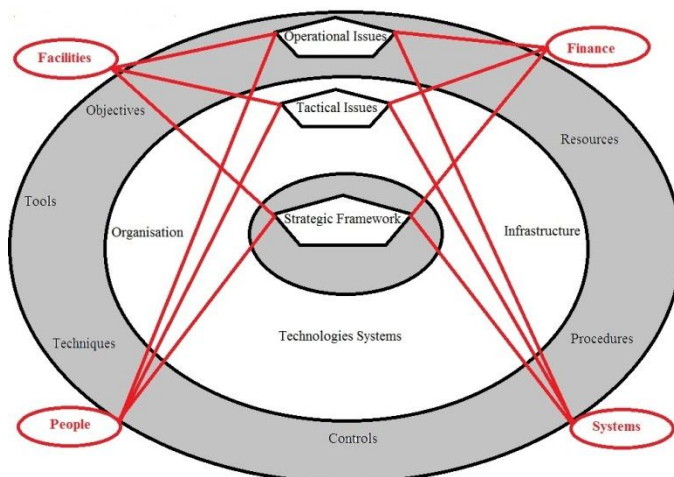
Now we have achieved the awareness of what flexibility entails, and its function within the supply chain. We know the importance of supply chain collaboration to achieve this supply chain flexibility, and its expected importance to customer satisfaction which on its turn is a requirement of customer retention for the b2b level within the supply chain between two or more direct links. All the previously mentioned aspects of supply chain flexibility are an important output of strategic supply chain management, but what, and how, is this strategic supply chain management relationship to these aspects. That is what I am going to show in this part of the thesis.

The objective of managing the supply chain is to synchronise the requirements of the customer with the flow of material from suppliers in order to affect a balance between what are often seen as the conflicting goals of high customer service, low inventory investment and low unit cost. The design and operation of an effective supply chain is of fundamental importance to every company.

Supply chain management seeks to enhance performance by closely integrating the internal functions within a company and effectively linking them with the external operations of suppliers and chain members. This effort requires a firm's activities to be closely coordinated with that of customers and suppliers (Agus & Hajinoor, 2012). As discussed in the paragraph supplier selection I have separately discussed these suppliers as a part of supply chain flexibility and an aspect of improving customer retention.

Traditionally firms have a very operational focus in resolving any supply chain issues or simply enhancing it. For example, when firms have conflicts in their supply chain, they concentrate at the operational and planning levels and compensate for the imbalance with excess inventory and capacity. The results of this approach have for some companies, at best, been frustrating and expensive, at worst, disastrous (Stevens, 1989).

Figure 6 Developing an Integrated Supply Chain.



The development of an integrated supply chain requires the management of material flow to be viewed from three perspectives; strategic, tactical and operational. At each level the use of facilities, people, finance and systems must be co-ordinated and harmonised as a whole (figure 2).

2.3.9 Strategic supply chain flexibility

One possible tool to assist organizations or networks in their quest for flexibility is the implementation and use of an effective strategy (Skipper & Hanna, 2009). If flexibility is considered as an instrument of competition and a priority to be pursued, the sphere of study is moved to a truly strategic level. (Toni & Tonchia, 2005) . The three main strategic imperatives that emerged in this century are low cost, high quality, and improved responsiveness (K., Duclos, Vokurka, & R., 2003).

Increased competition means more volatile markets, shorter life cycles and more sophisticated buyers, which all contribute to flexibility's emergence as a new strategic imperative. Strategic flexibility allows a firm to support the development of future manufacturing strategies, and these enable it to react swiftly to the changing nature of internal and environmental conditions ... Not only, but world-class manufacturing firms also can influence market demand, creating uncertainties or customer expectations that competitors cannot deal with". (Toni & Tonchia, 2005).

If supply issues are disregarded, such that the supply chain is excluded from the strategic debate, there is imbalance, exploitable opportunities are missed and the impact of the competitive threat increased. The focus at the strategic level should be to develop (Stevens, 1989):

- objectives and policies for the supply chain. These should be expressed in terms of what the supply chain has to do well (be responsive to change, operate at lowest cost, ensure a high level of product availability etc) to support the needs of the business;
- the shape of the supply chain in terms of key facilities and their locations;
- the company's competitive package, planned by product and market segment, detailing the balance between product availability, service level, lead time, technical support and after sales support;
- an outline organisation structure able to bridge functional barriers and operate an integrated supply chain effectively.

Strategic choices differ in terms of risks, rewards and resources. Advanced manufacturing technologies entail a large investment and irreversibility of risks, but offer managerial control and opportunity for organizational learning. In contrast, supply chain management options require a much lower investment, and decisions can be changed as conditions warrant (Narasimhan & Ajay, 1999).

All the aspects mentioned in the previous paragraph;

- Organizational
 - Recourse flexibility
 - Coordination flexibility
- Operational
 - Volume flexibility
 - Mix flexibility
 - Supplier flexibility

are possible outputs of strategic flexibility and will therefore be used as a control method on the effectiveness of the strategic supply chain strategy implemented in the firm.

In the next paragraph the aspects of the strategic supply chain dimension are summarised and will be used to form the propositions the conceptual model, and eventually the hypotheses and the research model.

2.4 Operationalizing strategic supply chain flexibility.

As shown in table 5 below, strategic supply chain flexibility is divided into three elements;

1. Competitive Environment Evaluation;
2. Supply Chain Diagnostic Review;
3. Supply Chain Development;

Each of these elements can be tested at the organization as shown in table 5, however each of these elements are linked to other supply chain flexibility aspects as an output of strategic supply chain flexibility. For each of these elements the control elements will be formulated in the paragraphs 2.4.1 – 2.4.3.

2.4.6 Competitive Environment Evaluation.

This is the very basis of strategic supply chain flexibility, and aims to evaluate all the parties directly involved in the firm's market. Those parties include its customers, vendors/suppliers and competitors. This is done by looking at these parties and surveying them, and documenting the results to review and summarise concisely the companies' existing strategies to focus and direct the supply chain development effort.

1. The firm shares knowledge important for decision making to achieve synchronization amongst supply chain members, by means of a real-time information sharing system. The ultimate opposite scenario, is that of no information sharing at all.
2. Suppliers are selected based on their ability to provide quality, reliable delivery, short lead-time, capability of supplying/processing other jobs in addition to those for which they are the original supplier. The ultimate opposite scenario is a supplier chosen solely based on price.
3. The firm has multiple suppliers clustered together sharing information and working together to deliver the best service to your firm. The worst case scenario, is only one supplier.

2.4.7 Supply Chain Diagnostic Review.

This could be considered as the second phase for achieving strategic supply chain flexibility. In this stage the firm reviews the supply chain operations and identifies those areas which offer potential improvement. This is the organizational level mentioned in § 2.3.5.

1. The firm has a large range of alternative uses to which a resource can effectively be used to, develop, manufacture, distribute or market, and can - without high costs - easily change from one resource to another. The worst case scenario is one in which the firm has no alternatives at all.
2. The firm has exactly defined its product strategies, in terms of - which product strategies it intends to offer, and which market segment it intends to offer to. A worse case scenario is one in which the firm has no product strategy at all.

2.4.8 Supply Chain Development.

The final stage for achieving strategic supply chain flexibility, is by developing the strategy and implementation. This stage is directly coupled to the operational flexibility extensively discussed in the literature research chapter, § 2.3.6.

- The firm can change product volume for its entire product line within reasonable cost expenses, quality loss and time loss. The worst case scenario is that in which the firm can not change its production volume at all.
- The firm can produce several non-identical products and changing the production mix can be done withing reasonable cost expenses, quality loss and time loss. The worst case scenario is that in which the firm can only produce one type of product.

Table 5 Strategic Supply Chain Management

Strategic Supply Chain Management			
	Objective	Means	Purpose
Competitive Environment Evaluation	The firm focuses on developing and documenting the marketplace.	By determining those areas where the marketplace demands that a company must be competitive.	To focus and direct the total strategy development effort to where it can be applied to best effect.
	The firm evaluates market characteristics to determine <i>the needs</i> of the customer.	By looking at and surveying customers. (<i>"what do customers want, and how much weight do they have in the market to get what they desire"</i>) <i>The output from this work is a list for each product of the market characteristics which can then be weighted in order of importance</i> (Stevens, 1989).	The purpose is to review and summarise concisely the company's existing strategies. The reason for this is not to evaluate the sophistication or the appropriateness of particular strategies but to focus and direct the supply chain development effort.
	The firm evaluates market characteristics to determine <i>the pressures</i> with the customers (this can apply in a particular situation).	By looking at and surveying customers.	The purpose is simply to identify the internal constraints which may impact on the development of a supply chain strategy.
	The firm evaluates market characteristics to determine the pressures which the vendors (this can apply in a particular situation).	By looking at and surveying vendors.	
	The firm evaluates market characteristics to determine the pressures which the competitors (this can apply in a particular situation).	By looking at and surveying competitors.	
	The firm determines the order winning criteria, the object being to define, prioritise and eventually weight the customers' critical purchasing factors.	By combining the internal and external factors which have been identified and by developing a single, prioritised list for each product market segment, such that effort can be concentrated on areas of importance.	This provides a clear framework which can be used to determine which techniques and strategic elements are most important to the company.
Supply Chain Diagnostic Review	The firm reviews the supply chain operations and identifies those areas which offer potential for improvement.	By developing a cost model.	To develop a realistic method of allocating overhead costs to products, markets and activities.
	The firm identifies those activities in the company which mostly affect and impact on the ability to meet customers' needs.	By identifying those activities in the company's operations which can significantly impact on the company's ability to satisfy customer needs.	Allowing effort into those activities which have impact on the company's ability to satisfy customer needs can provide improvement opportunities.
	The firm develops potential improvement techniques for each of the identified opportunities.	By develops a list of potential improvement techniques for each of the opportunities which have been identified.	To identify techniques for consideration in developing a supply chain strategy and a final implementation plan.
Supply Chain Development	The firm develops a supply chain strategy and tactical plan for implementing that strategy.	By developing a strategy for the company, based on the work done in the first two phases which is consistent with customer desires, management focus, market characteristics and the realities of the organisation.	To utilise fully the company's operations and competitive tools, and allow an approach to supply chain improvements which is integrated with the rest of the business.
	The firm reduces the supply chain strategy to actionable implementation plans.	By developing specific, time-phased, tactical plans for implementing the strategy, organising and prioritising the list of potential improvements developed.	To reflect the strategic plans which have now been developed. The result of this task is a set of time-phased action plans for implementing the supply chain strategy.

