



Master's degree thesis

LOG950 Logistics

**Investigating the decision to implement reverse
inventory consignment in a buyer-supplier relationship
- *A case study of Ekornes and Pla-Mek***

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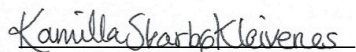
Preface

This thesis is written as a part of the two-year Master of Science degree program in Logistics at Molde University College. The research is conducted in the spring of 2016 and constitutes 30 ETCS credits. The work with this thesis has been a challenging and exciting process, which has given me a significant enhancement of knowledge and increased understanding of organizational behavior.

The purpose of this thesis has been to investigate how a buyer and a supplier should decide whether to implement reverse inventory consignment. A case study of Pla-Mek and Ekornes is used in this research, and the research question is answered based on a time series analysis and interviews with the companies.

I would like to give my gratitude to my advisor, Berit Irene Helgheim, who has given me guidance during the semester. She helped me get in touch with Ekornes, who has assisted me with data for my analysis. A special thanks goes to Ekornes and Pla-Mek, and the appurtenant respondents for their time and contribution. I especially appreciate Jan Kåre Alvestad's allotted time. His positive attitude has been a great motivation during my work.

Molde, 24.05.2016



Kamilla Skarbø Kleivenes

Summary

Ekornes is a furniture producer based in Norway that is seeking to free up their storage capacity and reduce costs related to inventory. Since it has become more common for buyers to turn to their suppliers to get help to manage their inventory, Ekornes has reached out to Pla-Mek. Ekornes wants its only supplier of molded plastic parts to manage the inventory related to these items. At the same time, Ekornes wants to be the inventory owner. This type of inventory management approach is called reverse inventory consignment. However, the two companies are not sure whether this method is the best-suited approach for their relationship. On basis of this, the following research question is formulated:

"How should a buyer and a supplier decide whether to implement reverse inventory consignment?"

The research question is discussed in the light of a theoretical framework where the agency theory, transaction cost economics and resource dependency theory are in focus. In the study mixed methods are used. First, a quantitative approach using time series analysis has been conducted to expose the nature of the demand pattern of products that requires molded plastic parts from Pla-Mek. In addition, qualitative data was collected through open individual interviews with four respondents from Ekornes and Pla-Mek.

The theoretical framework shows six main factors that should have an impact on the decision to implement RIC, and those are; the demand pattern, goal congruency, information asymmetry, asset specificity, power and trust. By assessing the empirical data against the theory, this thesis reveals that all of the six main factors, except the demand pattern, have an impact on both parties decision to implement RIC. It is also discovered that many elements within the mentioned factors have different impact on the buyer's and supplier's decision to implement RIC. From the assessment of all six factors and the associated elements, the thesis implies that Pla-Mek and Ekornes should implement RIC.

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1.0 Introduction

This chapter will give the reader an understanding of how this thesis was developed and its purpose. Moreover, the research question is introduced and an overview of the thesis structure is presented.

1.1 Background

In a supply chain companies usually make decisions about operational processes on their own based on the company's own costs. It starts with the customer who develops plans and sourcing methods, and then the vendor react to fulfil the customer's needs. Decisions on replenishment do not necessarily involve the choices of the upstream tier (Gümüő et al. 2008).

A focus of supply chain practice is to align decisions so that the whole chain's performance can be increased (Ibid.). As competition in markets become more intense companies focus more of their attention on cost reduction instead of just revenue generation. Inventory is a major source of cost in many companies and can represent up to 75% of a firm's operating budget (Quinn 1997). A lot of cash are tied up in physical inventory, but there are also cost associated with planning, storing and handling of purchased items (Wallin et al. 2006). The Norwegian furniture industry is an example of an industry in which cost reduction is highly relevant. Since the financial crisis in 2008 the Norwegian furniture industry's market share on the international market has been threatened (Sunnmørsposten 2009). In order to reduce their enormous inventory costs, the Norwegian furniture producer Ekornes want to implement a more efficient and effective inventory management approach.

A way of aligning decision in the supply chain is to implement inventory management approaches where both the supplier and buyer can achieve gains. It has become more common for customers to turn to their vendors to get help to manage the inventory that is supplied by the vendor. To reduce inventory costs, Ekornes is considering implementing reverse inventory consignment (RIC). The company wants its supplier, Pla-Mek, to manage the inventory of components that Pla-Mek supply to Ekornes. RIC involves the

inventory being located at the supplier's facilities, but to still be owned by the buyer.

It seems to be little previous work that examines the drivers behind implementing RIC as an inventory management approach. Wallin et al. (2006) emphasizes that the best suited inventory management approach will not necessarily be the same for companies purchasing the same product. This got me wondering how a buyer and supplier should decide whether to implement RIC.

1.2 Presentation of the research question

Ekornes and Pla-Mek are about to make a decision whether to implement the inventory management approach called reverse inventory consignment (RIC). In the development of the research question I emphasized on learning something new, and the lack of research on RIC makes it relevant and interesting to investigate this approach. The research question was developed throughout the researching process and changed many times as new thoughts came to mind. Since Ekornes and Pla-Mek do not know what to consider when making the decision to implement RIC, it is natural to ask:

"How should a buyer and a supplier decide whether to implement reverse inventory consignment?"

Based on existing theories I will identify important drivers in the decision to implement RIC. From the case study of Pla-Mek and Ekornes, these drivers will be considered in both a supplier and buyer perspective, since both parties would have to be part of the decision. The factors will work as determinants of whether RIC should be implemented in the relationship between Ekornes and Pla-Mek. The purpose of this thesis is to make it easier for the companies to consider if RIC is the right inventory management approach for the components Ekornes purchase from Pla-Mek.

Researchers (Levy 1985; Walker & Weber 1987; Wallin et al. 2006) have stated that the demand pattern is an important factor when considering the location of inventory. In addition, agency theory, transaction cost economics and resource dependency theory will be used to explore if goal congruency, information asymmetry, asset specificity, power and trust are factors that have an impact on the decision to implement RIC. It is not so common to investigate these factors in relation to inventory management, which makes this research fruitful and exciting.

It is important to analyse the research question in order to be aware of what we are seeking to achieve. According to Jacobsen (2005) we can analyse the research question in three dimensions. The first is if the question is clear or unclear, meaning if it tests or explore a phenomenon. My research question is relative unclear and explorative, where the idea is to understand new knowledge (Jacobsen 2005). When doing a case study, the most common form of the research questions is "why" and "how", and this is why my explorative research question works well doing a case study (Yin 2013). Secondly, we make the choice between a descriptive and a causal question. Since I do not seek to explain the relationship between cause and effect, my research question can be characterized as descriptive rather than explanatory (Jacobsen 2005). Thirdly, we have to decide if we want to generalize or not (Jacobsen 2005). It is hard to say if the factors identified in this thesis are equally important to companies that are not part of this study. Even though, this research shed light on the theoretical concept of RIC, which goes beyond the setting of the specific case that is studied (Yin 2013). This means that the findings of this thesis can be useful for other organizations that are assessing RIC. By using the revealed decision drivers as a starting point and assessing them in their own environment, other companies can become better equipped in their decision about implementing RIC.

1.3 Structure of the thesis

The further structure of the thesis is shown in the figure below. Chapter 2 presents the theoretical framework that the thesis builds upon. Chapter 3 contains the methodology, where my choices are justified. The theories and methodology build the foundation for the understanding of the empirical data, the analysis and the discussion. In chapter 4 the case of Ekornes and Pla-Mek is presented, the obtained sales data is unveiled and analysed, and the empirical data from the conducted interviews is presented. The discussion in chapter 5 connects the theory with the empirical data. Chapter 6 contains the conclusion of the thesis and suggestions for further research.

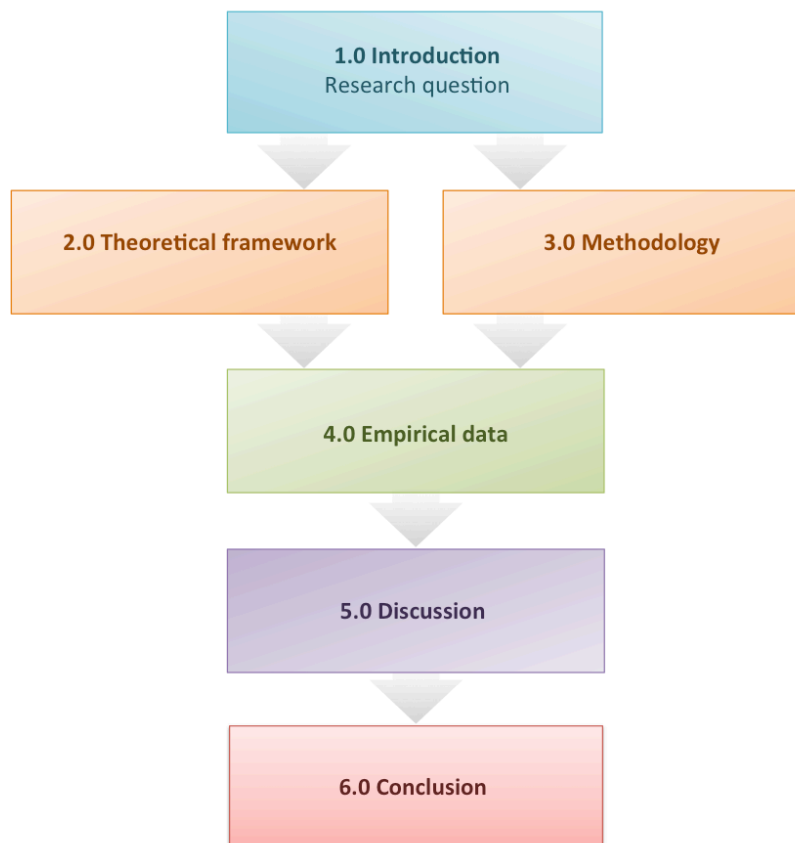


Figure 1. Structure of the thesis.

2.0 Theoretical framework

This chapter describes the theoretical framework that underlies the answer to the main research question of this thesis. The aim is to enhance the reader's prerequisites and ability to understand how the research question is approached. The chapter is structured by decision factors relevant to the choice of implementing RIC. I will start by presenting different inventory management approaches with emphasize on RIC. The theories in the rest of this chapter aim at discovering factors that relates to inventory management, which will be summed up in the end.

The figure below shows the main theories that will be presented. Agency theory makes it possible to discuss goal conflicts in relation to inventory management, and how lack of information can be crucial when inventory control has been entrusted the supplier. Transaction cost economics will shed light on the interorganizational relation between buyer and supplier. In addition, the concept of specific assets can explain the uniqueness of a purchased product and also add to the bargaining power between the parties. Furthermore, resource dependency theory emphasizes the power relation between buyer and supplier. In the end, trust is also considered in relation to RIC.

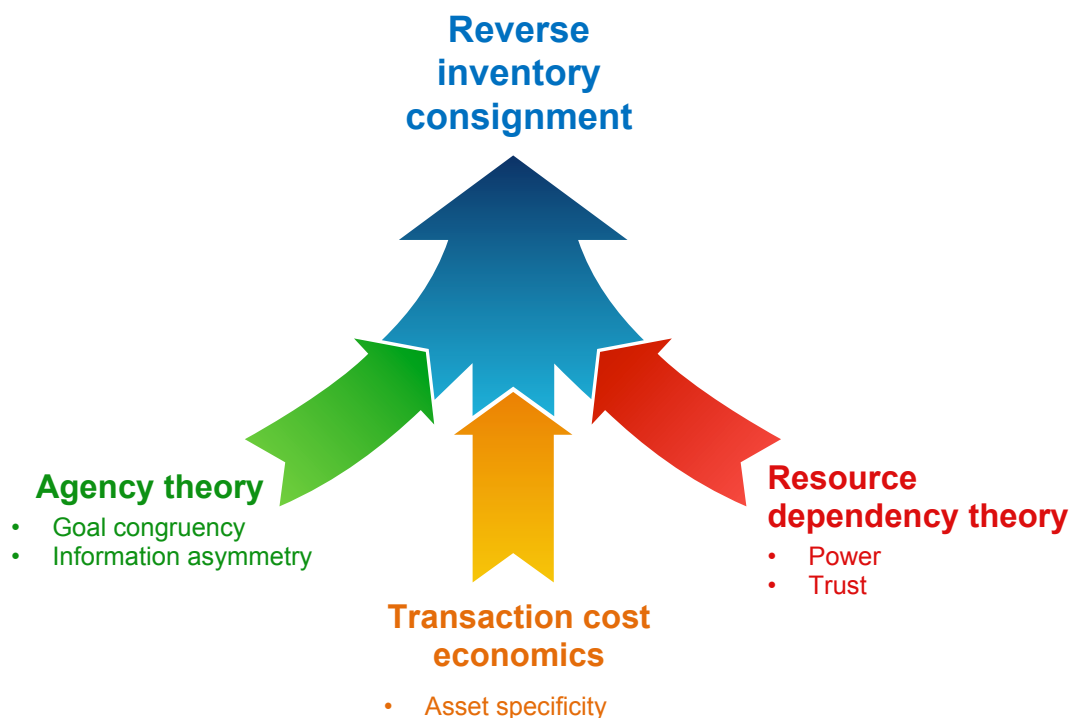


Figure 2. Overview of theoretical concepts.

2.1 Inventory management

Inventory management is important for companies since it can cause tremendous harm if not managed correctly. Component or material shortage can shut down a whole manufacturing line and force the company to reschedule its production plan. On the contrary, keeping more on stock than necessary will reduce profitability and increase cost associated with inventory, such as inventory holding cost, warehouse operation costs, and the risk of obsolescence (Bowersox & Cooper 2002).

There are different ways of managing inventory, and what is the best approach for one item in one company is not always the best approach for the same item within another firm (Wallin et. al. 2006). In addition, different inventory management approaches can often be used together. The most commonly used approach is inventory speculation, which Ekornes uses today. This is an inventory management approach where components are purchased from the supplier and held in the buyer's storage facilities before demand is known with certainty. By using inventory speculation approach the buyer can respond quickly to demand, which will be beneficial when demand is uncertain. In addition, the buyer can protect itself from price fluctuations and achieve discounts and reduced transportation cost from buying in bulk. On the other hand, the inventory holding cost will increase by using the inventory speculation approach (Wallin et al. 2006).