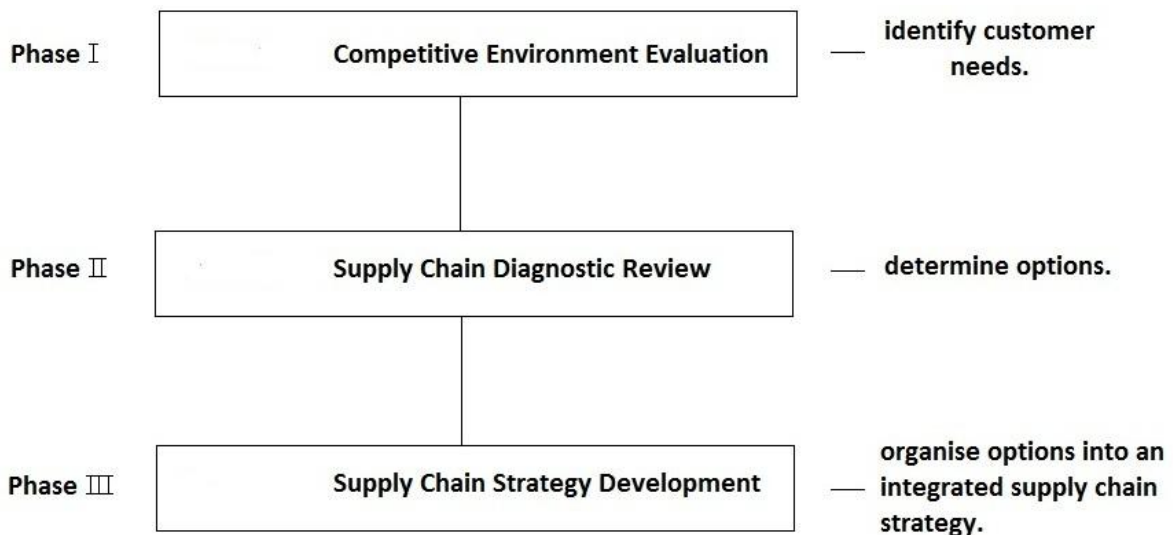
3 Hypotheses and research model.

Strategic supply chain decisions may include: plant or DC openings and closings, allocation of equipment to manufacturing facilities, selection of a location or locations for manufacture of a new product, or evaluation of changes in the flow of a particular product through the supply chain (Douglas & Griffin, 1996). Any such decisions need to take the supply chain flexibility dimension into consideration to eventually achieve customer retention for each of the links within the supply chain.

In many industries supply chain flexibility is becoming a more and more important concept for gaining competitive advantages. By the design and use of strategic supply chain networks significant improvements of supply chain flexibility can be achieved. In order to achieve common competitive advantages a high level of integration of all partners is imperative (Winkler, 2009).

To ensure success a structured approach is required. Developing an integrated supply chain strategy can be considered as a three phase process (Stevens, 1989).

Figure 7 Structured approach to developing a Supply Chain Strategy (Stevens, 1989).



Therefore the following three phases are going to be used to form the conceptual model for strategic flexibility as an independent variable for having an effect on customer retention. However any firm has to take into consideration that any decisions made have to continuously be reviewed in order to remain in the market by looking for opportunities to further reduce cost and improve availability, only this way it can continue to remain successful or become successful in this extremely competitive environment (Hammel & Kopczak, 1993). All the aspects of organizational- and operational supply chain flexibility are considered to have their roots in strategic decision making and therefore being indirectly a part of strategic supply chain flexibility. Therefore these aspects are going to be used as control measures for strategic supply chain flexibility in this thesis.

3.1 Hypotheses development

Competitive Environment Evaluation

The reason for this evaluation is to focus and direct the total strategy development effort to where it can be applied to best effect. Too often when companies want to evaluate the supply chain it is done either at the whim of the individual involved or it just focuses on areas where the company has had success in the past. This narrow approach is invariably ineffective. The way to evaluate operations and to develop a supply chain strategy is to determine those areas where the marketplace demands that a company must be competitive. Therefore, it is necessary to evaluate the market. By doing this it also provides a framework for the evaluation of alternative solutions which can be developed later. The process used to evaluate market characteristics involves looking at and surveying vendors, customers and competitors in order to determine the needs of the customer and the pressures which the vendors, customers and competitors can apply in a particular situation. In effect, what is being identified is, "what do the customers want?", and "how much weight do they have in the market to get what they desire?" (Stevens, 1989).

"H1 – Evaluating the competitive environment will have a positive impact on customer retention."

Supply Chain Diagnostic Review

The purpose of the second step is to review and summarise concisely the company's existing strategies. The reason for this is not to evaluate the sophistication or the appropriateness of particular strategies but to focus and direct the supply chain development effort. The purpose is simply to identify the internal constraints which may impact on the development of a supply chain strategy (Stevens, 1989).

"H2 - Reviewing and diagnosing the supply chain will have a positive impact on customer retention."

Supply Chain Strategy Development

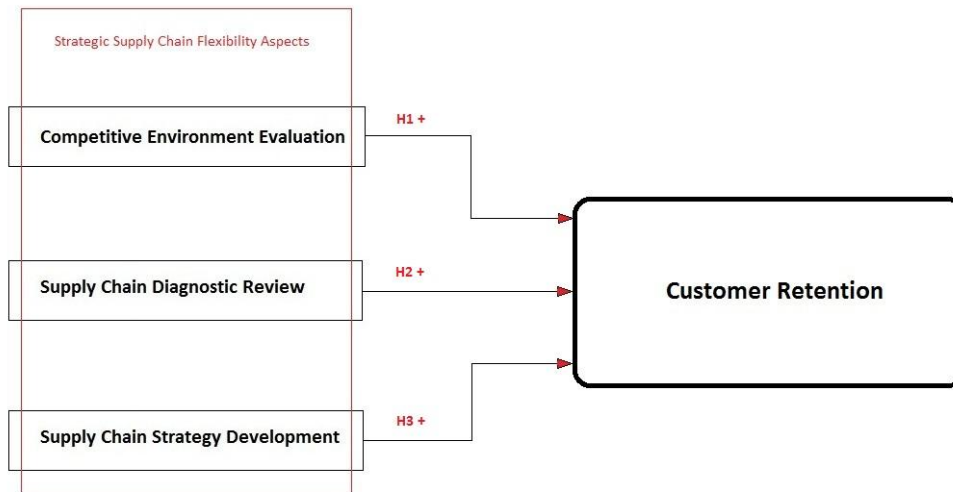
Supply chain strategy development is to determine the order winning criteria, the object being to define, prioritise and eventually weight the customers' critical purchasing factors. Managing a supply chain means managing all the different processes and activities that produce value in the hands of the ultimate customer (Lummus, Vokurka, & Alber, 1998). To do this, it is necessary to combine the internal and external factors which have been identified and develop a single, prioritised list for each product market segment, such that effort can be concentrated on areas of importance (Stevens, 1989).

Supply chain flexibility should be examined from an integrative, customer-oriented perspective. Thus, supply chain flexibility is defined in this research to encompass those flexibilities that directly impact a firm's customers (i.e., flexibilities that add value in the customer's eyes) and are the shared responsibility of two or more functions along the supply chain, whether internal (e.g., marketing, manufacturing) or external (e.g., suppliers, channel members) to the firm (Vickery, Calantone, & Dröge, 1999).

"H3 – Developing a supply chain strategy will have a positive impact on customer retention."

3.2 Research model.

Figure 8 Research model.



As competitive environment evaluation is the very basis of strategic supply chain flexibility, and aims to evaluate all the parties directly involved in the firms market. Those parties include its customers, vendors/suppliers and competitors. This is done by looking at these parties and surveying them, and documenting the results to review and summerise concisely the companies existing strategies to focus and direct the supply chain development effort.

Supply chain diagnostic review is the proceeding dimension for achieving strategic supply chain flexibility. In this stage the firm reviews the supply chain operations and identifies those areas which offer potential improvement. This can be considered as the implementation of the first dimension on an organizational level.

The supply chain strategy development is the final dimension for achieving strategic supply chain flexibility, is by developing the strategy and implementation on an operational level. This can be considered as the implementation of the first and the second dimension on an operational level.

All three are expected to have a positive impact on customer retention, although the first aspect, might be less visible on an operational level or even on an organizational (managements) level, because it is the output of the corporate decisionmaking process. Yet in general it is expected to be a necessity when the next two dimensions are present as managers and operational personnel are not expected to make such decisions without corperate guidance.

3.3 Methodology

The purpose of this chapter is to explain how the analyses are done, the type of research and why this is acceptable and valid in research terms. The structure of the research is justified in the following paragraphs. The research methodology consists of determining the purpose of the research, select a suitable research design and choose the appropriate data collection method (Flynn et al. 1990).

3.3.1 Nature of the research

The nature of this research is a deductive research. This is an approach to the relationship between theory and research in which the latter is conducted with reference to hypotheses and ideas inferred from the former. The researcher, on the bases of what is known about a particular domain (in this case strategic supply chain flexibility and customer retention) and of theoretical considerations in relation to that domain, deduces a hypothesis (or hypotheses) that must then be subjected to empirical scrutiny. Embedded within the hypotheses will be concepts that will need to be translated into researchable entities (translation to operational terms (Bryman & Bell, 2007)).

In this research – as shown in the research model – are several (three) entities deducted from the independent variable strategic supply chain flexibility, and operationalised to the there too belonging items in the questionnaire. This same process has been done for the dependant variable customer retention.

3.3.2 Data collection

There are several techniques to collect data, however the choice for my data collection is limited, because this research concludes a master thesis. Time and money are therefore limited as well as access to data within firms. As a student you are limited to the companies who are willing and capable to cooperate to the research.

In this case there is a large number of data needed to be able to make statistically valid claims for the output to be generalizable. If the data is gather by means of a survey, there remain several data collection methods, such as questionnaire, structured observation and interviews. Due to time and money limitations I chose to use a questionnaire as my data collection method for the survey. The advantage of this, is that it allows contact with otherwise inaccessible contacts. It is less expensive, and it allows the respondent to answer anonymously. It also allows the respondent to take his time in answering the questions, and at the same time, it allows me time to gather and analyse the acquired data.

However there are also some disadvantages to a questionnaire as a data collection method for a survey. For example it does not allow any feedback or explanation on the answers of the respondent. It takes more time to set up the research, and at the same time the length of the questionnaire has to be limited to allow more cooperation from the respondents. There is no direct benefit for them as individuals by cooperating to this research. This last disadvantage I tried to eliminate by offering them a gift if participating in the research, however only a few of the respondents actually asked for this gift, all the others were willing to help me with my survey without this incentive.

My aim was to have 100 plus managers or higher of manufacturing companies of commodity products to respond to my survey within three weeks. I eventually managed to gain 63 valid responses. To achieve this aim, I figured it would be best to make the effort respondents had to make to fill in the questionnaire as small as possible. By sending a questionnaire by mail, and requesting them to mail it back would probably result in a lower response rate because they would

have to put too much effort in it. I therefore decided to use an online survey program free for students, but with some limitations. This program is called survey gizmo and allows students to design a survey and send the link to their respondents. All they would have to do is click on the link and fill in the questionnaire. I would then automatically receive their response and I would have access to additional data, like geographical data or time spend on filling in the survey. The program calculates approximately how long a respondent needs to fill in the questionnaire. This data I can use to decide if a response is valid or not. One of the limitations is that the student licence does not allow more than 250 responses per month, or in other words sufficient for my aim of 100 responses within three weeks.

Then I needed a list of email addresses to which I could send the link to the survey. This I did by using a data base provided by a company in Amsterdam which had a contract with Erasmus University allowing students to download a limited student data base of the companies needed. One of the limitations is that the database did not provide students with email addresses. I solved this problem by adding the word "info@" before all the websites which were provided by the limited student data base. I gathered 1000 websites and sent to all of the "info@" addresses the link to my survey. This resulted in 867 delivered emails. And a response of only 9 valid questionnaires, which is only 1.038%. As I received a lot of emails back from many of the companies that would not cooperate with the questionnaire stating they daily receive many of these requests and could therefore not cooperate, I conclude that the entrance through an info@ email was not efficient. I needed to collect as many email addresses of persons who were themselves capable of filling in the questionnaire. The person reading the info@ mailbox is most likely just a receptionist or some kind of uneducated secretary who does not understand the importance of cooperating to these requests and is probably instructed to bounce these requests as well.

I therefore decided to follow a different approach in collecting the required email addresses. I started calling the different companies by phone and asked for the logistics department or any manager who could answer some strategic questions. Most of the time I got put through and could then request the email address of the person I had on the phone. This way I collected 121 email addresses, with a response of 33 valid questionnaires, this is a response rate of 27.27%, which is very high, and therefore very effective, but more expensive and time consuming. I spent 7 days phoning companies with an average of 50 to 70 phone calls a day.

Then I decided to visit some companies nearby, to try and achieve some more response. I visited 6 companies in IJsselstein Utrecht, Vianen and Nieuwegein in 3 days. They all cooperated with the survey. This took too much time and although it gave a high response rate (100%) it delivered not many responses. I therefore decided to go back to the internet.

I visited the actual websites of the different companies, and used their online request form to ask for their cooperation to fill in the questionnaire. This was much more time consuming than using a database but slightly more effective. I sent approximately 350 requests to the different companies and received 9 responses, which results in a response rate of 2,57%. This took me about 6-7 days.

Now it was time to use my own network to gather the last responses for my research. I collected all the email addresses of fellow students who worked at manufacturing companies to either fill in the survey or forward it to someone who was capable of filling in the survey within their company. Total 17 emails and 5 responses, which results into a response rate of 29,41%.

Lastly I contacted the one person I know who works as a managing director to fill in the questionnaire, who completed my response to a total of 63 valid responses.

In total I had 98 partially filled in responses. This means the person who started participating did not finish the questionnaire. I have some theories on why this could have happened but I was not capable of requesting feedback on the matter since the questionnaires were anonymous. I think the probability exists that after opening the questionnaire they discovered they were not the right person to answer the questions. But I also got feedback from some fellow students who pointed out to me that the questionnaire was not easy and some pages took a lot of time to open. For a respondent who does not gain any personal benefit from participating in this questionnaire those could be reasons not to continue filling in the questionnaire.

Table 6a Responserate

Action	means	Target/method	sent	resp.	%	Partials
Aim/ goal	survey	Commodity manufacturers		100		
Facilitate data collection	questionnaire	SurveyGizmo.com				
Collect company info	database	Companyinfo.com	1000/867	9	1,0	59
Collect company info	phone		121	33	27,3	5
Collect company info	visit	Companies region Utrecht	6	6	100	
Collect company info	online	Companies websites	350	9	2,6	29
Collect company info	Personal network					
Collect company info	connection		1	1	100	
Total			1478	63	4,26	93 partials

3.3.3 Research setting

This paragraph includes a description of the implementation of the chosen research method in practice. The instruments which will be used to measure the described capabilities of flexibility and customer retention for testing the hypotheses are presented in the data collection. The next subparagraphs contain the population and the sample technique that is chosen in this thesis and will be described. Also the validity (internal and external), the reliability, objectivity, the key respondent and the measurements will be described.

3.3.4 Population

The data is going to be gathered at commodities manufacturers in the Netherlands. Commodity, because this type of manufacturing differs from technological highly complicated production firms. They usually have less choice in suppliers and are much less flexible due to higher research and development expenses. The production process differs much from commodity manufacturers on this area. The choice of manufacturers is limited to any firm that has manufacturing activities.

3.3.5 Sample technique

The data is gathered by means of an online data base, which acquired me with the (e-mail) addresses of all the companies I selected on bases of specifications. In this case geographic location; the Netherlands, type of industry commodity manufacturers. The e-mail addresses of all the output of this data base are downloaded into an excel-sheet. Each of these addresses is then e-mailed with a link to the online survey.

3.3.6 Level of analysis

The level of analyses in this research is on an organizational level. This means 1 N is equal to 1 organization. For each company only one person can answer the questions in the survey, otherwise the data collected will not relatively be represented in the final results.

3.3.7 Key Respondent

The research is about strategic supply chain flexibility, and its' impact on customer retention. That means it has to be someone who has knowledge of the strategic decisions made by the firm, as well as their direct customers. They could vary from CEO, CFO to production or marketing manager, basically any manager could be expected to have the strategic and customer knowledge required to answer the questionnaire. Sales representatives might have some knowledge of these subjects as well since they possess general information about the firm. Each of the respondents is asked to mention his job title/prescription to be able to verify this, since in advance I cannot determine all the functions.

A downside of this approach could be that the general strategic information the manager is expected to have, might consist merely of that on an organizational level and not on the corporate level which is also required for this research. However, since a large N is required to be able to make any generalizable statements on the subject, to aim for directors and CEO etc. only, is not possible in such a short period of time. Thus, the risk exists the first strategic supply chain flexibility dimension is not going to be confirmed when it actually should be confirmed.

Table 6b Respondents

Functions	Amount	Company's
1 Management Assistant	2	Schilte houtfabriek IJsselstein/ CelaVita BV.
2 Purchaser	4	Vion N.V./ Nutreco N.V./ Hoogwegt International B.V./ De Heus Voeders B.V.
3 Project Manager	1	Unilever R&D Vlaardingen
4 Project leader	2	Interfood Holding B.V./ Den Braven Sealants B.V.
5 Director National Accounts	1	Deli XL
6 Region Controller	1	BAM Techniek
7 Sales Support	1	AEG Eurolec Consulting BV
8 Director	5	Amstel koffiebranderij B.V./ Flens B.V./ Aeson B.V./ Koninklijke Wessanen N.V./ Drents Overijsselse Coöperatie Kaas B.A.
9 Supervisor	1	Unknown
10 Technical Manager	1	BBS-Foods
11 New Product Logistics Planner	1	Bison International B.V.
12 Production Planner	1	Coca Cola - Dongen
13 Team leader	2	Dirk Bouman Bakkerijen B.V./ Continental Fruit B.V.
14 Managing Director	4	Koppert Beheer B.V./ Schut Hoes Cartons B.V./ Euro Mouldings/ Unknown
15 HR Manager	1	ForFarmers
16 Logistics Manager	3	Menken Orlando BV/ Peka Kroef B.V./ Teijin Aramid B.V.
17 Personnel Officer	1	Van Hessen B.V.
18 General Affairs / Secretary	1	SVZ International B.V.
19 Logistics Planner	1	El-Massria Co. for Mfg and Development
20 Analyst Drinking water Infrastructure	1	Dunea
21 Sales-Manager	3	Ghyczy selection/ Oerlemans Foods Nederland B.V./ Intertaste B.V.
22 DGA-Commercial Director	1	Unknown
23 Planner	3	Plasticfactory multishape/ Koffiebranderij en Theehandel 'Drie Mollen/ Mora Produktie B.V.
24 Marketing Manager	5	Van Hebel Tombeur/ Frisia Zout B.V./ Wild Juice B.V./ Delicia B.V./ Amarant Bakkersholding B.V.
25 Chef Internal Transport	1	Papierfabriek Doetinchem
26 Chairman	1	Bart's Retail B.V.
27 Assistant Transport Manager	1	Continental Bakeries (Haust) B.V.
28 Project Coach Industrial Atomisation	1	Delifrance Nederland B.V.
29 Logistics Coordinator	1	Lenger Seafoods Yerseke B.V.
30 Interim Sales and Operations planner	1	Pré Pain B.V.
31 Junior process technologist	1	AarhusKarlshamn Netherlands B.V.
32 Manager Warehousing	1	Th. Vergeer en Zonen B.V.
33 Expediter	1	Unknown
34 Systems Engineer	1	Willemstein's Industriële Ondernemingen B.V.
35 Transport Analyst	1	Ten Cate Protect B.V.
36 Sr. Associate Internal Sales	1	B.V. Gulpener Bierbrouwerij
37 Operator Flammable Substances	1	Shell Nederland B.V.
38 Unknown	3	Meilink Kistenfabriek B.V./ Bergenco Produktie B.V./ Avery Dennison Materials Nederland B.V.
Total	37 + 1 / 63	N = 63

3.3.8 Validity

Validity refers to the issue of whether or not an indicator (or a set of indicators) that is devised to gauge a concept really measures that concept. This paragraph explains how the validity of the research is “attempted” to be delineated as much as possible.

3.3.9 Internal validity

Selection bias; This bias can be prevented by making sure the right people are chosen to answer the questionnaire, those people who are capable of answering the questions. All the data collected from the respondents used for the results of this research are listed in table 6b: respondents. These represent the companies mentioned beside them. All commodity production manufacturers like; production of cheese, plastic, glue, tiles, bread, paper, wood, light metals, beer, milk, snacks, chicken wings, etc..

Respondent bias; This bias is caused by an individual who answers the questions positively because otherwise this could have an impact on his or her personal situation. For example if a manager is to answer these questions on flexibility and he knows or thinks that answering these questions negatively but honestly could have an impact on his appraisal or bonus in the end of that year. By explaining the purpose of this survey (being a theoretical research) and allowing each respondent to answer anonymously, this bias is prevented, because the respondent has no reason to fear any individual consequences due to his input.

Common method bias; because the same individual answering the questions on customer satisfaction is the same person to answer the questions on flexibility in his organisation there is a possibility of this bias. If for example he or she is to answer the questions on customer satisfaction positively unconsciously the questions on flexibility could be answered positively as well. By turning them around, so asking about flexibility first, those questions will be answered *more objectively* proceeded by only a few questions on customer satisfaction. The flexibility part of the questionnaire could per item be answered positively or negatively, therefore will not be influenced by the dependant variable of customer satisfaction. This prevents the bias that could be caused by positively or negatively answering the questions on customer satisfaction.

Multicollinearity: There is a high correlation between two or more items in the questionnaire caused by asking more questions on a comparable subject, allowing them to weigh more heavily than other items in the questionnaire. This is prevented by making sure each of the items, as well on flexibility as customer retention, are measuring a different aspect. When the relationship between two variables is higher than .55 (correlation matrix), this could possibly be the case. As shown in § 4.2.1 the inter-item correlation in the data of this research is always higher than ,55, there can be concluded that in this case there is no multicollinearity.

Early/late respondents' bias; To prevent the risk of unreliable or questionable response by late respondents I closed the survey after exactly two weeks. No respondents were allowed to answer the questionnaire after this time, because it would be very hard to find out why they answered so late, due to the anonymity of the survey.

3.3.10 External validity

External validity is the extent to which the outcome of a study in one instance or a group of instances applies (or can be generalised) to instances other than those in the study (Dul & Hak, 2008). In this case the aim is to achieve this external validity by selecting a large N of instances, all manufacturing firms in the Netherlands, for only commodity manufacturing. The aim is to have a 100 responses, with an expected response rate of 6 – 10 %, there will be sent at least 1000 surveys, to firms in the previously mentioned sector. Of course this way of gathering a response leads to selection bias, because I can only use the data of the response. Eventually I sent 1478 questionnaires and received a valid response of only 63 (4,26%).

3.3.11 Objectivity

As a researcher one needs to be aware of his/her own bias in order to be as objective as possible. The researcher in this thesis has attempted to guarantee objectivity by clearly specifying the “raw material” from the literature research into categories in advance for this assignment. This approach resides in an attempt to create transparency in the procedures so that the analyst’s personal biases are suppressed (Bryman & Bell, 2007). Therefore objectivity is guaranteed as much as possible in this research, because the rules in question were strictly followed.