As opposite to inventory speculation is inventory postponement, which means to delay the purchase until demand is know with certainty. By having the inventory owned by the supplier and located at the supplier's facilities, the buyer's inventory holding cost will be reduced, but might lead to lost sales due to long lead-time to the end-customer (Wallin et al. 2006).

Another inventory management approach is vendor managed inventory (VMI), which can be used to cut down inventory costs (Piplani 2006). The main characteristic of VMI is that the supplier is responsible for all decisions regarding the inventory, and that the inventory is located at the buyer's facilities (Chopra & Meindl 2016). This is similar to inventory consignment where inventory is also located at the buyer's facilities, but the difference is that VMI do not consider who owns the inventory (Piplani 2006). This means that VMI and inventory consignment can be used together or apart. With consignment inventory the

supplier gets paid when the goods are sold, which is common when prices for the goods are very high (Piplani 2006).

Consignment inventory is when a firm physically holds purchased items in their storage, but when ownership still resides with the supplier. It is only after the items have been used in production or sold by the buyer the ownership will shift hands. The benefits from consignment inventory is the easy access to items, but the buyer can be faced with price increase in the time between items are received and put to use (Wallin et al. 2006). The inventory management approach that will be further investigated in this thesis is called reverse inventory consignment, which is the total opposite of consignment inventory.

2.1.1 Reverse inventory consignment (RIC)

RIC is an inventory management strategy that is quite rare compared to inventory consignment. RIC it is when items are physically located at the supplier's facilities, but the buyer owns it. When using RIC the buying firm will not take physical possession of the items they purchase until they request it to be transferred to their facilities, even though they pay for it in an earlier phase (Wallin et al. 2006). The approach is illustrated in the figure below.

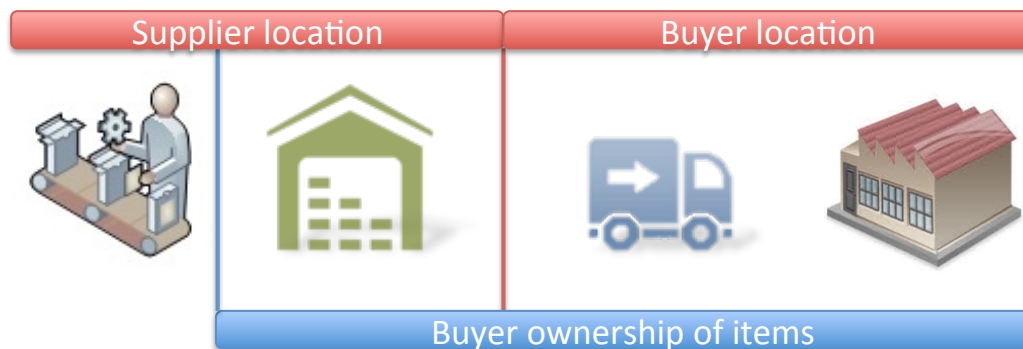


Figure 3. Reverse inventory consignment.

From a buyer's perspective, Waller and Esper (2014) list three different reasons for buying products but to ship them on a later date; (1) to free up the buyer's storage capacity, (2) if the supplier offers a promotion or a discount that the buyer want to take advantage of even though he does not need the products yet, or (3) if there is a shortage of the product in the market and the buyer is not yet sure which location he wants it to be shipped to.

We distinguish between benefits and drawback for the buyer and the supplier. RIC will trivialize the storage-related costs for the buyer and risks of price increase is mitigated, but the buyer will be faced with risk of obsolescence and opportunity cost of capital tied up in inventory. For the supplier, RIC will bring increased inventory storing and handling costs (Wallin et al. 2006). Both parties will gain a development in their partnership, where especially the buyer will be more tied to the supplier through its loyalty. The supplier will be able to plan production more efficient due to better control of demand, with better predictability and lower variation. Moreover, the buyer might lose some control (Piplani 2006).

As we now know, there are mainly three distinctions between different inventory management approaches and those are; who owns the inventory, who controls the inventory and where it is located. As we can see from table 1, the location of inventory in RIC is similar to inventory postponement, but opposite to inventory speculation. Having the ownership lie with the buyer is opposite to inventory postponement, but similar to inventory speculation.

Table 1. Inventory management approaches. Inspired by Wallin et. al. (2006).

Inventory management approach	Who owns the inventory?	Where is the inventory located?	Who controls the inventory?
Inventory speculation	Buyer	Buyer	Buyer
Inventory postponement	Supplier	Supplier	Supplier
Vendor managed inventory	Not considered	Buyer	Supplier
Inventory consignment	Supplier	Buyer	Buyer
Reverse inventory consignment	Buyer	Supplier	Supplier

The main operational questions in inventory management is when to order and how much to order. To assure a good answer, companies should forecast and share information in the supply chain (Bowersox & Cooper 2002).

2.1.2 Inventory control and RIC

An inventory control technique is to use a minimum-maximum inventory model, which is frequently used among companies (Wang et al. 2005). In RIC the supplier will be in control of the inventory, deciding when to produce to inventory and how much. Hence, the supplier will have some freedom in its choices. Though, with minimum-maximum inventory the supplier will have to reorder somewhere within the minimum and maximum limits. What remains in inventory when orders arrive should not be over the maximum level, nor should the inventory be below the minimum value before the items are replenished (Ibid.).

The predefined levels should be decided from the forecasted demand, which the buyer should share with its supplier in order to ensure enough volume. The minimum level of safety stock will protect the buyer, so that a certain service level is ensured. If the items are very critical to the buyer, the buyer might inflate its forecast on a regular basis to obtain a higher service level (Piplani 2006). This will involve increased problems related to managing and handling inventory for the supplier (Valentini & Zavanella 2003). By making the buyer promise to take out a certain level of the forecasted demand in each period, the supplier will be protected (Piplani 2006). If the items are not so critical to the buyer, the buyer is likely to want the minimum level to be as low as possible since it represents capital tied up in inventory. A high as possible maximum level will give the supplier increased flexibility in production. Since the inventory represents opportunity costs for the buyer, it is likely that the buyer wants the maximum level to be as close as possible to the minimum level (Valentini & Zavanella 2003).

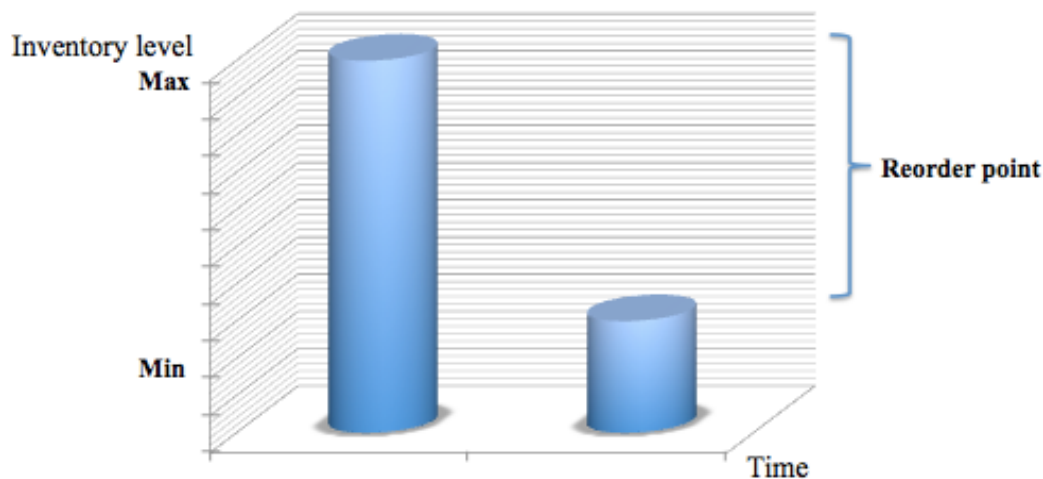


Figure 4. Minimum-maximum inventory control.

2.2 The importance of predictable demand

If there is uncertainty in the market, companies are faced with risks from unpredictable demand and market variations in cost and prices (Zsidisin & Ellram 2003). The knowledge about the demand pattern is important in inventory management, since an unpredictable increase in sales can cause stock-outs, while sudden decrease in sales can cause obsolescence of the inventory. In addition, the costs of holding inventory will increase when there is a decreasing need for the items.

The ability to forecast demand will have an impact on the likelihood that risks occur.

Supply chain risk can be defined as "the likelihood and impact of unexpected macro and/or micro level events or conditions that adversely influence any part of a supply chain leading to operational, tactical, or strategic level failures or irregularities" (Ho et al. 2015, p.5035).

Another definition is the probability that an unplanned event will occur, that can negatively affect a company's ability to serve its customers (Zsidisin & Ellram 2003).

When focusing on outcomes the use of buffers is a short-term solution for reducing the impact of supply chain risk events (Zsidisin & Ellram 2003). Safety inventory is carried to satisfy demand exceeding the amount forecasted. Since demand is relatively uncertain and forecast errors occur, companies keep safety inventory to prevent product shortage and potential loss of margin (Chopra & Meindl 2016). Though, the more predictable demand is the less is the need for a large amount of safety inventory.

The buyer and supplier using RIC are facing different consequences when they assess the outcome of holding inventory (Eisenhardt 1989). When the items are very critical to the buying company, it is risky for the buyer to have stock-outs. If the RIC contract does not include any penalty for the supplier if it cannot deliver on time, the risks for the supplier seem to be less than the risks for the buyer. Due to different risk preferences the buyer and supplier might prefer different actions, which is a problem (Eisenhardt 1989). Though, it seems that companies use safety stock as a buffer-oriented technique regardless of their perceived level of risk (Zsidisin & Ellram 2003). There are mainly two factors affecting the level of safety inventory. These are the uncertainty of both demand and supply, and the desired level of product availability. A higher level of safety inventory is required the more unpredictable supply and demand is, and as the desired level of product availability

increases. A key to success is to decrease the safety inventory without hurting the product availability (Chopra & Meindl 2016).

2.3 Agency theory

Jensen and Meckling was the first to develop agency theory in the 1970s. An agency relationship arises according to Jensen and Meckling (1976) when one or more persons (the principal) engage another party (the agent) to perform a service on behalf of the themselves. Meaning the principal delegates work to the agent, who performs that work (Jensen & Meckling 1976). This can be related to RIC, where the buyer delegates work (management of the inventory) to the supplier. A principal-agent relationship will not be without difficulties, since delegating work to another party will create dependencies.

Mainly two problems can occur in an agency relationship. The first is the so called "agency problem" where the principal have problems verifying that the agent is doing what it is supposed to (Eisenhardt 1989). For instance, whether the supplier is managing the inventory in the way that was agreed on. The buyer might have difficulties controlling what the supplier is doing. The second problem is that the principal and the agent might have different preferences due to their dissimilar attitude towards risk (ibid.). A buyer might be more dependent on receiving the components at a certain date than the supplier is of delivering on time.

The agency theory has developed through two different lines, positivist agency theory and principal-agent research. Both lines investigate the contract between the principal and the agent. The positivist direction has been focusing on describing the governance mechanism that solves the agency problem, while the principal agent literature is focusing on the relationship between the agent and the principal, where optimal behavior versus outcome is the core (Eisenhardt 1989). Agency relationships are usually related to the relationship between a supervisor and a subordinate, but can appear on all levels in an organization where a principal-agent relationship exists (Jensen & Meckling 1976). In this thesis we emphasize on the principal-agent relation between two companies engaged in cooperative behavior, as buyer and supplier in a supply chain.

According to Eisenhardt (1989) it is recommended for a principal to study the agency perspective when facing problems in a cooperative structure. When a principal is deciding where to place the responsibility of the inventory and where to locate it, he will likely be facing challenges such as goal conflicts and information asymmetry. The challenge for the principal is to create goal consistency using contracts and rewards (Eisenhardt 1989). Goal conflicts and information asymmetry between the principal and agent can all lead to the consequence of opportunistic behavior (Douma & Schreuder 2008), which will be further discussed in the chapter about transaction cost economics.

2.3.1 Goal conflicts

The researchers Kang and Jindal (2015) found that in order to mitigate opportunistic behavior it is important to reduce conflicts in the buyer-supplier relationship. A way to reduce supplier-buyer conflicts is to communicate and align goals before entering into a relationship, but also to revisit the consonance of goals during the relationship. This means that before implementing RIC between a buyer and a supplier, their goals should be aligned. A second way to avoid conflicts is to constant examine one's own behavior towards the other party and identify reasons that could make the behavior seem unfair. By adapting the company's own behavior the collaborative partner's perception of unfair behavior can be reduced (Kang & Jindal 2015).

The goals of exchange between buyers and suppliers are know to be very different (Jap 2001). While suppliers strive to achieve as high revenue, buyers wants to purchase at the lowest possible cost. This can make us question if a supplier as an agent comply with its responsibilities to the buyer (the principal) when managing the inventory. However, RIC can make the supplier produce more efficient due to better control of demand, which can reduce machinery downtime and further reduce costs (Piplani 2006). This will give the supplier incentives to work towards the goals of the buyer, to reduce total costs of the items.

Goal congruency is "the extent to which firms perceive the possibility of common goal accomplishment" (Eliashberg & Michie 1984). When common goals are established it creates a perception that what it best for the other party is also best for the organization, and the supplier and buyer will have incentives to seek mutual gains. Though, depending

on the nature of the relationship between the buyer and supplier goal congruency will have different impact (Jap 2001). Research (Jap 2001) show that goal alignment will have its greatest impact on the preservation of competitive advantages when there is a high risk of opportunistic behavior by the parties *ex post*. Opportunistic behavior *ex post* can be if the buyer expects that the supplier will take advantage of the inventory management control after it is given to the supplier. When the companies do not expect opportunism *ex post*, there will be no effect on competitive advantages by aligning goals with each other. When things are running smoothly and the companies do not expect opportunism goal congruence have less impact on the relationships outcome. The reason for this seems to be that goal congruence is taken for granted when everything is going well (Jap 2001).

Incentives in interorganizational relations intend to increase motivation and effort among the buyer and supplier. Incentives can also be used to illuminate goals especially important to the relationship. Regarding the use of incentives there are a number of conditions the partners should be aware of. First of all, it is essential to set clear and explicit objectives of the cooperation, meaning that the goals should be measurable and realistic. Further, it is important with congruency between what is measured and rewarded. The congruency is likely to give the parties a feeling of influence to the achievement of goals. Moreover, each of the parties should identify their skills and capital to check if there is sufficient capital and expertise to implement the cooperation (Haugland 2004).

2.3.2 Information asymmetry

When the principal delegates decision-making authority to the agent, the principal will keep ownership but the agent takes over some of the control. In connection to RIC it means that the buyer will still own the inventory, but the supplier will control it. Since the principal and the agent administrate different tasks each of them will receive task-specific information in their work. This means that the distribution of information will be asymmetrical which enables opportunistic behavior (Douma & Schreuder 2008). Given that the supplier will be dependent on the buyer to receive relevant information and the high level of information asymmetry, it will be challenging for the supplier to execute inventory management activities (Rungtusanatham et al. 2007).

We can distinguish between situations where the principal are not able to observe the agent's behavior and situations where the principal do not have enough insight in the agent's knowledge of the work, meaning that the agent is better informed than the principal. This is in the literature referred to as hidden action and hidden information (Douma & Schreuder 2008). Hidden action can be a situation where the buyer is not able to observe the inventory at the supplier's facilities. The agent's execution of work will depend on the agent's level of effort, but when the principal cannot observe this level, the principal will bear all the risk. If none of the parties can observe the actions of the other and if the actions can hurt the other party, completion of the transaction may be prevented. Simply an anticipation of hidden actions might prevent transaction to be executed (Ibid.).

Hidden information can be that the supplier does not know the buyer's demand or the buyer does not know the supplier's optimal production level. Short-term relationship has a higher degree of information asymmetry than long-term relationships. The reason is that in long-term relationships the principal will learn about the agent and vice versa. Hence, the parties can assess behavior more readily (Eisenhardt 1989). If the buyer and supplier have been in a relationship for a long time the supplier can know the buyer's demand pattern by looking at how much the buyer has purchased. Hidden information is based upon different knowledge between the agent and the principal and happens before a transaction is agreed on (Douma & Schreuder 2008). If the other party were aware before the transaction took place, this type of information would be valuable to the trade.

Knowledge can come with experience. A buyer who has been in control of its inventory for a long time holds more information about inventory management than the supplier who receives control through RIC. An example of information asymmetry is information about sales in a supply chain. A buyer is likely to have more information about its own sales numbers than its supplier has. If sales information is necessary to make good decisions about inventory control, the supplier who delegates the control to the buyer should make sure this information is shared. If the buyer is to determine a minimum and maximum inventory level, the buyer does not necessary know the suppliers optimal production level. If the total supply chain profit is not to be diminished, sharing information about capacity is important. In order to avoid asymmetric information it requires that the buyer and supplier share information between each other on a regular basis. Lin and Shaw (1998)

emphasize that if order information from entities downstream in the supply chain is shared with upstream entities, production planning of upstream entities will improve.

2.4 Transaction cost economics (TCE)

Transaction cost economics was first introduced by Coase (1937), but was developed by Williamson (1981). According to Williamson (1981) the understanding of transactions cost is central to the study of organisations. The theory of transaction costs economics regards the transaction as the unit of analysis, and tries to explain how transactions should be govern; should they be executed across markets or take place within organizations. The level of asset specificity, the frequency of transactions and the uncertainty surrounding transactions are the determinants (Williamson 1981). Governance is said to be a type of effort to gain order in transactions. By gaining order, conflicts can be mitigated and the parties realize that they have mutual gains. This is how governance make organizations cooperate (Williamson 2000).

2.4.1 Assumptions of TCE

Two prerequisites of transaction cost economics are that human beings are bounded rational and can display opportunistic behavior (Douma & Schreuder 2008).

Bounded rationality is the idea that when people make decisions they intend to be rational, but are limited by the available information. In addition, human being has limited capability to solve complex problems. Even when people have all the information necessary to make the right decision, the extent of the information might be so great that people do not have the capacity to evaluate the consequences of all possible decisions. Bounded rationality will only pose a problem when there is uncertainty in the environment, because this increases the complexity of the transaction (Douma & Schreuder 2008). When the decision maker is limited by bounded rationality it has difficulties with modifying contractual agreements to changes in the environment, due to uncertainty. This is called the adaptation problem (Rindfleisch & Heide 1997). The individual is uncertain about the environment, it is not the environment that is uncertain in itself (Pfeffer & Salancik 1978). An example is that buyers and suppliers might not know what they want out of their relationship in the future. The reason can be that they have

problems image how the future will look like, or that the persons responsible of specifications of the relationships in the companies can change. The idea of implementing RIC can seem to be good for the companies today, but tomorrow new knowledge can come to mind that do not favour RIC.

Opportunism is when someone is trying to exploit a situation to its own advantage. Though, the assumption of opportunism is not that all actors will behave opportunistic. Only some people display opportunistic behavior, and they might not do so all the time. Hence, it is difficult or impossible to distinguish honest from dishonest buyers or suppliers before a deal is made. This leads to adverse selection (hidden information), which only occurs when there is asymmetric information as examined in agency theory (Douma & Schreuder 2008). Those companies facing asymmetric information have limited ability to detect opportunism.

In the original literature about TCE opportunism is defined as "self-interest seeking with guile". To steal, cheat, mislead, confuse, disguise and obfuscate are behavior included in the term guile. This includes lack of truthfulness and failure to honor a legal or relational contract. Opportunism can occur actively, when a party engage in particular actions, or passively, when it refrains from actions. The supplier has to investigate the reason why the buyer wants to implement RIC, and vice versa, to ensure that opportunism is not likely to occur. We can distinguish between opportunistic actions that take place within the original environment of exchange and where the circumstances have changed due to external influence (Wathne & Heide 2000).

2.4.2 Critical dimensions of transactions

Transaction costs depends on three critical dimensions of the transaction. These are the frequency of transactions, asset specificity and uncertainty or complexity (Douma & Schreuder 2008).

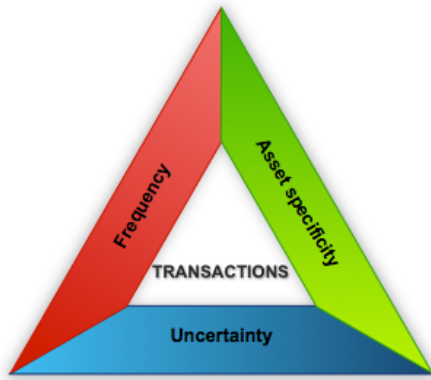


Figure 5. Critical dimensions of the transaction.

When we assume bounded rationality and opportunism, and different levels of the critical dimensions of transactions, it leads to different governance problems: the adaptation problem, the performance evaluation problem and the safeguarding problem (Rindfleisch & Heide 1997). The presence of these three problems is likely to have an impact on the decision of implementing RIC.

The frequency dimension relates to the cost of governance, and that they are easier to recover if transactions happens in larger volumes. This means that if transactions happens frequently it might be best to carry them out within the organizations than across the market (Williamson 1981). By implementing RIC the buyer would have to interact more frequently with the buyer about the inventory, since the inventory is not located within the buyer's facilities. These interactions can lead to increased transaction costs. Though, if the transactions between the supplier and buyer happen frequently it might be easier to assess the quality performance of the other party (Wallin et al. 2006).

Uncertainty is a situation where the decision outcomes are impossible to tell beforehand, maybe due to lack of information or bounded rationality. Uncertainty can be described as a transactional problem related to the decision environment where the transaction takes place. If a buyer faces volatile demand of its products, it will be hard to specify the required purchase volumes from the supplier in advance (Heide & Stump 1995). This will have an impact on the decision of implementing RIC, since unpredictable demand favours an in-house location of inventory (Wallin et al. 2006). This source of uncertainty is called volume unpredictability which gives rise to transaction costs in connection with modifying agreements to new conditions (Heide & Stump 1995).

Behavioural uncertainty is viewed as "arising from the difficulties associated with monitoring the contractual performance of exchange partners" (Rindfleisch & Heide 1997, p.43), which can lead to the performance evaluation problem. If the buyer has difficulties of monitoring the supplier, it might not be a good idea to let the supplier control the inventory. Behavioural uncertainty relates to opportunism, and the problem that it is not easy to tell who plays opportunistic before an event occurs (Rindfleisch & Heide 1997).

2.4.2.1 Asset specificity

A transaction specific asset is uniquely tailored to a particular relationship and cannot be redeployed to an alternative use without a reduction in its value (Bjørvik & Brochs-Haukedal 2001). A company would benefit from encouraging a partner in a buyer-supplier relationship to make asset specific investments (Kang & Jindal 2015). When a buyer invests in relational specific assets the cost of obtaining such assets will give disincentives to change supplier (Heide & Stump 1995) and reduce opportunism (Kang & Jindal 2015). Though, the safeguarding problem occurs when "a firm deploys specific assets and fears that its partner may opportunistically exploit these investments" (Rindfleisch & Heide 1997, p.43). The safeguarding problem can be related to resource dependency theory, because specific assets give rise to "replaceability" problems (Rindfleisch & Heide 1997).

Williamson (1983, p.526) differentiates between four types of asset specific investments; human asset specificity, physical asset specificity, site specificity and dedicated asset specificity. Site specificity is when stations are located very close to each other in order to economize on inventory and transportation expenses, and these assets might inquire substantial cost to be moved. Physical asset specificity is specialised parts required to produce a component. An example is when suppliers invest in tools or equipment that are tailored to the relationship with an individual buyer. Human specific assets include knowledge and expertise specific to the buyer-supplier relationship. Human specific assets can be obtained in a learning-by-doing fashion, and through close collaboration. Dedicated assets are those assets that are put in place due to a supply agreement. The dedicated investment is general and not specific to one buyer. However, if the buyer decides not to purchase the goods, the supplier will have significant excess capacity (Williamson 1983).

The cost of assets that are specific to the relationship will be more easily recovered when transactions happen frequently and capacity is utilized (Douma & Schreuder 2008).

2.5 Resource dependency theory (RDT)

RIC requires close cooperation between the parties involved. In a strategic partnership companies become interdependent, they adapt to each other and commit to technology sharing and closely integrated planning and control systems. Though, this type of partnership is resource intensive and very demanding (Hoek & Harrison 2011). Resource dependency theory can be used to understand interorganizational relations, such as buyer and supplier relationships.

Pfeffer and Salancik (1978) was the first to introduce RDT, and they emphasized the importance of acquiring and maintaining resource for the survival of the firm. There is probably no organization that is self-servingly and in complete control of all components they are in need of. According to resource dependency theory a company is dependent on other actors to survive. Companies are embedded in a network of exchange relationships within an uncertain environment. Organizations are forced to transact in order to acquire the needed resources, but the resources are not always available and stable. Problems arise since environments companies operate in are not dependable. For instance, companies can go bankrupt and the supply of product might become scarce (Pfeffer & Salancik 1978).

When the principal (the buyer) is depending on resources from the supplier, the buyer tends to seek ties with its supplier in order to reduce uncertainty. When dependence between parties is not equal power will be imbalanced, and not in favour of the weakest actor (Katila et al. 2008). If we investigate the environment the company operates in it can be easier to respond to changes and to understand how the environment creates problems for the company to obtain its needed resources (Pfeffer & Salancik 1978).

2.5.1 Power

From agency theory we know that the agent's interest might not be aligned with the interest of the principal, and from transaction cost economics we know that the buyer and supplier can play opportunistic and be self-serving. Contrary to these theories are the concept of power, which is to make people do something they would not otherwise do (Dahl 1957). Since power also can be defined as control over vital resources (Ulrich & Barney 1984), the concept is central to RDT and when companies act to reduce uncertainty in the environment.

According to Wallin et al. (2006) the role of power is a decision factor when it comes to choosing the right inventory management approach. How much power a company has over another is measured by how much control it has over something the other party is dependent on. Emerson (1962, p.32) defines actor A's power over actor B as "the amount of resistance on the part of B which can be potentially overcome by A" and power as "the ability of an actor to influence another to act in the manner that they would not have otherwise". An actor's dependency is proportional with the strength in his motivation to reach goals given by the other party. The dependency is also inversely proportional to the availability of those goals outside of the relationship with the other actor (Emerson 1962). Usually companies attempt to increase their power over others and reduce others power over them.

In short term it can be an advantage to exploit power. Though, the drawbacks are felt in the long term. If the buyer or supplier use their power to achieve individual goals, their profits are maximized but on the expense of others in the supply chain. The total supply chain profit will decrease, which can hurt the company who exploit power once the power balance change. The use of power can cause tiers in the supply chain to compete rather the cooperate (Chopra & Meindl 2016).

2.5.2 Trust

When the buyer and supplier engage in RIC, some degree of trust has to exist. If trust is absent the buyer might not give the supplier access to information, or control of decisions related to inventory replenishment and maintenance. Moreover, the supplier might not want to take responsibility for the inventory (Rungtusanatham et al. 2007).

Trust can be defined as confidence in an exchange partner's reliability and integrity (Morgan & Hunt 1994). Another definition is "the firm's belief that another company will perform actions that will result in positive outcomes for the firm as well as not take unexpected actions that result in negative outcomes" (Morgan & Hunt 1994, p.23). Trust will increase the transaction costs and risk, but it will help secure other economic and strategic advantages that are difficult to get through the open market (Hoek & Harrison 2011). Trust increases the performance in a buyer and supplier relationship because of the following reasons (Chopra & Meindl 2016):

- The objectives for both parties will be aligned and considered when making decisions.
- Sharing of information becomes natural and operational improvements are easier to implement
- Sales and production information are usually shared to a greater extent, which makes the parties able to coordinate production and distribution decisions.