The aspects of strategic supply chain flexibility are gathered from the literature and presented as propositions towards customer retention. Customer retention on its turn has also been categorised as the literature shows. These propositions are then defined according to this literature research and formed into hypotheses. These hypotheses are then formed into questions without adding or changing any of the items gathered from the literature for the survey research. The data collected from this survey is finally statistically tested. Thereby preventing any subjective input from the researcher.

4 Results

This thesis researches the impact of several strategic supply chain flexibility aspects on customer retention. It distinguishes three different strategic supply chain flexibility aspects and statistically measures their impact on customer retention. Customer retention is measured by means of one set of indicators. All data, as well as those from strategic supply chain flexibility as the customer retention, are gathered by means of a survey in the form of a questionnaire by several commodity manufacturers. Only data collected from managers or higher or very specific functions was permitted as valid in the analyses of the results for this thesis.

This chapter presents the results gathered by means of a statistical data analyses performed by the use of SPSS PASW 18.0 for Windows. The first paragraph shows the reliability analyses.

As the analyses in the proceeding paragraphs done are based on a normal distribution of the data, a Skewness and Kurtosis analyses was done first. The next table shows the values and the next figure shows a graph with a histogram and a normal curve to visualise the normal distribution of the data collected in this research.

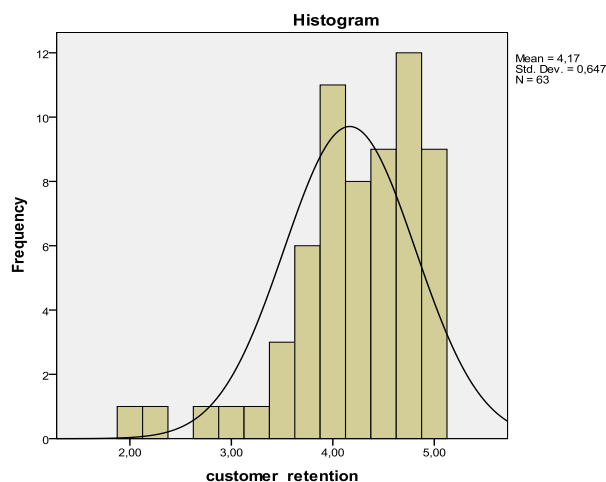
Table 7: Skewness and Kurtosis Customer Retention

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
						Statistic	Statistic	Statistic	Statistic
customer_retention	63	2,00	5,00	4,1667	,64719	-1,275*	,302	2,132*	,595
Valid N (listwise)	63								

The value of skewness in the data collected in this research is -1,275, which is a negative value, indicating a shift to the right. However the range of the shift within acceptable limits, and does not limit the statistical data analyses to a non-normal distribution analyses. The same conclusion can be drawn on the Kurtosis value of 2,132 which is rather high meaning a rather high peak, but still within acceptable levels. Therefore in the following paragraphs the data analyses will be done on a bases the data represents a normal distribution without having to use advanced regression analyses or search for any outliers.

Figure 9: histogram and a normal curve Customer Retention



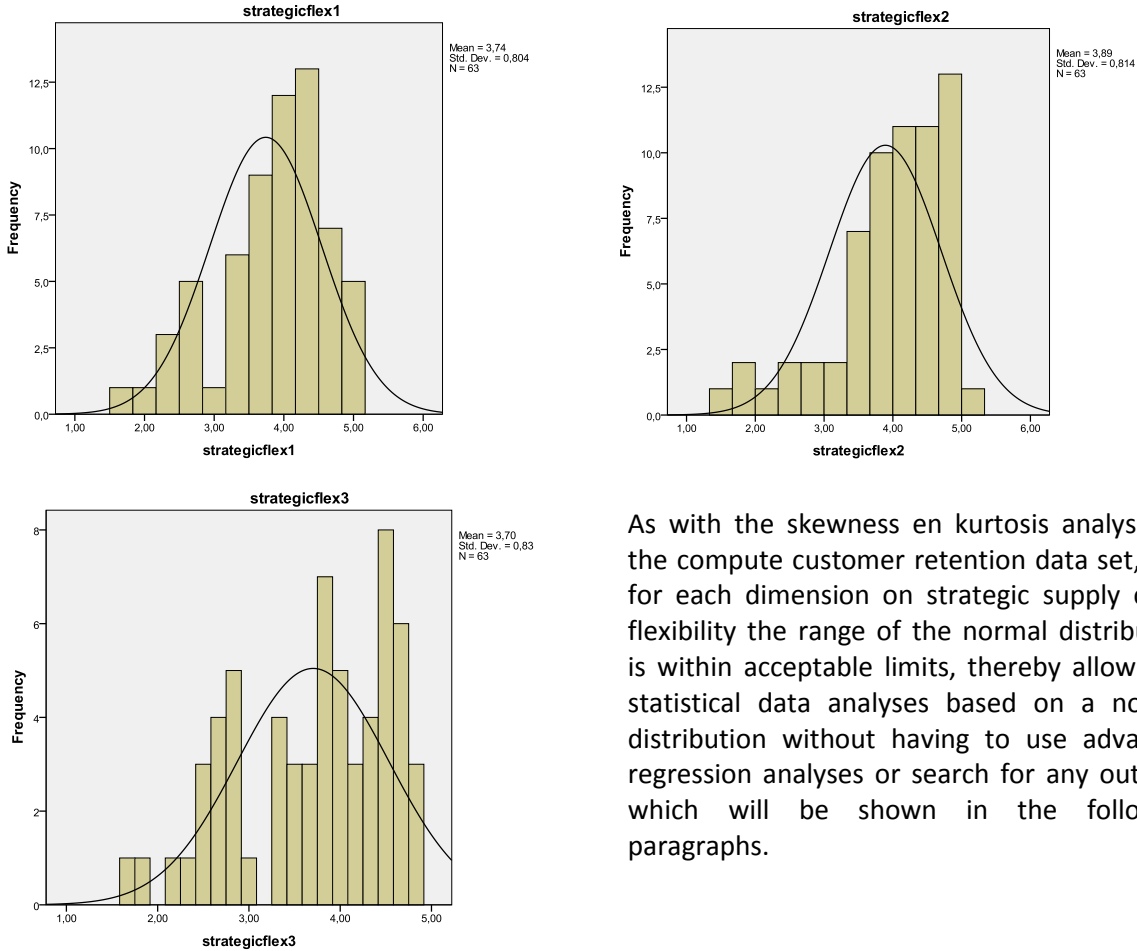
The same is done for the three dimensions of strategic supply chain flexibility. The three dimensions of strategic supply chain flexibility are; Competitive Environment Evaluation (strategicflex1), Supply Chain Diagnostic Review (strategicflex2) and Supply Chain Development(strategicflex3).

Table 8: Skewness and Kurtosis strategic supply chain flexibility dimensions

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
strategicflex1	63	1,67	5,00	3,7407	,80365	-,760	,302	-,032	,595
strategicflex2	63	1,50	5,00	3,8915	,81439	-1,123	,302	,877	,595
strategicflex3	63	1,67	4,83	3,7037	,83034	-,570	,302	-,656	,595
Valid N (listwise)	63								

Figure 10: histogram and a normal curve strategic supply chain flexibility dimensions



As with the skewness en kurtosis analyses in the compute customer retention data set, also for each dimension on strategic supply chain flexibility the range of the normal distribution is within acceptable limits, thereby allowing a statistical data analyses based on a normal distribution without having to use advanced regression analyses or search for any outliers, which will be shown in the following paragraphs.

4.1 Reliability Analyses

The reliability analyses shows the internal coherence between the individual items. I will start by showing the Cronbach's Alpha over the customer retention dataset in table 9.

Table 9: Cronbach's Alpha Customer Retention

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,906	,910	8

Cronbach's alpha Internal consistency

$\alpha \geq .9$	Excellent
$.9 > \alpha \geq .8$	Good
$.8 > \alpha \geq .7$	Acceptable
$.7 > \alpha \geq .6$	Questionable
$.6 > \alpha \geq .5$	Poor
$.5 > \alpha$	Unacceptable

As you can see the cronbach's alpha with ,906 is excellent. Above ,700 the internal coherence between the individual items is considered statistically acceptable/reliable for usage of the items to draw conclusions.

The next table shows the cronbach's alpha score for customer retention if an item is deleted.

Table 10: Customer Retention Cronbach's Alpha if item is deleted

	Cronbach's Alpha if Item Deleted
Your firm has a high customer retention rate.	,903
Your firm focuses more on retaining an acquired customer, rather than focussing on acquiring new customers.	,895
Your firm focuses on the changing customer needs and has the capability to anticipate what customers will value in time to actually deliver.	,887
Your firm delivers the products to the customers in time as promised, consistently and accurately (without errors).	,893
Your firm delivers prompt service (willingness to go "the extra mile" to help; delivery of product or service) in a timely manner.	,894
Customer satisfaction is a part of the basic goal of the firm.	,900
Customers are satisfied with the product variety, delivery service, price and quality of your product(s).	,892
Your firm tries to anticipate what customers will value in the future.	,885

The average cronbach's alpha is higher than the average would be when one of the eight items is deleted from the customer retentions set.

Statistically it is therefore better to leave all items in the set for customer retention.

The same as the above for the data set of customer retention is done for strategic supply chain flexibility. strategic supply chain flexibility consists of three data sets;

1. Competitive Environment Evaluation
2. Supply Chain Diagnostic Review
3. Supply Chain Development

First I will show the reliability analysis for the total set of strategic supply chain flexibility;

Table 11: Strategic supply chain flexibility – total set

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,946	,947	18

Table 12: Strategic supply chain flexibility – Competitve Environment Analysis

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,878	,879	6

Table 13: Strategic supply chain flexibility – Supply Chain Diagnostic Review

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,865	,866	6

Table 14: Strategic supply chain flexibility – Supply Chain Development

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,846	,847	6

As the Total set and all the separate sets of data all consist of a cronbach’s alpha of ,7 or higher the sets are statistically considered as internally consistent and sufficient for basic research, above .8 good. Strategic supply chain flexibility scores ,946 and is therefore excellent in its internal reliability. No items are being deleted from this research.

4.2 Hypotheses Analyses

The results of the reliability analyses show good measurement property for all of the constructs. In this paragraph the hypotheses between the three constructs of strategic supply chain flexibility and customer retention are tested.

In the first paragraph the correlation between each aspect of strategic supply chain flexibility and customer retention is presented. In the second paragraph the regression analyses are done for each of the aspects of strategic supply chain flexibility and customer retention.

4.2.1 Correlation Analyses

Whether or not a correlation coefficient is statistically significant or not will be affected by two factors (Bryman & Bell, 2007);

- The size of the computed coefficient; and
- The size of the sample.

In the next table; table 15, you can see the inter-item correlation matrix for each of the 8 items within customer retention and their individual scores to one another.