In bargaining between buyer and supplier it will be central to have trust in each other. Trust will make it easier to achieve cooperative problem solving and a constructive dialogue. Moreover, trust leads to a higher degree of loyalty to the bargaining partner (Morgan & Hunt 1994). Some other advantages are saving in form of less negotiations and monitoring of the suppliers quality and productivity. These advantages will shorten the lead-time and product cycles, which enables longer-term investments. On another hand, there will be an increased risk of revealing sensitive information to the competitors (Hoek & Harrison 2011).

Different factors that have an effect on trust are time; how long it will take for it to build and to be broken, and incentives to break the trust. Loss of reputation or trust might limit opportunism, however this is not likely in situations where a company is dependent on another either way (Douma & Schreuder 2008). Trust is a major influencer of relationship commitment, and is said to be the cornerstone of any strategic partnership (Morgan & Hunt 1994). Morgan and Hunt (1994) states that the cost of terminating the relationship and benefits from the relationship will have an indirect effect on trust through the direct influence on commitment. Shared values, communication and opportunistic behavior will directly influence trust (ibid.). Shared value can be linked to goal congruency (section

2.3.1), while communication link information asymmetry (section 2.3.2) negatively to trust. If partners believe that the other party is engaging in opportunistic behavior, trust will decrease and so will relationship commitment (Morgan & Hunt 1994).

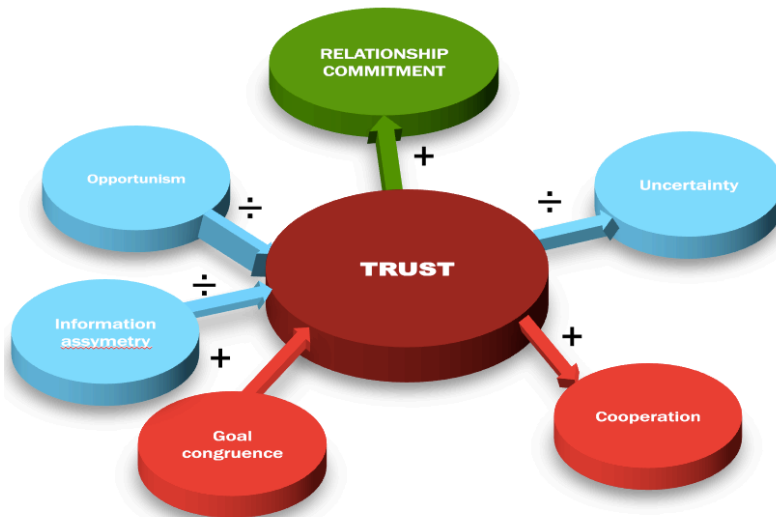


Figure 6. Factors influencing trust. Inspired by Morgan and Hunt (1994).

As we can see from figure 6, trust decreases uncertainty since the trusting partner is confident that the other party is to be relied on. In addition, trust will increase cooperation, which is to work together towards mutual goals (Morgan & Hunt 1994). If a company works on making itself more trustworthy the other party is less likely to seek other options outside of the relationship and act opportunistic (Kang & Jindal 2015).

2.6 Drivers in the choice of inventory management approach

In the decision about adopting inventory postponement research (Levy 1985; Walker & Weber 1987) revealed a negative link between inventory postponement and demand uncertainty. This link can be applied to RIC, since Wallin et. al. (2006) says being in possession of the inventory is best when demand is not easy to predict, no matter who owns it. This indicated that a driver that should lie behind the decision of implementing RIC is predictability in the demand pattern (Levy 1985; Walker & Weber 1987; Wallin et al. 2006). The reason is that RIC entails that the inventory is located at the supplier. If the demand is not predictable it makes more sense to be in physical possession of it (et al. 2006).

Many supply chains are struggling with lack of coordination, which can lead to an increase in order fluctuations upstream in the supply chain. This phenomenon is called the bullwhip effect (Chopra & Meindl 2016). In order to achieve better coordination the buyer can let the supplier manage the inventory (Piplani 2006) and adapt its production process according to this. The success of a supply chain is measured by the total profit shared between all tiers and intermediaries in the chain. If every tier in the supply chain tries to maximize its own profit it can diminish the total supply chain profit. This is why it is important to align goals and ensure sharing of necessary information, which RIC can encourage. Lack of coordination happens when companies work toward their own goals that conflict with other actors in the supply chain, or information is delayed or distorted in the chain (Chopra & Meindl 2016).

In cases where the supplier controls the inventory, and a stock-out will cause tremendous harm to the buyer, the buyer is likely to want a higher level of inventory than the supplier who bears the inventory holding costs. The parties have objective conflicts. For the supplier it can be hard to measure what inventory level is jointly optimal, since the supplier usually do not have precise information about the stock-out cost for the buyer. The assumption that the supplier has complete knowledge of the cost structure of the buyer is rarely the case in practice (Sucky 2006). Considering this, goal conflicts and information asymmetry are important topics within inventory management.

A researcher that has investigated inventory management in a supply chain is Corbett (2001). He looked into two parties with conflicting goals and asymmetric information. Corbett (2001) found that by reallocating decision rights, for instance by implementing RIC, the performance of the supply chain would be affected. He suggested that goals should be realigned to overcome information asymmetry. The degree to which there are goal consistency and asymmetric information are emphasized in agency theory (section 2.3). These factors will drive the decision of implementing RIC, since goal conflicts and information asymmetry between the principal and agent can lead to the consequence of opportunistic behavior (Douma & Schreuder 2008). Opportunistic behavior was deliberated in transaction cost economics (section 2.4.1). If RIC entails expectancy of opportunistic behavior, the supplier and buyer will not benefit from the inventory management approach.

Many suppliers accept to manage the inventory because buyers that are more powerful ask them to, and not due to the fact that they will have financial gains (Piplani 2006). This indicates that power is an important driver of RIC, which is supported by Wallin et al. (2006). From resource dependency theory (section 2.5) we know that if a company is dependent on another, and have invested resources into the relationship, it is harder to leave the relationship partner (Heide & Stump 1995). In addition, Wallin et al. notice that the uniqueness of the purchased product will affect the power one company has over another. Ways of measuring the uniqueness of a product is by the specific assets invested (section 2.4.2), uncertainty and number of available suppliers or buyers (Wallin et al. 2006).

Since inventory has a major impact on a company's turnover (Quinn 1997) and RIC will give the buyer less control over the inventory (Piplani 2006), the buyer should trust that the supplier will handle it according to the agreed plan. RIC might make it more costly to measure the supplier performance, since the buyer will have to increase inspections in order to have control. This relates to the theory of transaction cost economics (section 2.4) and the performance measurement problem (Rindfleisch & Heide 1997). By having trust in the other party's quality and delivery, the buyer can decrease counting and inspections (Chopra & Meindl 2016). In order for RIC to be sustainable, trust between the buyer and supplier has to exist (Rungtusanatham et al. 2007). This is why trust is a factor in the decision to implement RIC (refer section 2.5.2). Trust can also be increased by using RIC since the approach tie the companies closer together (Piplani 2006).

In summary of the theoretical framework, the revealed drivers of RIC are the following:

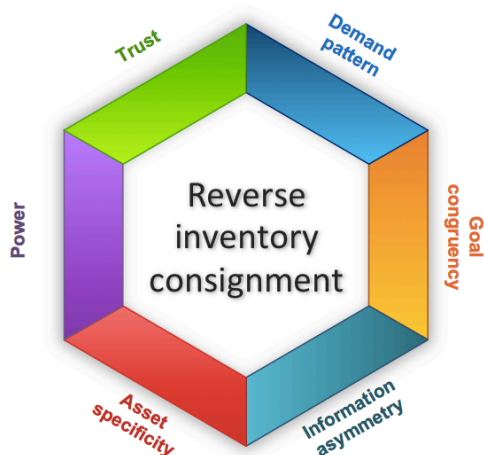


Figure 7. Alleged decision factors in the choice of implementing RIC.

3.0 Methodology

The purpose of this chapter is to give a description of the methodology used in this master thesis. Methodology determines the progress of identifying the reality, but there are different opinions of what approach is best suited for the task. This chapter will make it possible for the reader to understand and consider the results from my studies based on thoughts and arguments behind the methodological choices.

Initially a description of my scientific approach will be given. My methodological choices are based on Jacobsen (2005) framework for research, where the first phase was explained in section 1.2. Further in this chapter I will explain the research design and the choice of using both qualitative and quantitative methodology. Moreover, I will explain how data are collected and analysed. In the end of the chapter, the reliability and validity of the research are discussed.

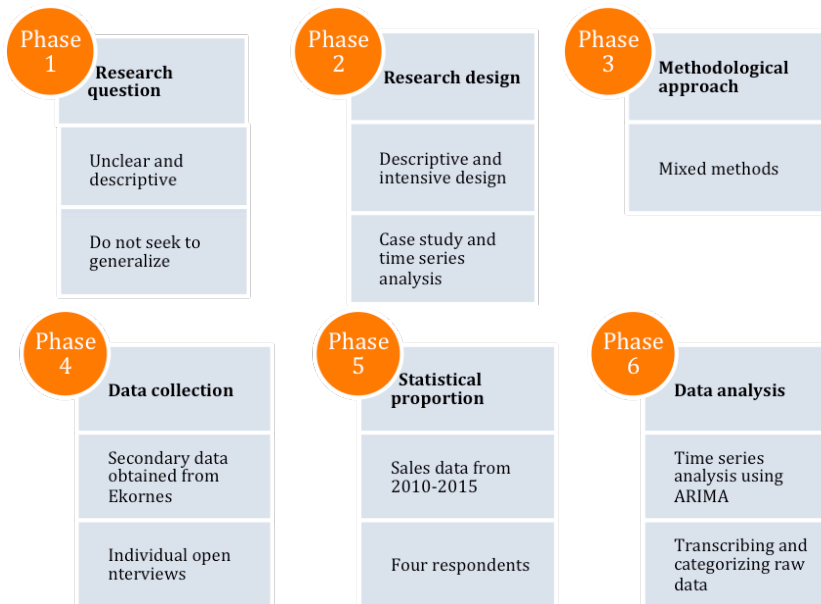


Figure 8. Methodological choices.

3.1 Scientific theory

Within the scientific theory awareness of ontology and epistemology it central to the understanding of our limitations and to make good decisions when it comes to methodological choices. An explanation of the methodological choices will force me to reflect about my decisions and the resulting consequences.

Ontology is the philosophical study of what the reality looks like. Our perception of the reality will affect what we are looking to find when we conduct research. Ontology provides guidelines for the epistemology, which is our view of how to acquire knowledge. If we have a positivistic view of the reality, we believe that it is objective and can be studied in an objective way. Hence, general laws exist. If we have a hermeneutic view we do not believe an objective reality exist, but different interpretations of the reality. These interpretations can only be understood in the context they are in (Jacobsen 2005). According to Nyeng (2004) a hermeneutic view require closeness to the research object, and can be investigated using a qualitative research method. On the contrary, the quantitative methodology relates to measureable facts and do not investigate how people interpret the reality. This is why a positivistic ontology facilitates a deductive data collection method with the use of quantitative methodology.

I acknowledge that my research will not give an absolute truth about the reality, but relates to the research objects interpretation of the reality. My perception and interpretation of the reality will be guiding for the choice of research problem, and will affect how I obtain information and what I elucidate. How I acquire knowledge will also affect my interpretation of quantitative data in this thesis, so it will not be completely objective. Jacobsen (2005) points out that there are principally few differences between both the positivistic and hermeneutic approach based upon Karl Poppers ontological view: both the hermeneutic and positivistic view of the truth can be replaced with the understanding of the truth as an inter-subjective agreement. All knowledge is subjective, but the more people who agree the more likely it is that what they agree about is true. Laws can exist, but they are not absolute. Based on this, my thesis will include elements from both the positivistic and hermeneutic approach. I want to study the reality that is not my subjective experience. Moreover, I acknowledge that I will not be able to be completely without any prejudices.

3.2 Research design and research method

According to Jacobsen (2005) the first phase in a researching process is the development of a research question. In phase two the choice of research design is made, which is important for the validity of the research. In phase three the choice of methodology is made, where we separate between qualitative and quantitative methodology (Jacobsen 2005). The choices a researcher makes in each phase will have impact on the quality of the research.

3.2.1 Research design

When we choose a research design we choose within two dimensions. The first dimension is if we investigate in width or depth, and depends upon how many units we want to include and how we approach the phenomenon we study. When we go in width on a phenomenon we investigate many units and few variables. This is called an extensive design. An intensive design goes in depth on few units and aims to bring out details surrounding the phenomenon by including many variables. The second dimension is whether the design is descriptive or casual (Jacobsen 2005).

I seek to investigate individual differences and similarities between two units, the buyer and supplier, and this is something that characterizes an intensive design. The unit of this study will be Ekornes and Pla-Mek. My research is also a cross-sectional study, which is an example of a descriptive design, where one situation is investigated in a given time. The time is at present, before RIC is implemented. When using an intensive and descriptive design it fits well to do a case study (Jacobsen 2005). Yin (2009, p.16) define a case study as: "An empirical inquiry that investigates a contemporary phenomenon (the case) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident".

My study will also contain a time series analysis, where I investigate sales numbers in order to predict future sales. Time series analysis is to investigate a development over time, and is further described in section 4.3. One can argue that time series analysis is a casual design method, since the previous sales explain the reason behind future sales. Though, the aim with this research is to describe demand and this is why the design will be descriptive (Jacobsen 2005).

3.2.2 Triangulation of methods

The third choice in Jacobsen's framework (2005) is to choose among qualitative and quantitative methods. The difference between qualitative and quantitative research methods is explained by the degree of openness; in what way the researcher decides what data is to be collected. It is the difference between words and numbers. In quantitative methods the researcher provides strong guidelines for what information that are collected. Information is structured before the collection of data, where the researcher defines which variables are interesting and relevant. On the contrary, when using qualitative methods information is categorized after data is collected. Both methods can be equally good, but are best suited to answer different questions (Jacobsen 2005).

In order to answer the research question, a qualitative approach is best suited for my thesis since I want closeness to the research objects, where I want a detailed description of important decision factors. The individual opinions give a unique understanding and interpretation of the phenomenon. A qualitative method is an interactive approach, which has given me a chance to change the research problem as the project has been going on. According to Wallin et al. (2006) demand is a decision factor when choosing the "right" inventory management approach. I found it necessary to go even more in depth on the demand pattern, since it does not necessarily fit the opinions of people. This is why I have used the quantitative method to investigate if demand is an important decision factor in the context of Ekornes and Pla-Mek. The qualitative method will give reflections about this decision factor, but the quantitative approach will check the validity of this and add a supporting role in this thesis.

3.3 Data collection and selection of respondents

Data collection is phase four of Jacobsen's framework for a research, while the choice of units is the fifth phase. Since we cannot ask the whole population, we take out a sample to investigate. The qualitative method has generally four methods for data collection: the open individual interview, interview of a group, observation and document investigation (Jacobsen 2005). I will use open individual interviews to generate data, since I am interesting in Ekornes and Pla-Mek's point of view. In addition, I will receive sales data obtained by Ekornes.

3.3.1 Open individual interviews

Open individual interviews are primary data in this thesis. Primary data is when the researcher collects information for the first time (Jacobsen 2005). Since it is the people who work at Ekornes and Pla-Mek who are going to decide to implement RIC, I found it relevant to identify their view and reflections related to the topic. My contact person at each company suggested respondents based on my criteria; the respondents should have knowledge about the relationship to the other company and be working with the decision about moving the inventory to Pla-Mek's facilities. Since there were not many respondents to choose from, four interviews were conducted with two respondents from each company.

To facilitate a relaxed and trustful atmosphere every interview was carried out face-to-face in places the informants suggested, which was in offices at the companies' facilities. Tjora (2012) points out that where the interviews take place can have a major impact in some interviews. To ensure enough information an interview guide was compiled and partly structured in order to compare the respondents to each other. The interviews lasted between 30 and 60 minutes. Under the interviews the respondents could talk freely since the interview guide contained open questions. I found it necessary to ask follow-up questions under the interviews in order to adapt to each respondents answers, so the interview guide functioned as a guideline and not as a strict framework. The first questions were warm-up questions so that the respondent would feel comfortable in the situation. The other questions had an aim to give answers to the topic of the research question. According to Tjora (2012) the ideal is to have both a free conversation and situations where the informant answer scheduled questions. In cases where the respondent(s) was very engaged and had much to tell, I let them talk as long as it was in relation to the elements in the interview guide. When informant(s) was reserved and concise I tried to ask questions from the interview guide that was appropriate to the context.

With consent from the informants a recording device was used under the interviews. In my opinion, the recording did not affect the interviews, even though theory say that it can make informants confine themselves and react negatively (Tjora 2012). The recordings made me able to focus completely on what the respondents said, instead of writing their answers. In addition, I was able to transcribe the whole interviews afterwards.

3.3.2 Secondary data obtained from Ekornes

Secondary data are data collected by someone else. I asked Ekornes for data of their sales numbers for the Stressless chair as far back in history they could obtain. Since Ekornes has started using a new ERP system not far back, I was only able to obtain data from year 2010 until year 2015. I put a lot of work in sorting the data in Excel, since data for three different chair types were mixed. Afterwards, the data was put into the data program IBM SPSS Statistics. For the chairs named "Classic" I ended up with 260 observations, for the "City Starbase" chairs 104 observations, and 52 observations for the "Signature" chairs.

3.4 Qualitative data analysis

When the data is finished collected, the next phase is the data analysis. Analysis and interpretation is the sixth phase in Jacobsen's framework (Jacobsen 2005), where the aim is to give the reader a better understanding of the research topic without having to go through the data material (Tjora 2012).

The first part of my qualitative analysis was to listen to the recordings and transcribe everything that was being said. This was done to ensure that all information from the informants got included. When the transcribing was done, I reduced the material and sorted it in categorize matching the theory in the thesis. In the end, quotes that could emphasize what the informants described were included.

3.5 Quantitative data analysis using time series analysis

The quantitative data analysis was done using time series analysis. Time series methods are built on the statement that sales in the future will be similar to the patterns of past sales. Time series will identify patterns of trend and seasonality. The longer the time horizon of the data is, the higher the possibility for observations of patterns will be (Chase 2013). A time series can be defined as "a time-oriented or chronological sequence of observations on a variable of interest" (Jennings & Kulahci 2014, p.2). There are different classes of time series methods including regression models, smoothing models and general time series models. General times series models use the statistical properties of historical data to specify a model and to estimate unknown parameters of this model (Jennings & Kulahci 2014).

The reason for doing forecasting is that prediction of future events is a critical input into planning and decision-making processes. In operations management forecasts can be used in order to control inventory (Montgomery et al. 2014). There are several issues when it comes to forecasting. Many believe that a forecast is a single number that is our best estimate, but we usually experience forecasting error. Since forecasting is not an exact science, and there will always be some degree of variance in the predictions that are generated. That is why forecasting models should accompany a confidence interval.

The forecast lead-time is the number of future periods for which forecasts must be provided and the forecast interval is how often new forecasts are prepared. It requires time to plan and change a production schedule, and that is why it is usual to forecast product demand three months ahead. This is what is going to be made in this thesis. Though, new forecasts should be made every month. The reason is that the longer into the future we predict, the less accurate the forecasting will be (Jennings & Kulahci 2014). It will be up to the companies to update the forecasts from this research if they want to use it in the future.

3.5.1 Stationary time series

When we want to forecast it is important to have stationary time series. The reason for this is that a stationary stochastic process will make it possible to study the behaviour not only for the time period under consideration, but to generalize into other time periods. This is not possible with non-stationary time series. In addition, non-stationary times series may obtain what seems to be significant relationships from unrelated variables. Non-stationary times series needs to be transformed so that it becomes stationary. By using stationary times series in the analysis we avoid this so-called spurious regression problem (Gujarati & Porter 2009). Gujarati and Porter (2009) explain the difference between stationary and non-stationary time series: A non-stationary time series will either have a time-varying mean or a time-varying variance, or even both, while stationary time series tend to fluctuate around its mean with an constant amplitude, due to the finite variance. A characteristic of stationary time series is that they vary around a fixed level.

“If a time series is stationary, its mean, variance and autocovariance (at various lag) remain the same no matter at what point we measure them; that is, they are time invariant.” (Gujarati & Porter 2009, p.741).

3.5.2 Autoregressive moving average (ARIMA) models

To identify the best-suited method for the time series used in this thesis, the statistical data program IBM SPSS Statistics' Expert Modeler is used. This will automatically find the best-fitting model for each dependent series. The most advanced time series model is the Box-Jenkins technique called autoregressive integrated moving average (Chase 2013). In this research, SPSS found different ARIMA models to be best suited, and this is why ARIMA is emphasized in this section.

ARIMA consist of different processes. The autoregressive (AR) process specifies that the output value depend on its own value in a previous time period and a random term. The moving average (MA) process is a linear combination of the current value against current and previous white noise and error terms. ARIMA models describe the autocorrelations in the data and are denoted as $ARIMA(p, d, q)$. In order to make a time series stationary we have to difference the original series d times, but if $d=0$ the time series is already stationary. Then we will apply the $AR(p)$ and $MA(q)$ process to it (Gujarati & Porter 2009).

$ARIMA(p, d, q)$ is non-seasonal, but times series can also have a seasonal component where the mean or variance follows a repeating pattern. The seasonal ARIMA is denoted as $ARIMA(p, d, q) \times (P, D, Q)_m$, where P, D and Q stands for the seasonal counterparts of p, d, q ; P is the order of seasonal autoregressive terms (SAR), D is the number of seasonal differences, Q is the number of seasonal moving average (SMA) and m denoted the seasonal periods (Abhishek & Mishra 2015). For weekly data the seasonal period is 52. If we have a seasonal order of 1 it means that the series are affected by the value 52 weeks in the past.

According to Abhishek and Mishra (2015, p.85) a non-seasonal ARIMA(p, d, q) model can be expressed as:

$$Y_t = \theta_0 + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \dots + \Phi_p Y_{t-p} + e_t - \theta_1 e_{t-1} - \theta_2 e_{t-2} - \dots - \theta_q e_{t-q} \quad (1)$$

where Y_t is actual values and e_t is a random error at time t , θ_0 is the constant, Φ_i ($i=1, 2, \dots, p$) and θ_j ($j=1, 2, \dots, q$) are the model parameters. p are the order of AR and q is the order of MA.

We can regard ARIMA as a special type of regression model, where the dependent variable is stationary and independent variables are all lags of the dependent variable (Nau 2016). If we add information from an exogenous variable, such as regressor X , to the model a new element is added to equation (1):

$$Y_t(ARIMAX) = Y_t(ARIMA) - \beta [X_t - (\Phi_1 X_{t-1} - \Phi_2 X_{t-2} - \dots - \Phi_p X_{t-p})] \quad (2)$$

Note that the AR-part is applied to the X variable in the same way that it is applied to the Y variable in (1), before X is multiplied by the regression coefficient β (Nau 2016). Only ARIMA and ARIMAX are mathematical expressed in this thesis to give the reader an understanding of the underlying calculations performed by SPSS. Even though SPSS also calculates SARIMA and SARIMAX, these expressions are left out since they are only extensions of the previous mentioned expressions. Due to the scope of this thesis they are not regarded as relevant.

The Box-Jenkins methodology has three phases (Gujarati & Porter 2009):

1. Model Identification

This is to find the appropriate values for p, d and q . In my analysis the Expert Modeler will identify the best-fitted ARIMA model to the time series.

2. Parameters estimation

SPSS will give us parameters estimations for the fitted ARIMA model that together with the model identification will give us the model equation.

3. Diagnostic checking

We have to check if the chosen model is a good fit to the data. We do so by testing if the residuals from the model are white noise. If so, we accept the model as a good fit.

3.5.3 Model diagnostic check

It is important to test the goodness of fit of the time series model. The Ljung-Box test can be used to check if the residuals from a time series model resemble white noise, and is purely random. If the observations are not random, the observations are autocorrelated. Autocorrelation can cause misinterpretation of the data and decrease the accuracy of the forecasting model. The statistics for the Ljung-Box Q is:

$$Q_k = n(n + 2) \sum_{l=1}^k \frac{r_l^2}{n - l} \quad (3)$$

We test with a significance level α whether:

H₀: Autocorrelation up to lag k equal zero. Residuals are random and the model does not exhibit lack of fit.

H₁: Autocorrelations for one or more lag is different from zero. Residuals are not random and the model exhibit lack of fit.

Another measurement of goodness of fit is the mean absolute percentage error (MAPE). This is the average error of the forecast, and the lower value of MAPE the more accurate the forecast will be. In the formula below Y_t is the actual values while \hat{Y}_t is the forecast values.

$$MAPE = \frac{100}{n} \sum_{t=1}^n \left| \frac{Y_t - \hat{Y}_t}{Y_t} \right| \quad (4)$$

One problem with MAPE is that it do not make sense if the times series Y_t contains zero-values. In addition, it is scale sensitive and do not work well with low volume data. Notice that when actual values of Y_t are very small MAPE can give us very high values.

Stationary R-Squared is an estimate of the proportion of the total variation in the series (Hota & Pushpanjali). In other words, it compares the stationary part of the model to a simple mean model. Stationary R^2 has the range $(-\infty, 1)$. If the value is negative the model is worse than the baseline model, while a positive value indicates that the model is a better fit than the baseline model.

Normalized Bayesian information criterion (BIC) measures the overall fit of the model, and attempts to account for complexity. It gives a penalty based upon the number of parameters and the length of the series, so that it is easy to compare different models for the same series. In this thesis different models are not compared, since SPSS determine what has the best fit. Even though, normalized BIC are shown so that future researchers are able to test the results obtained (IBM Knowledge Center 2016).

3.6 The quality of the research

Validity and reliability are used to assess the quality of the research, which is the seventh phase in Jacobsen's framework (Jacobsen 2005). According to Yin (2013, p.240) reliability is "the consistency and repeatability of the research procedure used in a case study". Validity is whether the research measures what we want it to measure and if it is relevant to the research problem (Jacobsen 2005).

The diagnostic of the statistical models show that the result from the quantitative analysis is to be trusted. We can draw the conclusion that if we use the same method with the same dataset again, the same results will be found. Meaning that the quantitative research is reliable.

In a qualitative research it will be hard for the researcher to be neutral and objective in interaction with the respondents. Because of the closeness to the research object we risk that the researcher affect the respondents, which might have happened during my interviews. This is usually a problem in qualitative research methods and affects the reliability of the research (Jacobsen 2005). In addition, I was interviewing respondents dependent on each other. It is possible that their answers were strategic so that they did not affect the company's reputation. Since both companies are aware that the other party will have insight into this research, I believe that this affected their answers to some degree. Though, I do believe that what the respondents said was true but that parts might have been left out so that the relationship between the parties are not affected.

Throughout my research I have been conscious about relating data to theories, both when collecting and analysing the data. I believe that this has strengthened the validity of the research. The theoretical framework worked as the basis when I formed the questions in the interview guide. I also experienced that the respondents had good knowledge of the topic that was investigated. Due to this it can be argued that the internal validity is high.

External validity is whether we can generalize our findings into other situations that are not a part of our study (Yin 2013). This has not been an objective in my case study; hence my findings are difficult to generalize. The results are valid in the relationship between Ekornes and Pla-Mek. Since few respondents were interviewed, their answers do not represent the opinion of everyone in the companies. Though, I regard the opinions of the respondents as valid to those working with the topic within the two companies. Even though, it is necessary to conduct further research in order to say something about other companies and other contexts.

4.0 Empirical data

In this chapter we look at the data used in this thesis. The data intends to highlight the research question: "How should a buyer and a supplier decide whether to implement reverse inventory consignment?". First, an introduction of the companies and a description of the case will be given so that the reader can fully understand the context of this research. Secondly, the quantitative data will be presented and a time series analysis performed. In this section the demand pattern on top of the alleged factors-circle is in focus. Then follows the qualitative data with a summary of what was discussed in the interviews at Pla-Mek and Ekornes. The interviews will highlight all of the points in the circle.