Table 15: Inter-item Correlation Matrix Customer Retention

Inter-Item Correlation Matrix								
	Your firm has a high customer retention rate.	Your firm focuses more on retaining an acquired customer, rather than focussing on acquiring new customers.	focuses on the changing customer needs and has the capability to anticipate what customers will value in time to actually deliver.	Your firm delivers the products to the customers in time as promised, consistently and accurately (without errors).	Your firm delivers prompt service (willingness to go "the extra mile" to help; delivery of product or service) in a timely manner.	Customer satisfaction is a part of the basic goal of the firm.	Customers are satisfied with the product variety, delivery service, price and quality of your product(s).	Your firm tries to anticipate what customers will value in the future.
Your firm has a high customer retention rate.	1,000							
Your firm focuses more on retaining an acquired customer, rather than focussing on acquiring new customers.	,566	1,000						
Your firm focuses on the changing customer needs and has the capability to anticipate what customers will value in time to actually deliver.	,644	,609	1,000					
Your firm delivers the products to the customers in time as promised, consistently and accurately (without errors).	,390	,521	,596	1,000				
Your firm delivers prompt service (willingness to go "the extra mile" to help; delivery of product or service) in a timely manner.	,405	,598	,582	,622	1,000			
Customer satisfaction is a part of the basic goal of the firm.	,463	,385	,560	,513	,518	1,000		
Customers are satisfied with the product variety, delivery service, price and quality of your product(s).	,421	,589	,487	,668	,554	,569	1,000	
Your firm tries to anticipate what customers will value in the future.	,518	,574	,692	,630	,596	,591	,736	1,000

The diagonal line shows all 1,000 which represents the inter-item correlation of each item with itself. All scores below this diagonal line are important. As you can see all results are higher than .300, which statistically means the inter-item correlation very high for each item and there for statistically significant.

As the Cronbach’s alpha shows an internal consistency within the data of customer retention and the correlation analyse shows a high inter-item correlation between all the items of customer retention, I will now compute the items into the dependant variable and execute the analyses between the three dimensions of strategic supply chain flexibility with customer retention.

Table 16: Inter-item Correlation Matrix

	customer_retention	strategicflex1	strategicflex2	strategicflex3
customer_retention	1,000			
strategicflex1	,719	1,000		
strategicflex2	,802	,841	1,000	
strategicflex3	,767	,773	,853	1,000

4.2.2 Regression Analyses

R-Squared is a statistical term saying how good one term is at predicting another. If R-Squared is 1.0 then given the value of one term, you can perfectly predict the value of another term. If R-Squared is 0.0, then knowing one term doesn't help you know the other term at all. More generally, a higher value of R-Squared means that you can better predict one term from another.

R-Squared is most often used in linear regression. Given a set of data points, linear regression gives a formula for the line most closely matching those points.

The independent variables in this research are the three dimensions of strategic supply chain flexibility; Competitive Environment Evaluation (strategicflex1), Supply Chain Diagnostic Review (strategicflex2) and Supply Chain Development(strategicflex3). In table 17 below, you can see the R-Square is ,671. This indicates the statistical predictability of the dependant variable customer retention (CRR) in the results of this research.

Table 17: Regression analyses

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,819 ^a	,671	,655	,38036	,671	40,166	3	59	,000

a. Predictors: (Constant), strategicflex3, strategicflex1, strategicflex2

In general the larger a sample the more likely it is that a computed correlation coefficient will be found to be statistically significant. With a correlation between customer retention and strategic supply chain flexibility of higher than 0,719 in all combinations and a significance >,05 the relationship is very strong and that there is a very small chance (less than 1 in 1000) that there is no relationship between the variables at all.

Table 18: Coefficients

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,575	,244		6,462	,000
	strategicflex1	,080	,113	,099	,701	,486
	strategicflex2	,377	,136	,474	2,773	,007
	strategicflex3	,223	,114	,287	1,966	,054

a. Dependent Variable: customer_retention

As the coefficients matrix shows the significance value of the three independent variables vary somewhat from one-another. Strategicflex1 represents the dataset for Competitive Environment Evaluation, and shows a very high significance of ,486 which indicates a high statistical risk. Any score above ,05 is considered statistically insignificant, therefore H1 = rejected. With a Sig. score of ,007 the second independent variable strategicflex2 which represents the dataset for Supply Chain Diagnostic Review is statistically confirmed. The third set strategicflex3 which represents Supply Chain Development just passed the maximum score and should therefore be rejected. However, since the score of H1 has such a high difference it could have an impact on the other scores as well. Therefore a second Regression Analyses is done without the first dataset strategicflex1, shown in table 19 & 20 below.

Table 19: Regression analyses strategicflex2 & 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,818 ^a	,669	,658	,37874	,669	60,516	2	60	,000

a. Predictors: (Constant), strategicflex3, strategicflex2

The adjusted R –square shows again a very high value of ,658, which means that the regression analyses on the datasets strategicflex2 and strategicflex3 have a statistical probability of 65% of confirming the second and third hypotheses. With a Sig. F Change value smaller than ,0009 the chance that there is no relationship between the variables is extremely small (less than one in 1000).

Table 20: Coefficients strategicflex2 & 3

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,610	,237		6,783	,000
	strategicflex2	,429	,113	,540	3,796	,000
	strategicflex3	,239	,111	,307	2,156	,035

a. Dependent Variable: customer_retention

Table 20 shows a big difference with the first regression analyses done. Namely strategicflex3 shows a value of ,035 which does confirm the hypothesis. As in the first regression analysis strategicflex3 just scored below the confirmation rate, and in the second regression analysis without strategicflex1 confidently passed the confirmation rate, the difference in value is explained by the first independent variable strategicflex1. Since this variable is rejected it will not be taken into account for the confirmation of the third hypothesis. Strategicflex3 is therefore confirmed.

Table 21: Summary Results & Hypotheses

	N	Skewness	Kurtosis	Cron. Alpha Standised Items	Adjusted R ²	Sig. F Change	Set 2 adj. R ²	Set 2 Sig. F Change	t-value set 1	t-value set 2	Conclusion
CRR	8	-1,275	2,132	,910							
SF1	6	-,760	-,032	,879		,486			,701		<i>H1 – Rejected</i>
SF2	6	-1,123	,877	,866		,007		,000	2,773	3,796	<i>H2 – Confirmed</i>
SF3	6	-,570	-,656	,847		,054		,035	1,966	2,156	<i>H3 – Confirmed</i>
SFtot.	18			,947							
Tot.	26				,655	,000	,658	,000			

The results based on 63 respondents are not uniform. According to the correlations of each of the flexibility dimensions on customer retention two dimensions have a positive relationship with customer retention, only the relationship between Competitive Environment Evaluation as a strategic supply chain flexibility dimension did not statistically show a relationship with customer retention to be significant. Regarding the effect of the strategic supply chain Flexibility dimensions on customer retention in the research model, the data support two of the three relationships, namely hypotheses 2 and 3 which are statistically significant with a t-value above 2 and a p-value less than 0,05. So Supply Chain Diagnostic Review and Supply Chain Development as strategic supply chain flexibility dimensions have a significant impact on customer retention.

5 Discussion, Conclusion, Limitations and further research.

In this concluding chapter of this research the final discussion will be presented in § 5.1, followed by the conclusion of the research thesis in § 5.2. Finally in § 5.3 the limitations and § 5.4 recommendations for further research are done.

5.1 Discussion

In this study the impact of strategic supply chain flexibility on customer retention is determined by testing the relationship between three dimensions of strategic supply chain flexibility with customer retention. The dimensions that are studied in this research are Competitive Environment Evaluation, Supply Chain Diagnostic Review and Supply Chain Development. When these dimensions are tested in a direct one-to-one relationship with customer retention, the results show that all dimensions have a significant positive relationship with customer retention.

These results are nearly the same as in previous research on this topic by (Zhang, Vonderembse, & Lim, Logistics flexibility and its impact on customer satisfaction., 2005) which shows a positive and significant relationship between supply chain flexibility customer satisfaction, and (McDougall, 2001), which show a significant relationship between customer satisfaction and customer retention. Note that the study on logistics flexibility by Zhang et al, also refers to customer retention.

Possibly the results of this study can be explained by:

Companies that scored low on the flexibility dimensions also scored less on customer retention, vice-versa companies that scored higher on the supply chain flexibility dimensions also scored higher on customer retention.

Related to this:

The reason why Competitive Environment Evaluation is important to achieve Customer Retention, is because this is the very basis of strategic supply chain flexibility, and aims to evaluate all the parties directly involved in the firms market. Those parties include its customers(, vendors/suppliers and competitors). This is done by looking at these parties and surveying them, and documenting the results to review and summerise concisely the companies existing strategies to focus and direct the supply chain development effort.

For the second dimension of strategic supply chain flexibility; the Supply Chain Diagnostic Review, the firm reviews the supply chain operations and identifies those areas which offer potential improvement. The firm has a large range of alternative uses to which a resource can effectively be used, to develop, manufacture, distribute or market, and can - without high costs - easily change from one resource to another. This ultimately results in a higher customer retention, because the manufacturer creates the possibility for itself to serve the customer better in case of any foreseen circumstances, which ofcourse occur frequently in nowadays volitile markets. Also it allows the firm to exactly define its product strategies, in terms of - which product strategies it intends to offer, and which market segment it intends to offer to. Knowing this, it allows the company to better anticipate to the wishes of their customer.

And lastly Supply Chain Development which obliges the firm to developing the strategy and implementation of the previous. The firm can change product volume for its entire product line within reasonable cost expenses, quality loss and time loss and the firm can produce several non-identical products and changing the production mix can be done withing reasonable cost expenses, quality loss and time loss.

5.2 Conclusion

Global competition, rapidly changing technology, and shorter product life cycles have contributed to making the current manufacturing environment an extremely competitive one. Organizations face significant uncertainty and continuous change. Traditional manufacturing approaches, such as mass production of a few standardized products, are no longer sufficient competitive weapons by themselves. Customers are demanding a greater variety of high quality, low-cost goods and services.

These market changes, technological development capabilities and customer demands underline the importance of a flexible supply chain which starts at a strategic level, and are therefore expected to have an impact on the customer retention amongst businesses. All the businesses in the supply chain are depending on one another to supply at the demanded rate, in the demanded quality required, with high margins to remain sustainable. These changes demand an answer to the question whether commodity manufacturers – who used to focus on mass production and other cost reduction methods to compete – should focus more on flexibility by implementing this on all levels (corporate, organizational and operational) to increase customer retention.

In this research the output of the strategic decisions to all three levels of the firm are being studied to see whether this could lead to an increased customer retention for commodity manufacturers in the B2B segment by answering the following research question;

“What is the impact of strategic supply chain flexibility on customer retention in the b2b segment?”

The strategic supply chain flexibility dimensions are measured on three levels; 1. the corporate level, which entails the supply chain environment evaluation and focuses on the decision making process based on the information gathered from the market, the competitors and the customers. 2. The organizational level, which entails the supply chain diagnostic review, and focuses on the decision making on an organisational level. 3. The operational level, which entails the supply chain development, and focuses on the actual implementation of the previous process.

As the results show that those commodity manufacturers who score low on the flexibility dimensions also score less on customer retention. They focus more on cost and sales-prices and apparently pay less attention on customer retention. Their target customers are those who want to have the best bargain. However this research shows that by making considerations on being more flexible could potentially lead to a higher customer retention. Therefore, even commodity manufacturers, should consider implementing strategic supply chain decisions, which might lead to higher costs, but result in higher customer retention.

However, the first strategic step is the least visible, it merely tells a firm which direction it wishes to maintain. For example cheap slow production or less cheap fast production. Once this decision is made the organisation decides which supplier. This second step is experienced as a more direct visible process whereas the first in most cases middle-management and lower aren't even aware of. To them these are merely experienced as standard procedures. Once these steps are taken the organisation implements how practically to implement the entire production/supply process. For the operational employers this is experienced as the most direct output of the organisations methods and decision making process.