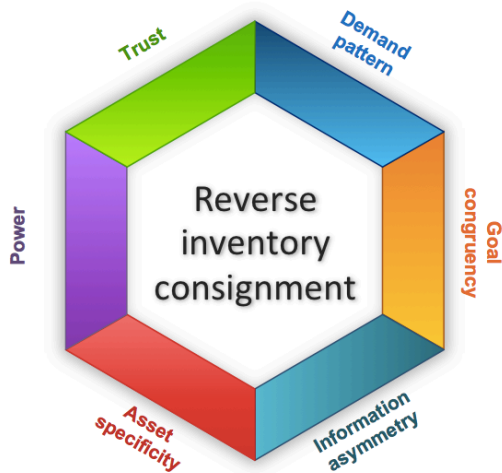


Figure 9. Alleged decision factors in the choice of implementing RIC.

4.1 Presentation of the companies

4.1.1 Ekornes

Ekornes ASA is the largest producer of furnitures in the Nordic region. The company's headquarter is located at Ikornnes in Sykkylven. Ekornes is most famous for brand names such as Stressless®, Ekornes® and Svane®. In fact, Stressless is one of the most exclusive and famous brand names in the whole furniture industry. The production takes place in seven different locations; while one factory is located in the USA, the rest is based in Norway. The company's products are sold all over the world. Ekornes' vision is to be one of the world's most attractive suppliers of home furnishings. The company wants to

offer products to a broad public in terms of price and design. Ekornes must also develop and manufacture products offering outstanding comfort and function (Svane® 2015).

The Stressless furnitures have different design, where some have a base made of wood others are made of aluminium. It also consists of many plastic components, which Pla-Mek supplies. At present time Ekornes have only one supplier for these plastic components in their furniture production. Even though it can be risky to have only one supplier, the reason is that it is too costly to have several. Since Ekornes owns the molds used in production and they are very expensive, it would be costly to have multiple molds at different locations.

4.1.2 Pla-Mek

Pla-Mek AS is a manufacturer of injection molded plastic parts for industry- and product suppliers. The company was established in 1991 and had two facilities located in Stranda, until the factories were gathered at one facility in Sykkylven, in the year of 2015. The company is a relatively small enterprise in regard to the number of employees, which are approximately 20.

Pla-Mek is one of Ekornes main suppliers and produces a variety of plastic parts for Ekornes' products. For instance, the Ekornes Stressless chairs contain more than 35 unique components made by Pla-Mek. The plastic are melted in custom-made casts that are patented and owned by Ekornes. Casting is a process where fluid plastic mixtures or resins are injected into a mold or against a substrate with little or no pressure. Then follows solidification and removal of the formed object, and a solid or hollow article is formed.



Figure 10. Example of a mold used at Pla-Mek.

Pla-Mek works in close cooperation with purchasers and engineers at the product development and design department at Ekornes to find good solutions for the plastic products. The company value transparency, honesty and respect towards their customers. In the production Pla-Mek has automated assembly and packaging of products customized for Ekornes.

4.2 Description of the case

Ekornes is in need of reducing its inventory due to lack of space in their in-house storage facilities. Over the years the company has been manufacturing relatively standardized furnitures. Today their product range is developing, introducing new tables and more options in their existing assortment. This is likely to involve many more component parts on stock for production. In order to solve the capacity issue, Ekornes has suggested to move the inventory of items purchased from Pla-Mek to Pla-Mek's own facilities. Pla-Mek is positive to this suggestion, but is not interested in owning the inventory. Pla-Mek seeks to increase order predictability to fully utilize machinery in production.

Pla-Mek has been Ekornes' supplier for many years. About 20 years ago Ekornes began using Pla-Mek more frequent for the supply of products. Ekornes moved away from using several suppliers that was located farther away. Pla-Mek was competitive on price, and this was the reason why Ekornes chose Pla-Mek as its main supplier at that time. Over the years Pla-Mek has shown to be a good strategic partner to Ekornes. In fact, Pla-Mek has proved to be efficient when it comes to logistic costs. The reason is their high degree of automation and skills in finding good solutions. Ekornes view Pla-Mek as an important partner, and regards the components Pla-Mek produce as strategic items (Caniels & Gelderman 2005). The components are very critical for Ekornes' production, and their attitude in the past has been to ensure enough on stock in case of unforeseen events.

4.3 Time series analysis

In this part of the thesis I will present the results from my analysis of the sales order data I received from Ekornes. I was only able to obtain sales data from one chair from each of the three different bases of the Stressless, and not for each individual model within each base. The three Stressless models are pictured below.



Figure 11. Stressless City Starbase chair, with high back and footstool.



Figure 12. Stressless Magic (M) Classic chair with footstool.



Figure 13. Stressless Magic (M) Signature chair.

Every individual model within each base has a different bill of materials (BOM), but it does not vary much. I have used one BOM from each base that I believe is representative for all models within each base. Though, using the exact sales data and BOM for each individual model could have made the forecast more accurate.

I am assuming that:

- The BOM for "Stressless City high back w/footstool high base" is representative for all of the Starbase chairs.
- The BOM for "Magic (M) Signature w/footstool" is representative for all of the Signature chairs.
- The BOM for "Magic (M) Classic" is representative for all of the Classic chairs.

From the BOMs I have picked out only components that Ekornes purchase from Pla-Mek. All together I ended up with 19 different items.

Table 2. Bill of materials for the three Stressless models.

Component nr	Item number	Object description	Unit of measurement	Signature	Classic	City Starbase
990001641	1	PC R-skive S	EA	2	2	2
990001646	2	PC Ratt Stressless m/senterlogo	EA	2	2	2
990001649	3	PC R-foring S	EA	2	2	0
990001652	4	PC Skumhylse	EA	2	2	0
990001653	5	PC Hylse 10/7x11 k1	EA	2	2	2
990001660	6	PC Flexoholk 6-30-44 plast	EA	2	2	2
990001661	7	PC Hylse 10,1/8,3 x 6,3	EA	2	2	2
990001663	8	PC Hylse 13,3/11,3 x 51	EA	2	2	2
990001672	9	PC Nakkemansjett	EA	2	2	0
990001677	10	PC S-Hylse	EA	2	2	2
990001682	11	PC Nakkeforing	EA	2	2	0
990001683	12	PC Nakkeglider	EA	2	2	0
990001691	13	PC Glidesko 4 stk (1 stol)	EA	1	1	1
990001719	14	PC Tilt complete	EA	2	2	2
990001756	15	PC Trekkstang monterert HØGRE	EA	1	1	1
990001757	16	PC Trekkstang monterert VENSTRE	EA	1	1	1
990001659	17	H-clips 14mm	EA	0	0	14
990001733	18	PC Distansekobling krakk	EA	0	0	2
990002626	19	PC RV Sleeve Snap T484	EA	0	0	2

In the next sections I will analyse the sales data for the three different chairs. I start by examining the data, before the ARIMA models are identified. Afterwards, parameters are estimated and I perform diagnostic checking to ensure good results.

4.3.1 Examining the data

In the figure below we see the total demand for the three Stressless chairs from week 1 in year 2010 throughout week 52 in year 2015. The demand seems to be very stable. The total sales data exhibits a smooth stable trend, with hints of seasonal variations.

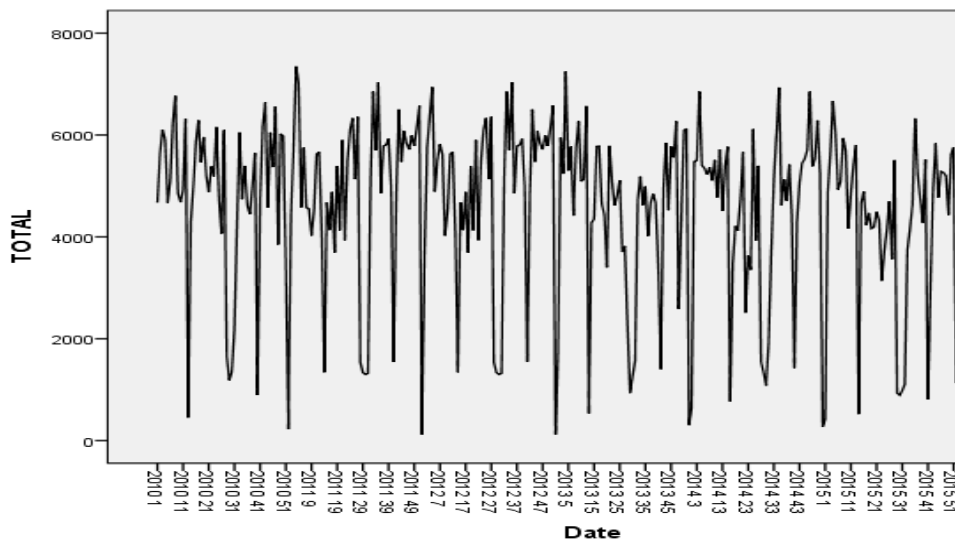


Figure 14. Total sales from week 1 in 2010 to week 52 in 2015.

The classic chair has been for sale the whole data period, while sales of the City chair started in week 1 year 2014. One year after, the Signature chair hit the market. When we look further into the sales data for the three different types of chairs we see that the Classic chair has a decreasing trend from the time City Starbase starts to sell. When Signature starts selling, the trend of the Classic chair is decreasing even more.

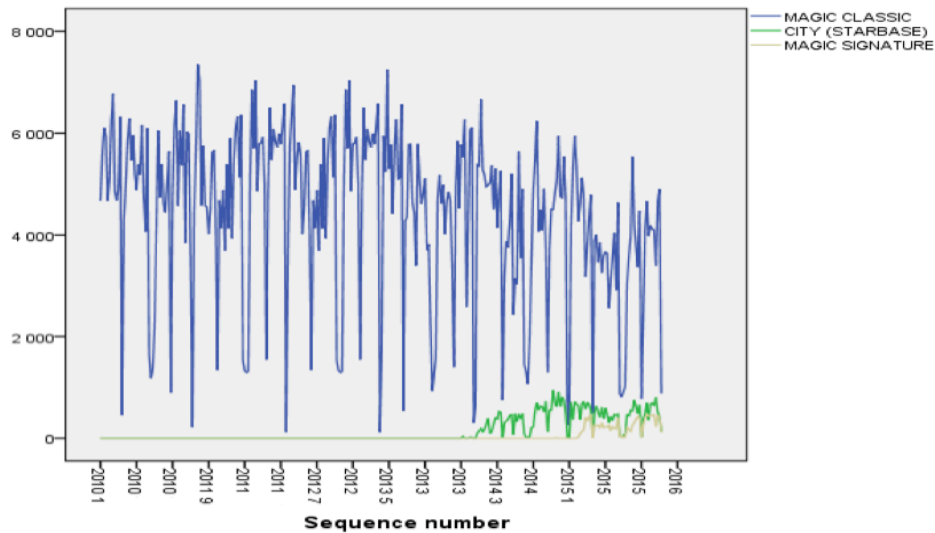


Figure 15. Historical sales of the three Stressless models.

4.3.1.1 Predictors

The series exhibits numerous bottoms, many of which appear to be equally spaced. The equally spaced bottoms suggest the presence of some periodic components to the time series. To examine the seasonal pattern the average weekly sales orders are plotted against the week of the year.

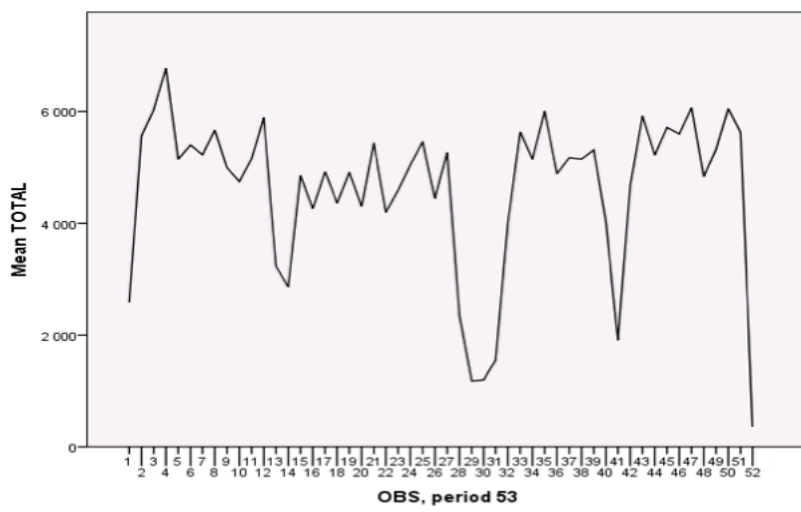


Figure 16. Mean of total sales against week of the year.

We can see from the graph that the low values occur during the holiday seasons. From this I am assuming annual seasonal components to the data. When using week numbers in the times series analysis, holidays will not hit the same weeks every year. I experimented with different independent variables, and ended up using event variables to model effects. *Seasonal dummy* predictors add seasonal indicators to the model to serve as regressors for seasonal effects. Each is coded such that 1 indicates a time point where the event is thought to have an effect, and 0 when no effect is expected. The effect is also added to the forecasting period. Only predictor variables that have a significant relationship with the dependent variable are included in the model.

Based on the five periods with the lowest values in the graph above, five event variables or "dummy variables" are used as regressors in the data analysis:

1. "Week 1"

It seems to be that in the first week of every year the sales numbers are low. The Week 1 variable was coded 1 every first week of the years.

2. "Easter"

I accounted for the Easter holiday in week 12 in 2016, week 13 in 2010 and 2013, week 14 in 2011, 2012 and 2015, week 16 in 2014.

3. "Summer holiday"

Experimenting with a four weeks summer holiday did not give a good explanation to the model. Changing the summer holiday to the last three weeks in July every year gave a significant predictor. In year 2010, 2011, 2012 and 2016 the weeks 28, 29, 30 was coded 1, and in year 2013, 2014 and 2015 the weeks 29, 30 and 31 was coded 1.

4. "Autumn holiday"

Week 40 in year 2010 and week 41 in year 2011-2015 was coded 1.

5. "Christmas holiday"

Every week 52 in year 2010-2016 was coded 1.

4.3.1.2 Outliers

Outliers are shifts in the time series that cannot be explained. In the data set there are bottoms and peaks that do not appear to be part of the seasonal pattern and which represent significant deviations from the neighbouring data points. I made the Expert Modeler in SPSS detect outliers automatically. Those are much different in relation to other observations in the sample. It is important to detect outliers since they may change the mean level of the series and alter the analysis (Gujarati & Porter 2009). The different types detected in my analysis were additive outliers, transient change and local trend.

The local trend outlier starts a local trend, or a drift, at a particular point in the series. The local trend do not consist of points that are unusual if we look at the entire time series, but the values stands out to the surrounding points. An additive outlier is a suddenly large or small value at one point in the series that do not affect other observations. A transient change, on the other hand, affects other observations by decaying exponentially over the next observations until the value reaches the normal level.

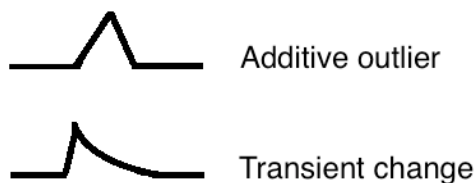


Figure 17. Outliers illustrated graphically.

4.3.2 Model identification

SPSS Expert Modeler chose different ARIMA models as the best fitted model for the three Stressless chairs. Manually the autocorrelation function (ACF) and partial autocorrelation function (PACF) are used to find the best fitted ARIMA model. ACF measures the linear dependence of a variable with itself at two points in time, while PACF measures correlation between observations that are k periods apart from each other, accounting for the values of the intervals between (Gujarati & Porter 2009).

4.3.2.1 Classic

For the Classic chair we have historical sales data from five years. The number of observations is 260. Expert Modeler identified ARIMA (0, 0, 1)(1,0,0) as the best fitted model. This is a stationary, mixed seasonal ARMA model with $p=1$ and $Q=1$. In general the mixed model is more difficult to identify by the ACF and PACF, but a non-seasonal MA (1) means that ACF has one peak in lag 1 with no correlation to the other lags. The ACF is more positive than negative, indicating a SAR term and not a SMA term to the model. When the model has a seasonal AR (1) it is shown by exponential variations in the seasonal lags of the ACF and a significant spike at lag 52 in the PACF.

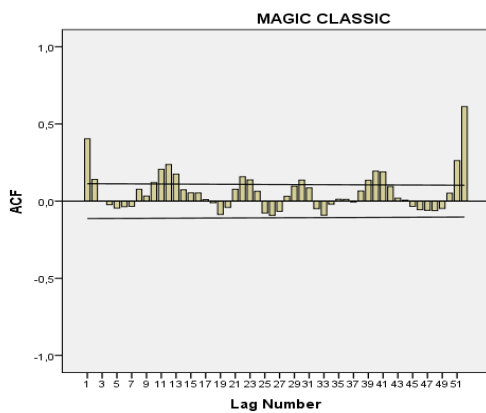


Figure 18. Correlogram of Magic Classic.

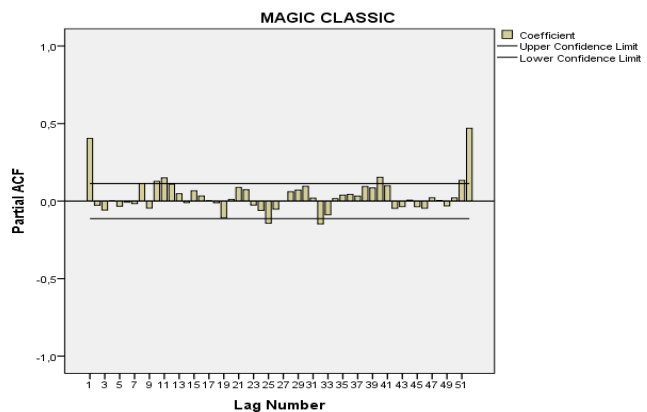


Figure 19. Partial correlogram of Magic Classic.

4.3.2.2 City Starbase

For the City Starbase chair we have historical sales data for two years and the number of observations are 104. Expert Modeler identified a ARIMA(0, 0, 0) model, which is a white noise process. This indicates that the ACF and PACF should have no significant spikes (Yaffee & McGee 2000). Even though, it looks like PACF has a spike at lag 1. Identifying the right ARIMA model based on ACFs and PACFs requires skills, since they are estimates that do not match exactly the theoretical ACFs and PACFs (Gujarati & Porter 2009). The model does not only consist of white noise as we can see in the parameter estimation section, but these parameters do not show in the ACF and PACF diagrams.

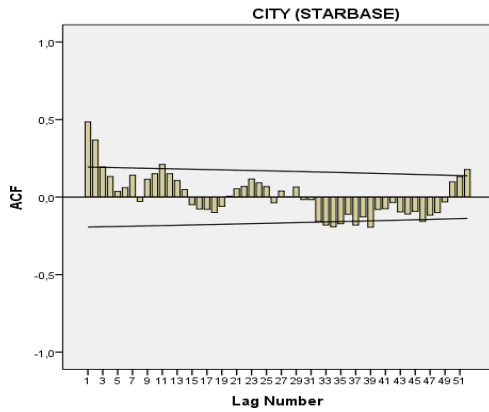


Figure 20. Correlogram of City Starbase.

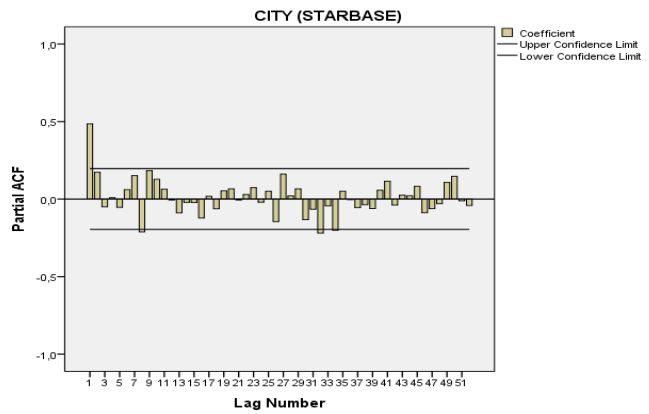


Figure 21. Partial correlogram of City Starbase.

4.3.2.3 Signature

For the Signature chair we have historical sales data for one year and the number of observations are 52. Expert Modeler identified a $ARIMA(1, 0, 0)$ model, which is an autoregressive process. Since there is an exponential decay in the correlogram, and the partial correlogram has a significant positive spike at lag 1, it looks like an $AR(1)$ process fits.

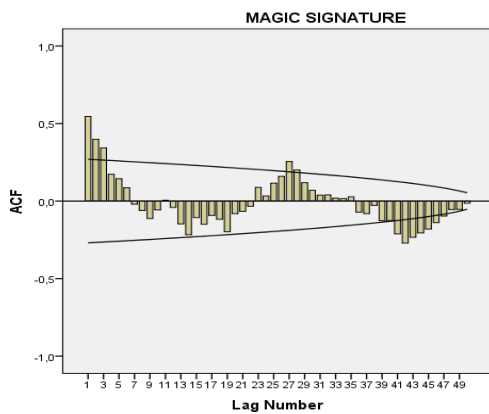


Figure 22. Correlogram of Signature.

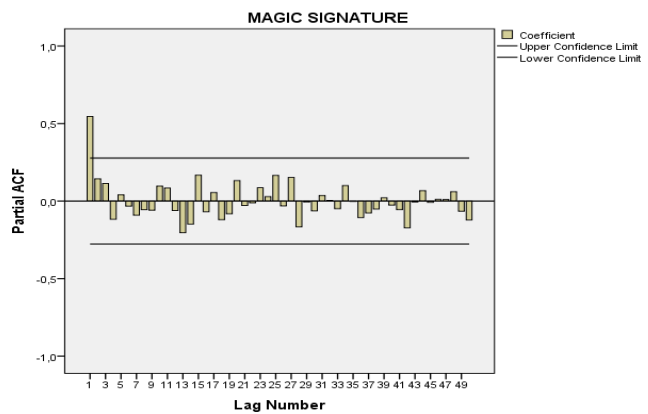


Figure 23. Partial correlogram of Signature.

4.3.3 Parameters estimation and diagnostic checking

4.3.3.1 Classic

The Expert Modeler in SPSS gives us the following parameters estimation for the Classic model ARIMA(0, 0, 1)(1, 0, 0):

Table 3. Model parameters for the Classic chairs.

ARIMA Model Parameters					Estimate	SE	t	Sig.
MAGIC CLASSIC	MAGIC CLASSIC	No Transformation	Constant		5231,657	121,412	43,090	,000
			MA	Lag 1	-,196	,058	-3,375	,001
			AR, Seasonal	Lag 1	,556	,051	10,878	,000
	Summer holiday	No Transformation	Numerator	Lag 0	-2715,403	359,853	-7,546	,000
	week1	No Transformation	Numerator	Lag 0	-2329,831	607,246	-3,837	,000
	Easter holiday	No Transformation	Numerator	Lag 0	-3781,448	301,167	-12,556	,000
	Autumn holiday	No Transformation	Numerator	Lag 0	-3457,212	441,623	-7,828	,000
	Christmas holiday	No Transformation	Numerator	Lag 0	-4270,280	608,276	-7,020	,000

All of the five predictors turned out to be significant in the model. In addition, the model contains a constant.

Table 4. Model statistics for the Classic chairs.

Model Statistics								
Model	Number of Predictors	Model Fit statistics			Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	MAPE	Norm. BIC	Statistics	DF	Sig.	
MAGIC CLASSIC	5	,771	25,078	13,591	18,235	16	,310	3

Three outliers are detected and accounted for. Those are two additive outliers; one in year 2013 week 48 and one in year 2014 week 28, and a local trend in year 2013 week 6. We see from the model statistics that the P-value from Ljung-Box test is 0,310. The P-value is larger than 0,05 and we fail to reject H_0 , that the residuals are random, with 95% confidence. This means that the model is a good fit. Though, the MAPE-value indicates are 25% error in the forecasting values. The actual values in the data are not very small, so that is probably not the reason why the error is a bit large. This has to be taken into

account when using the forecasted values. The stationary R-square value is the upper layer, with a value of 0,771. This also indicates that the model is a good fit.

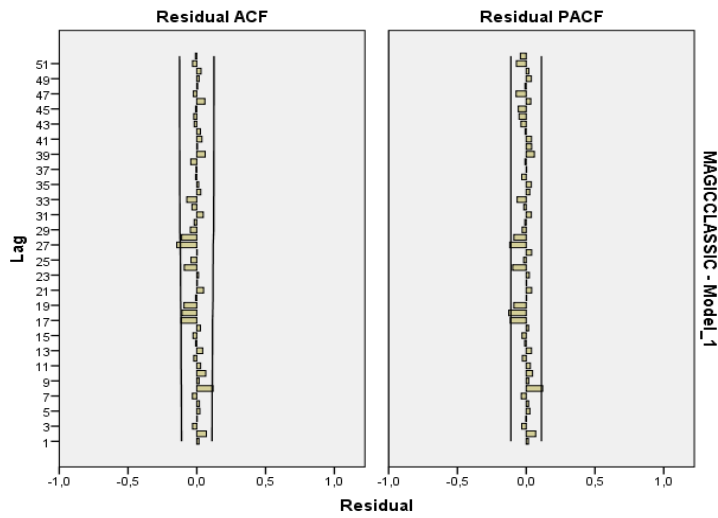


Figure 24. ACF and PACF residuals from the model for Classic chairs.

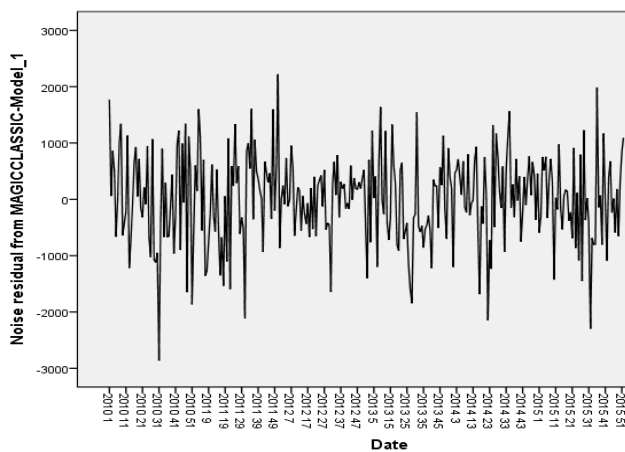


Figure 25. Noise residuals from the model of Classic chairs.

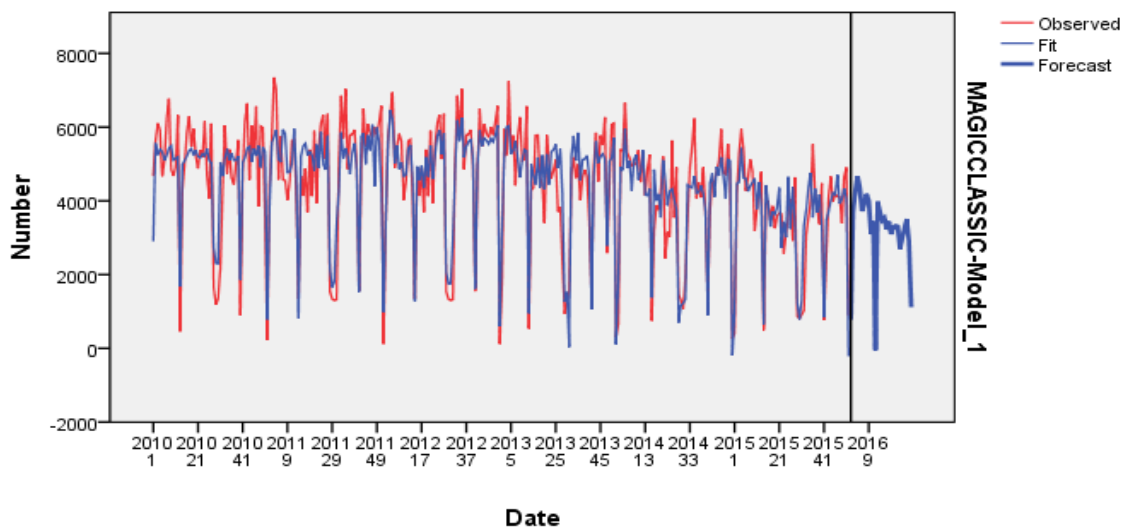


Figure 26. Actual sales versus the model fitted values and forecasted values.