Concluding to the presented research question, this research shows convincing statistical evidence for a positive relation between strategic supply chain flexibility and customer retention, mainly Supply Chain Diagnostic Review and Supply Chain Development. There is no evidence found to support a direct impact for the strategic decision making process on a corporate level to prove this has a

positive impact on customer retention. Possible explanations to this could be, that most of the respondents in this research are not expected to be aware of these corporate decisions, as they are mostly middle management or lower. Another explanation could be that the corporate decision making, actually does not affect customer retention, because it is indirectly coupled to the output. Whereas the organisational and the operational output is directly coupled to the customer retention.

However in most organizations any organisational decisions find their roots in a corporate decision output, as well as any operational decisions find their roots in an organizational decision output. So unless the middle management can make strategic decisions without corporate direction, all three dimensions of strategic supply chain management are recommended to be implemented within commodity manufacturing companies to increase their customer retention within the B2B segment.

5.3 Limitations

In this paragraph the limitations to this research are being discussed. The limitations to the dependant variable customer retention (§5.3.1) will be firstly viewed followed by the independent variable strategic supply chain flexibility (§5.3.2).

5.3.1 Customer retention

In this research customer retention is being measured by asking the same manager who answered the questions on strategic supply chain flexibility. Due to time and money limitations, but also accessibility to the firms information resources there were no “better” options available. This is a limitation because by researching this variable in this way bias is not filtered (fully) as well as the restriction to the estimation-capability of the manager responsible for answering these questions. A manager most likely will not do the research for you just to answer your questionnaire, he will most likely do an estimate according to his own experience and knowledge of the matter.

The same can be concluded for the other questions asked in the questionnaire about customer retention, for example customer satisfaction and the capability of judging what customers value or not, now and in the future. These aspects are all important to be able to conclude whether or not a company truly has a high customer retention rate or not.

5.3.2 Strategic supply chain flexibility

One of the questions related to strategic supply chain flexibility is the suppliers choice. Does the company choose its suppliers solely on price, or are other aspects as delivery time, quality etc. more important. However when asking a company’s manager this question instead of researching this at the supplier, again, the generalizability is restricted to the amount of bias and judgement capability of the manager. As stated earlier the financial and time limitations as well as accessibility limited the information gathered in this research to this research method.

5.4 Further research

As to probably any study, this study too has its limitations as you could see in the previous paragraph. These limitations can be taken into consideration in any future research to enhance the generalizability of the theory. In the next sub-paragraphs possible recommendations to better measure customer retention and strategic supply chain flexibility are summed for any further research.

5.4.1 Customer retention

Customer retention can be more objectively measured by looking into the actual numbers of the customer files of the firm, if one is present. This would be more objective and reliable than asking the managers because – especially with large firms – the managers can never exactly know these numbers by heart, he will have to do an experienced based estimate.

As explained in the theoretical background research (chapter 2 of this research) there are several aspects important to achieve a “high”-customer retention. One of those aspects is for managers (or/and other relevant employers) to know what customers value and what they will value in the future (Slater & Narver, 2000) (Bernard, Jaworski, & Kohli, 1993). As seen in the previous paragraph asking this to a manager of this firm has its limitations. Therefore this is recommended to be measured by asking the customers themselves. This could also be done at the company in a more extensive study, for example by using method defined by (Nagel & Cill, 1990) who distinguish several aspects a firm needs to follow to achieve customer satisfaction.

5.4.2 Strategic supply chain flexibility

Instead of measuring the suppliers flexibility of the firm by asking the managers of the firm, this research could also be done at the companies suppliers themselves. Of course, when doing this it should not be done by asking those managers, because then there exists a large risk of bias. This could be done for example by testing the 5 components distinguished by (Hansen & Steadman, 1991) through an observational research.

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APPENDIX 1. Overview dimensions of Strategic Supply Chain Flexibility

Strategic Supply Chain Management			
	Objective	Means	Purpose
Competitive Environment Evaluation	The firm focuses on developing and documenting the marketplace.	By determining those areas where the marketplace demands that a company must be competitive.	To focus and direct the total strategy development effort to where it can be applied to best effect.
	The firm evaluates market characteristics to determine <i>the needs</i> of the customer.	By looking at and surveying customers. (<i>"what do customers want, and how much weight do they have in the market to get what they desire"</i>) <i>The output from this work is a list for each product of the market characteristics which can then be weighted in order of importance</i> (Stevens, 1989).	The purpose is to review and summarise concisely the company's existing strategies. The reason for this is not to evaluate the sophistication or the appropriateness of particular strategies but to focus and direct the supply chain development effort.
	The firm evaluates market characteristics to determine <i>the pressures</i> with the customers (this can apply in a particular situation).	By looking at and surveying customers.	The purpose is simply to identify the internal constraints which may impact on the development of a supply chain strategy.
	The firm evaluates market characteristics to determine the pressures which the vendors (this can apply in a particular situation).	By looking at and surveying vendors.	
	The firm evaluates market characteristics to determine the pressures which the competitors (this can apply in a particular situation).	By looking at and surveying competitors.	
	The firm determines the order winning criteria, the object being to define, prioritise and eventually weight the customers' critical purchasing factors.	By combining the internal and external factors which have been identified and by developing a single, prioritised list for each product market segment, such that effort can be concentrated on areas of importance.	
Supply Chain Diagnostic Review	The firm reviews the supply chain operations and identifies those areas which offer potential for improvement.	By developing a cost model.	To develop a realistic method of allocating overhead costs to products, markets and activities.
	The firm identifies those activities in the company which mostly affect and impact on the ability to meet customers' needs.	By identifying those activities in the company's operations which can significantly impact on the company's ability to satisfy customer needs.	Allowing effort into those activities which have impact on the company's ability to satisfy customer needs can provide improvement opportunities.
	The firm develops potential improvement techniques for each of the identified opportunities.	By develops a list of potential improvement techniques for each of the opportunities which have been identified.	To identify techniques for consideration in developing a supply chain strategy and a final implementation plan.
Supply Chain Development	The firm develops a supply chain strategy and tactical plan for implementing that strategy.	By developing a strategy for the company, based on the work done in the first two phases which is consistent with customer desires, management focus, market characteristics and the realities of the organisation.	To utilise fully the company's operations and competitive tools, and allow an approach to supply chain improvements which is integrated with the rest of the business.
	The firm reduces the supply chain strategy to actionable implementation plans.	By developing specific, time-phased, tactical plans for implementing the strategy, organising and prioritising the list of potential improvements developed.	To reflect the strategic plans which have now been developed. The result of this task is a set of time-phased action plans for implementing the supply chain strategy.

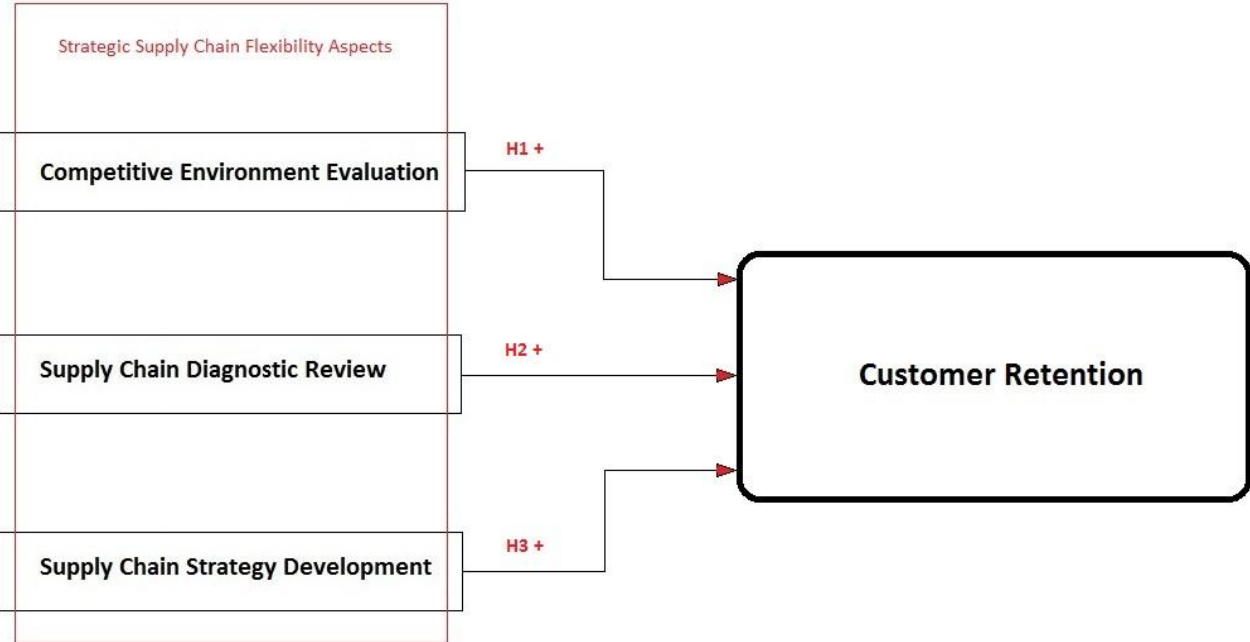
APPENDIX 2. Overview aspects of customer retention

Aspect	Function/advantage	Question	Source
Customer Retention Rate	A high Customer Retention entails many customers stay loyal.	The firm has a high customer retention rate.	
Retaining rather than acquiring	Customer retention is very important from a financial perspective to the business. Acquiring a new customer is six to ten times more expensive than to retain an existing one.	The firm focuses more on retaining an acquired customer, rather than focussing on acquiring new customers.	(Wagner, 2008)
Focus on changing customer needs	The capability to anticipate what customers will value. Implying the need for such a capability, market-orientation research calls for marketers to partly focus on changing customer needs.	The firm focuses on the changing customer needs and has the capability to anticipate what customers will value in time to actually deliver.	(Flint, Woodruff, & Gardial, Exploring the Phenomenon of Customers' Desired Value Change in a Business-to-Business Context., 2002) (Bernard, Jaworski, & Kohli, 1993)
Reliability	Delivering as promised and accurately is critical to service quality from the customer's point of view.	The firm delivers the products to the customers in time as promised, consistently and accurately (without errors).	(Hansen & Steadman, 1991)
Responsiveness	Prompt service; delivery of product or service in a timely manner is critical to service quality from the customer's point of view.	The firm delivers prompt service (willingness to go "the extra mile" to help; delivery of product or service) in a timely manner.	(Hansen & Steadman, 1991)
Customer Satisfaction a basic goal of the firm	An aspect a firm has to follow to achieve customer satisfaction.	Customer satisfaction is a part of the basic goal of the firm.	(Nagel & Cill, 1990)
Supplier selection	Supplier selection for customer satisfaction to achieve an acceptable price, fast delivery, high delivery service and a large product variety.	Customers are satisfied with the product variety, delivery service, price and quality of your product(s).	(Tracey & Tan, 2001)
Customer Value Anticipation	Understanding the dynamic nature of customer valuing, inherently customer-oriented suppliers would expend effort trying to anticipate what their customers will value in the future in order to facilitate a valuable service exchange throughout an ongoing relationship.	The firm tries to anticipate what customers will value in the future. The worst case scenario is that in which the firm only acts on customer demand as it is presented to you in the present orders.	(Flint, Blocker, & Boutin, Customer value anticipation, customer satisfaction and loyalty: An empirical examination., 2011)

APPENDIX 3. Conceptual Model



APPENDIX 4. Research model



APPENDIX 5. Questionnaire

Strategic supply chain flexibility

Competitive Environment Flexibility

1. The firm regularly looks at and surveys customers so that they know exactly how much they weigh in the market and what their exact wishes are.
2. The firm regularly evaluates market characteristics to determine exactly how much pressure the vendors/suppliers can have on the firm.
3. The firm regularly evaluates market characteristics to determine exactly how much pressure the competitors can have on the firm.
4. The firm shares knowledge important for decision making to achieve synchronization amongst supply chain members, by means of a real-time information sharing system. The ultimate opposite scenario, is that of no information sharing at all!
5. Suppliers are selected based on their ability to provide quality, reliable delivery, short lead-times, capability of supplying/processing other jobs in addition to those for which they are the original supplier. The ultimate opposite scenario is a supplier chosen solely based on price!
6. The firm has multiple suppliers, clustered together, sharing information and working together to deliver the best service to your firm. The worst case scenario, is only one supplier!

Supply Chain Diagnostic Review

7. The firm regularly reviews the supply chain operations and identifies those areas which offer potential improvement (for example by developing a cost model).
8. The firm regularly identifies those activities in the company which mostly effect and impact on the ability to meet customers' needs (for example bottle necks).
9. The firm develops potential improvement techniques for any identified improvement opportunities.
10. The firm has a large range of alternative uses to which a resource can effectively be used to, develop, manufacture, distribute or market, and can - without high costs - easily change from one resource to another. The worst case scenario is one in which the firm has no alternatives at all!
11. The firm has exactly defined its product strategies, in terms of - which product strategies it intends to offer, and which market segment it intends to offer to. A worse case scenario is one in which the firm has no product strategy at all!
12. Its within the organizations culture to continuously search for reduction of lead-time internally (by reducing its own production time; for example by eliminating/reducing "waste*") and externally (by finding ways to reduce inbound and outbound deliveries; for example by reducing transportation lead-times).

**waste: in lean supply chain management is referred to as time spent into a certain activity of the production process, which can be prevented by more efficiently arranging this task. For example, shortening the distance a production employee has to walk to fulfil the required task, reducing the total internal production lead-time.*

Supply Chain Development

13. The firm develops a supply chain strategy and tactical plan for implementing its strategy.
14. The firm reduces the supply chain strategy to actionable implementation plans.
15. The firm can change product volume for its entire product line within reasonable cost expenses, quality loss and time loss. The worst case scenario is that in which the firm can not change its production volume at all!
16. The firm can produce several non-identical products and changing the production mix can be done within reasonable cost expenses, quality loss and time loss. The worst case scenario is that in which the firm can only produce one type of product.
17. The firm can maintain short lead times while having low inventory levels. The worst case scenario is that in which a firm has a high inventory level and a long lead time!
18. The firm never operates at full capacity. The worst case scenario is that in which a firm continuously operates at full capacity.

Customer retention

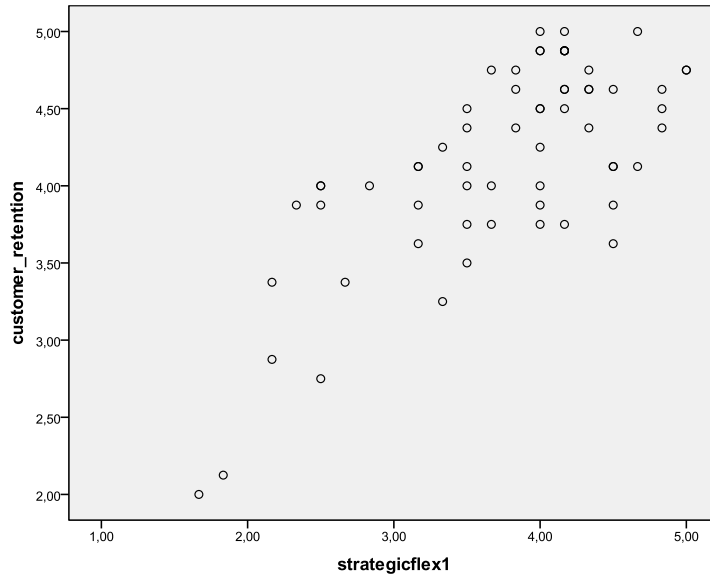
1. The firm has a high customer retention rate.
2. The firm focuses more on retaining an acquired customer, rather than focussing on acquiring new customers.
3. The firm focuses on the changing customer needs and has the capability to anticipate what customers will value in time to actually deliver.
4. The firm delivers the products to the customers in time as promised, consistently and accurately (without errors).
5. The firm delivers prompt service (willingness to go “the extra mile” to help; delivery of product or service) in a timely manner.
6. Customer satisfaction is a part of the basic goal of the firm.
7. Customers are satisfied with the product variety, delivery service, price and quality of your product(s).
8. The firm tries to anticipate what customers will value in the future. The worst case scenario is that in which the firm only acts on customer demand as it is presented to you in the present orders.

APPENDIX 6. Scatter plots H1 – H3

Competitive Environment Evaluation

“H1 – Evaluating the competitive environment will have a positive impact on customer retention.”

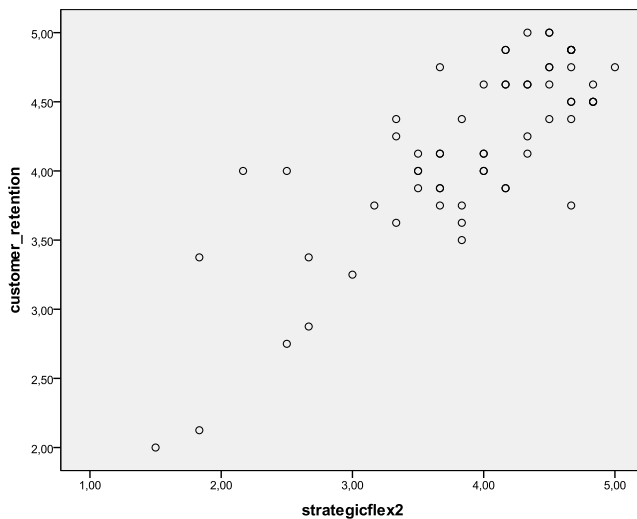
According to the regression analyses there is **no positive relationship** ($t < 2,00$) and $p < 0,05$) between Supply Chain Environment Evaluation and customer retention.



Supply Chain Diagnostic Review

“H2 - Reviewing and diagnosing the supply chain will have a positive impact on customer retention.”

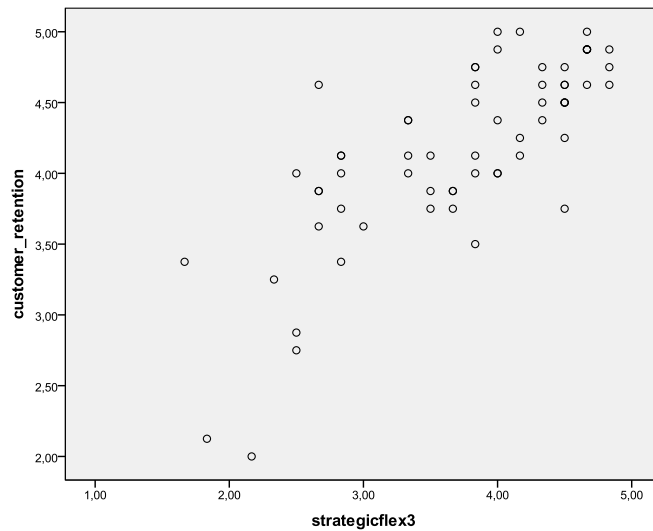
According to the regression analyses there is **a positive relationship** ($t > 2,00$) and $p < 0,05$) between Supply Chain Diagnostic Review and customer retention.



Supply Chain Strategy Development

“H3 – Developing a supply chain strategy will have a positive impact on customer retention.”

According to the correlation matrix and the scatter diagram there is a **positive relationship** ($t > 2,00$) and $p < 0,05$) between Supply Chain Strategy Development and customer retention.



	N	Skewness	Kurtosis	Cron. Alpha Standised Items	Adjusted R ²	Sig. F Change	Set 2 adj. R ²	Set 2 Sig. F Change	t-value set 1	t-value set 2	Conclusion
CRR	8	-1,275	2,132	,910							
SF1	6	-,760	-,032	,879		,486			,701		<i>H1 – Rejected</i>
SF2	6	-1,123	,877	,866		,007		,000	2,773	3,796	<i>H2 – Confirmed</i>
SF3	6	-,570	-,656	,847		,054		,035	1,966	2,156	<i>H3 – Confirmed</i>
SFtot.	18			,947							
Tot.	26				,655	,000	,658	,000			

APPENDIX 7. Reliability analyses customer retention

Case Processing Summary

		N	%
Cases	Valid	63	100,0
	Excluded ^a	0	,0
	Total	63	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,899	,904	8

Inter-Item Correlation Matrix

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Q1	1,000	,507	,644	,390	,405	,463	,421	,518
Q2	,507	1,000	,542	,457	,536	,324	,530	,519
Q3	,644	,542	1,000	,596	,582	,560	,487	,692
Q4	,390	,457	,596	1,000	,622	,513	,668	,630
Q5	,405	,536	,582	,622	1,000	,518	,554	,596
Q6	,463	,324	,560	,513	,518	1,000	,569	,591
Q7	,421	,530	,487	,668	,554	,569	1,000	,736
Q8	,518	,519	,692	,630	,596	,591	,736	1,000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1	29,21	20,134	,613	,473	,895
Q2	29,33	19,710	,624	,466	,895
Q3	29,27	19,491	,768	,669	,878
Q4	29,13	20,661	,702	,582	,885
Q5	29,03	21,031	,696	,526	,886
Q6	28,98	22,080	,636	,477	,892
Q7	28,95	21,175	,726	,670	,884
Q8	29,10	19,152	,790	,696	,876

APPENDIX 8. Reliability analyses Supply Chain Environment Evaluation

Case Processing Summary

		N	%
Cases	Valid	63	100,0
	Excluded ^a	0	,0
	Total	63	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,878	,879	6

Inter-Item Correlation Matrix

	Q1	Q2	Q3	Q4	Q5	Q6
Q1	1,000	,603	,637	,557	,489	,481
Q2	,603	1,000	,608	,572	,353	,484
Q3	,637	,608	1,000	,611	,540	,560
Q4	,557	,572	,611	1,000	,507	,629
Q5	,489	,353	,540	,507	1,000	,581
Q6	,481	,484	,560	,629	,581	1,000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1	18,78	16,627	,690	,514	,856
Q2	18,68	17,156	,648	,494	,863
Q3	18,60	16,534	,749	,572	,847
Q4	18,87	16,080	,727	,541	,849
Q5	18,51	16,899	,612	,434	,869
Q6	18,78	15,950	,687	,510	,857

APPENDIX 9. Reliability analyses Supply Chain Diagnostic Review

Case Processing Summary

		N	%
Cases	Valid	63	100,0
	Excluded ^a	0	,0
	Total	63	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,865	,866	6

Inter-Item Correlation Matrix

	Q1	Q2	Q3	Q4	Q5	Q6
Q1	1,000	,464	,627	,357	,437	,600
Q2	,464	1,000	,557	,276	,589	,466
Q3	,627	,557	1,000	,502	,616	,623
Q4	,357	,276	,502	1,000	,469	,509
Q5	,437	,589	,616	,469	1,000	,688
Q6	,600	,466	,623	,509	,688	1,000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1	19,44	17,444	,627	,486	,849
Q2	19,44	18,122	,589	,430	,855
Q3	19,38	16,336	,762	,591	,824
Q4	19,60	17,663	,526	,330	,868
Q5	19,43	16,281	,722	,600	,831
Q6	19,44	16,315	,753	,612	,826

APPENDIX 10. Reliability analyses Supply Chain Strategy Development

Case Processing Summary

		N	%
Cases	Valid	63	100,0
	Excluded ^a	0	,0
	Total	63	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,846	,847	6

Inter-Item Correlation Matrix

	Q1	Q2	Q3	Q4	Q5	Q6
Q1	1,000	,507	,471	,614	,440	,384
Q2	,507	1,000	,510	,574	,389	,321
Q3	,471	,510	1,000	,525	,579	,239
Q4	,614	,574	,525	1,000	,627	,528
Q5	,440	,389	,579	,627	1,000	,503
Q6	,384	,321	,239	,528	,503	1,000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1	18,52	18,770	,631	,434	,821
Q2	18,48	18,770	,597	,416	,826
Q3	18,68	17,091	,602	,468	,827
Q4	18,51	16,286	,771	,612	,790
Q5	18,44	16,993	,681	,532	,809
Q6	18,48	18,705	,501	,356	,844

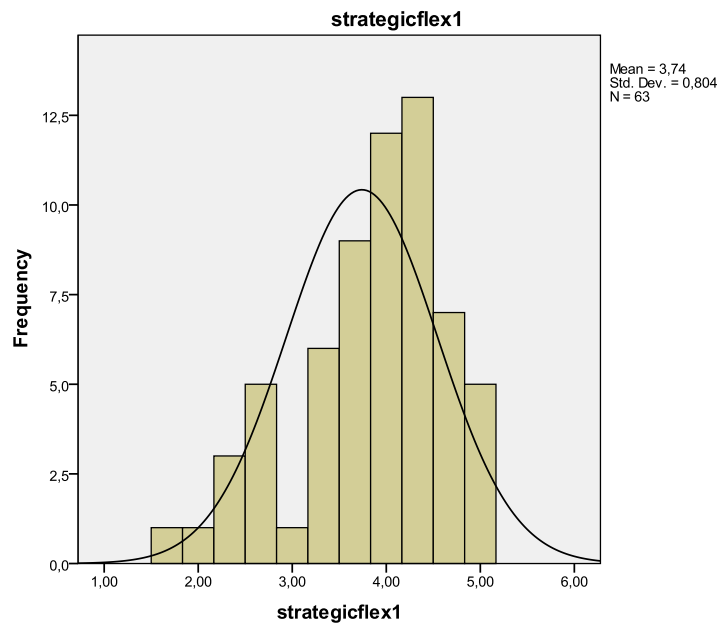
APPENDIX 11. Histograms strategic supply chain flexibility dimensions and customer retention

In the underneath figures, a histogram for each aspect of strategic supply chain flexibility and customer Retention is presented to get a visual overview of the responses.

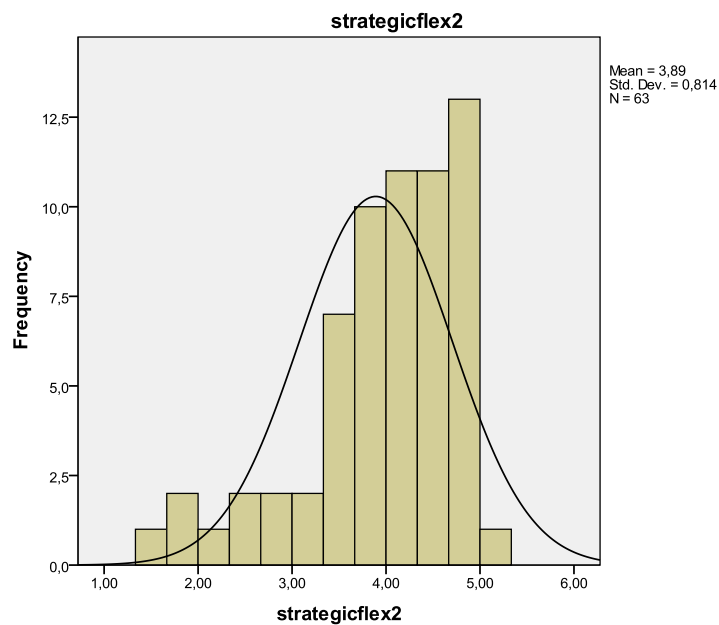
Statistics

	strategicflex1	strategicflex2	strategicflex3	customer_retention
N Valid	63	63	63	63
Missing	0	0	0	0

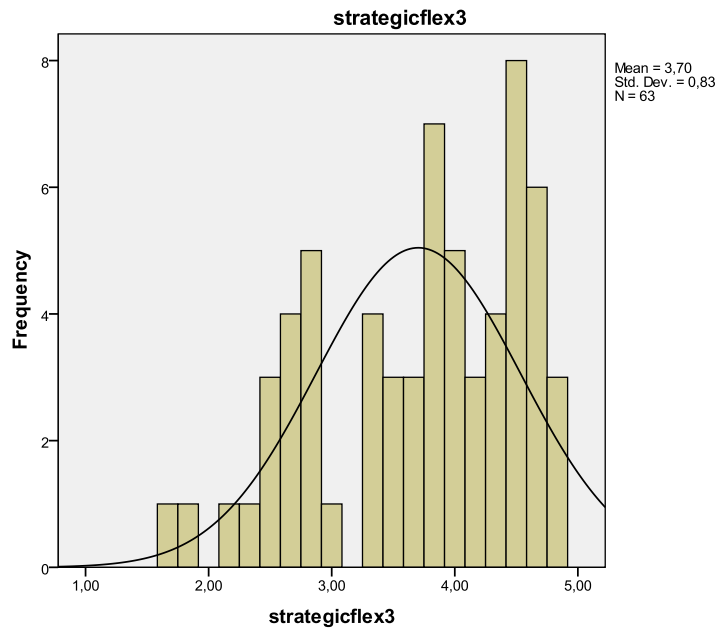
Supply Chain Environment Evaluation



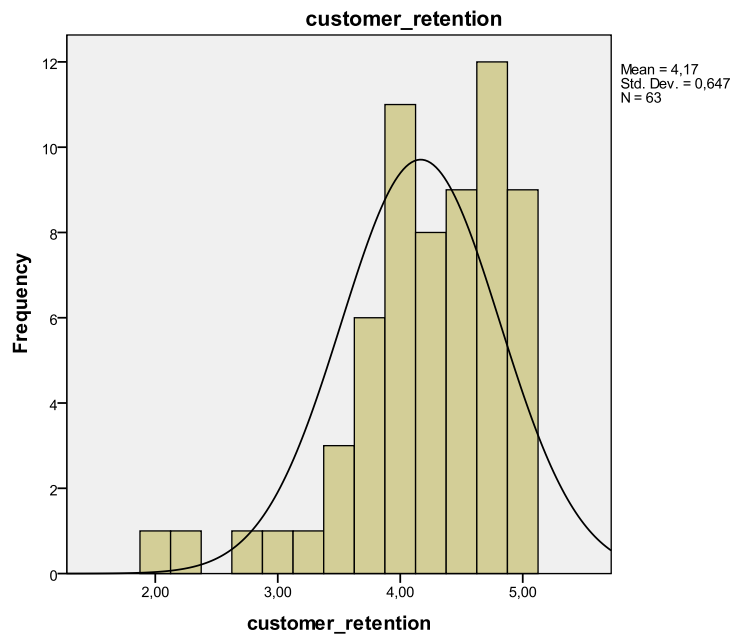
Supply Chain Diagnostic Review



Supply Chain Strategy Development



Customer retention



Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
strategicflex1	63	1,67	5,00	3,7407	,80365	-,760	,302	-,032	,595
strategicflex2	63	1,50	5,00	3,8915	,81439	-1,123	,302	,877	,595
strategicflex3	63	1,67	4,83	3,7037	,83034	-,570	,302	-,656	,595
customer_retention	63	2,00	5,00	4,1667	,64719	-1,275	,302	2,132	,595
Valid N (listwise)	63								

6 Respondents

APPENDIX 12. Respondents

Functions	Amount	Company's
1 Management Assistant	2	Schilte houtfabriek IJsselstein/ CelaVita BV.
2 Purchaser	4	Vion N.V./ Nutreco N.V./ Hoogwegt International B.V./ De Heus Voeders B.V.
3 Project Manager	1	Unilever R&D Vlaardingen
4 Project leader	2	Interfood Holding B.V./ Den Braven Sealants B.V.
5 Director National Accounts	1	Deli XL
6 Region Controller	1	BAM Techniek
7 Sales Support	1	AEG Eurolec Consulting BV
8 Director	5	Amstel koffiebranderij B.V./ Flens B.V./ Aeson B.V./ Koninklijke Wessanen N.V./ Drents Overijsselse Coöperatie Kaas B.A.
9 Supervisor	1	Unknown
10 Technical Manager	1	BBS-Foods
11 New Product Logistics Planner	1	Bison International B.V.
12 Production Planner	1	Coca Cola - Dongen
13 Team leader	2	Dirk Bouman Bakkerijen B.V./ Continental Fruit B.V.
14 Managing Director	4	Koppert Beheer B.V./ Schut Hoes Cartons B.V./ Euro Mouldings/ Unknown
15 HR Manager	1	ForFarmers
16 Logistics Manager	3	Menken Orlando BV/ Peka Kroef B.V./ Teijin Aramid B.V.
17 Personnel Officer	1	Van Hessen B.V.
18 General Affairs / Secretary	1	SVZ International B.V.
19 Logistics Planner	1	El-Massria Co. for Mfg and Development
20 Analyst Drinking water Infrastructure	1	Dunea
21 Sales-Manager	3	Ghyczy selection/ Oerlemans Foods Nederland B.V./ Intertaste B.V.
22 DGA-Commercial Director	1	Unknown
23 Planner	3	Plasticfactory multishape/ Koffiebranderij en Theehandel 'Drie Mollen/ Mora Productie B.V.
24 Marketing Manager	5	Van Hebel Tombeur/ Frisia Zout B.V./ Wild Juice B.V./ Delicia B.V./ Amarant Bakkersholding B.V.
25 Chef Internal Transport	1	Papierfabriek Doetinchem
26 Chairman	1	Bart's Retail B.V.
27 Assistant Transport Manager	1	Continental Bakeries (Haust) B.V.
28 Project Coach Industrial Atomisation	1	Delifrance Nederland B.V.
29 Logistics Coordinator	1	Lenger Seafoods Yerseke B.V.
30 Interim Sales and Operations planner	1	Pré Pain B.V.
31 Junior process technologist	1	AarhusKarlshamn Netherlands B.V.
32 Manager Warehousing	1	Th. Vergeer en Zonen B.V.
33 Expediter	1	Unknown
34 Systems Engineer	1	Willemstein's Industriële Ondernemingen B.V.
35 Transport Analyst	1	Ten Cate Protect B.V.
36 Sr. Associate Internal Sales	1	B.V. Gulpener Bierbrouwerij
37 Operator Flammable Substances	1	Shell Nederland B.V.
38 Unknown	3	Meilink Kistenfabriek B.V./ Bergenco Productie B.V./ Avery Dennison Materials Nederland B.V.
Total	37 + 1 / 63	N = 63