The residuals show the differences between expected and actual values for the model. When we look at the remaining residuals in the ACF and PACF we can see from lag 27 that there is a very small amount of autocorrelation left. This suggests that the model still can be improved, but the amount is so small (-0,146) that it looks like the model has captured the patterns in the data very well. From the graph of the residuals, there are some peaks that should have been accounted for in order to make the model even better. How well this model fits is illustrated in figure 26. We can see that the fitted line is very close to the observed values.

4.3.3.2 City Starbase

The Expert Modeler in SPSS gives us the following parameters estimation for the City Starbase model ARIMA(0, 0, 0):

Table 5. Model parameters for the City Starbase chairs.

ARIMA Model Parameters					Estimate	SE	t	Sig.
CITY (STARBASE)	CITY (STARBASE)	No Transformation	Constant		540,825	24,875	21,742	,000
	week1	No Transformation	Numerator	Lag 0	-572,856	94,729	-6,047	,000
	Easter holiday	No Transformation	Numerator	Lag 0	-426,295	93,844	-4,543	,000
	Summer holiday	No Transformation	Numerator	Lag 0	-468,704	56,144	-8,348	,000
	Autumn holiday	No Transformation	Numerator	Lag 0	-444,792	94,274	-4,718	,000
	Christmas holiday	No Transformation	Numerator	Lag 0	-510,630	94,711	-5,391	,000

All of the five predictors turned out to be highly significant in the model. In addition, the model contains a constant.

Table 6. Model statistics for the City Starbase chairs.

Model Statistics								
Model	Number of Predictors	Model Fit statistics			Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	MAPE	Norm. BIC	Statistics	DF	Sig.	
CITY STARBASE	5	,731	75,318	10,237	13,016	18	,791	3

Three outliers are detected and accounted for in the model; two transient outliers in year 2014 (week 2 and 44) and one additive outlier in year 2015 (week 32). We see from Ljung-Box test that the P-value (0,791) is larger than 0,05, so we fail to reject H_0 . This

means that the residuals are random, with 95% confidence, and that the model is a good fit. Though, the MAPE-value indicates are 75% error in the forecasting values. I conclude that MAPE is not a good estimate of fit to this model, since the actual data set contains zero values, which gives a high MAPE. The stationary R-square value is the upper layer, with a value of 0,731. This also indicates that the model is a good fit.

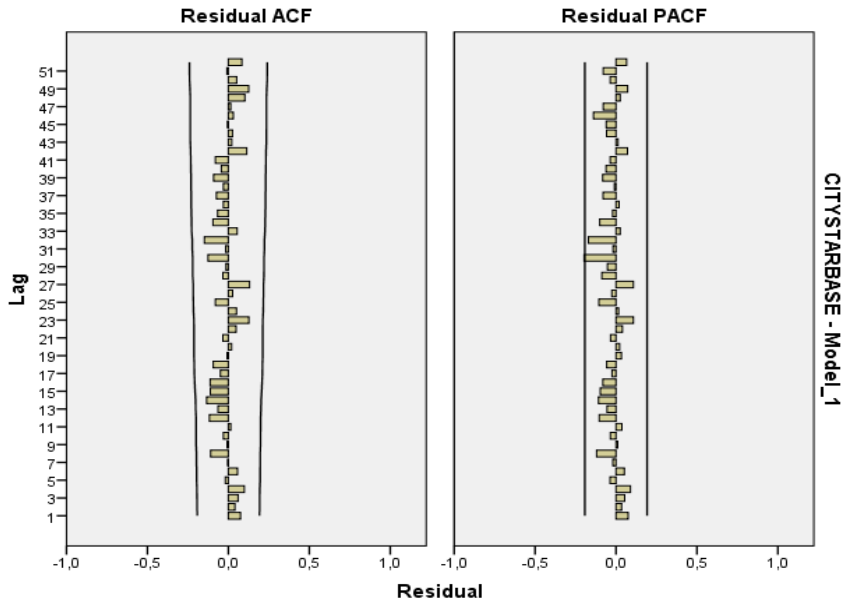


Figure 27. Residual ACF and PACF from the model of City Starbase chairs.

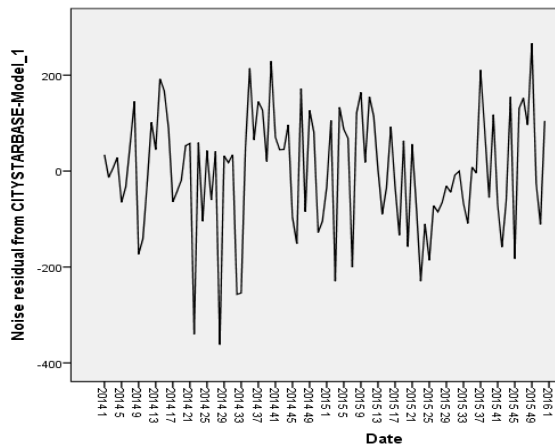


Figure 28. Noise residuals from the model of City Starbase chairs.

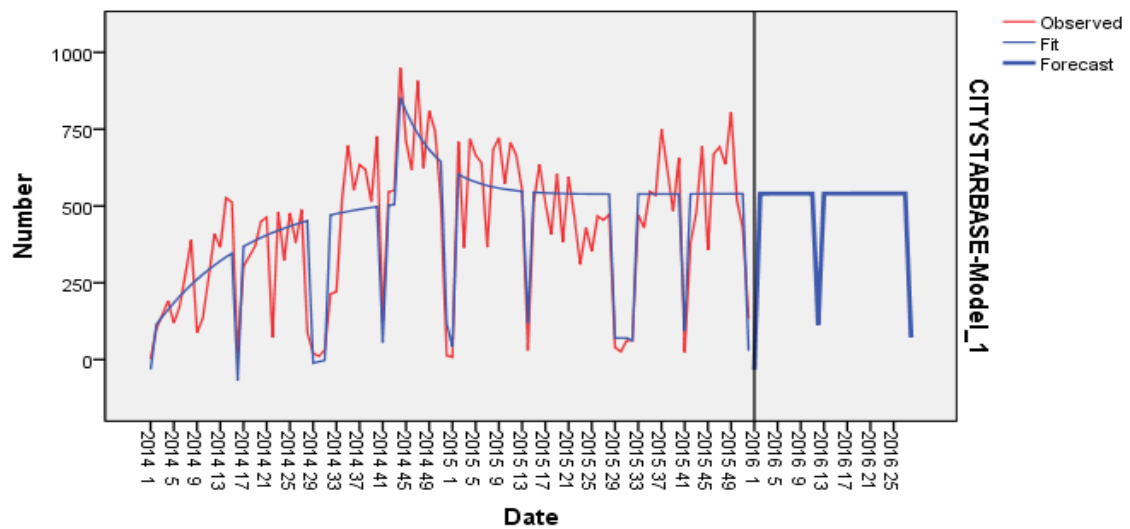


Figure 29. Plots of the actual sales versus the fitted values and forecasted values from the model of City Starbase chairs.

Since this model do not contain any AR or MA terms, we know that the residuals are just deviations from the mean. The model is a pretty good fit, as we can see from figure 29. The lowest points are fitted, but many of the peaks are not accounted for. In addition, from the graph of noise residuals it looks like there are two outliers that are not detected in year 2014 (around week 22 and 28). It is reasonable to say that the model can be improved.

4.3.3.3 Signature

The Expert Modeler in SPSS gives us the following parameters estimation for the Signature model ARIMA(1, 0, 0):

Table 7. Model parameters for the Signature chairs.

ARIMA Model Parameters					Estimate	SE	t	Sig.
MAGIC SIGNATURE	MAGIC SIGNATURE	No Transformation	AR	Lag 1	,981	,035	28,389	,000
	Summer holiday	No Transformation	Numerator	Lag 0	-190,750	61,843	-3,084	,004
	Easter holiday	No Transformation	Numerator	Lag 0	-356,465	43,842	-8,131	,000
	Autumn holiday	No Transformation	Numerator	Lag 0	-312,427	43,767	-7,138	,000
	Christmas holiday	No Transformation	Numerator	Lag 0	-300,615	63,030	-4,769	,000

Only four of the predictors turned out to be significant in this model. Week 1 was not significant and hence, not included. In addition, the model does not contain any constant.

Table 8. Model statistics for the Signature chairs.

Model Statistics								
Model	Number of Predictors	Model Fit statistics			Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	MAPE	Norm. BIC	Statistics	DF	Sig.	
MAGIC SIGNATURE	4	,875	211,157	8,991	12,719	17	,755	4

Four outliers are detected and accounted for in the model. Those are three additive outliers in year 2015 (week 28, 32 and 49), and one transient outlier in year 2015 week 10. We see from Ljung-Box test that the P-value (0,755) is larger than 0,05, so we fail to reject H_0 . This means that the residuals are random, with 95% confidence, and that the model is a good fit. Though, the MAPE-value indicates a 211% error in the forecasting values. I conclude that MAPE is not a good estimate of fit to this model as well, since the actual data set contains zero values, which gives a high MAPE. In addition, the actual data values are quite low and contribute to the high MAPE value. The stationary R-square value is the upper layer, with a value of 0,875. This indicates that the model is an excellent fit.

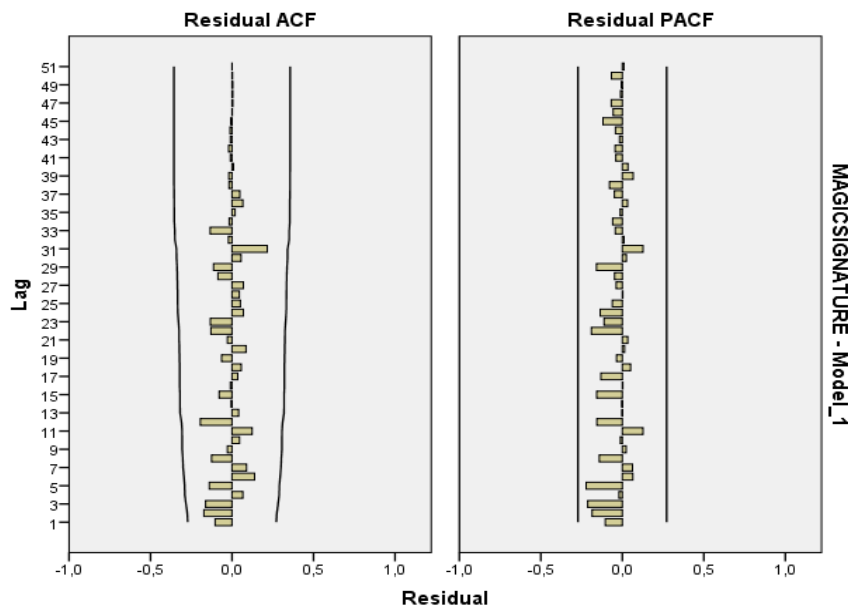


Figure 30. ACF and PACF residuals from the model of Signature chairs.

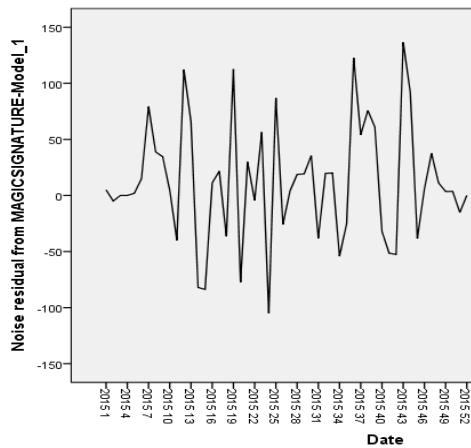


Figure 31. Noise residuals from the model of Signature chairs.

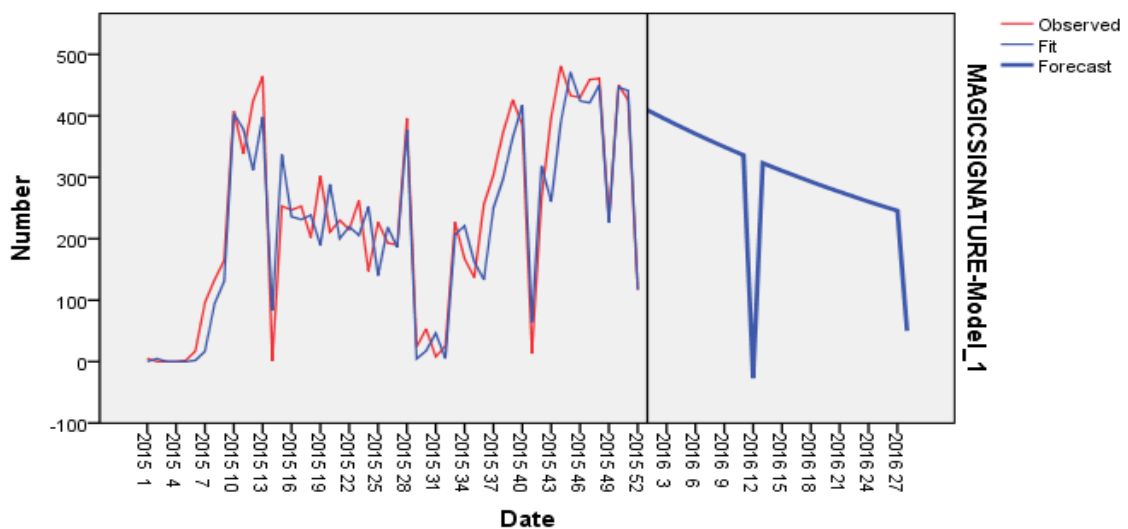


Figure 32. Observed values versus fitting values, and forecasted values from the model of Signature chairs.

When we look at the remaining residuals in the ACF and PACF it looks like the model has captured the patterns in the data very well. How well this model fits is illustrated in figure 32. We can see that the fitted line is very close to the observed values, and that all peaks are accounted for. In conclusion, the model is a very good fit to the data.

4.3.4 Forecasted values

From the three different ARIMA models for the Stressless Classic, City Starbase and Signature chairs we get the predicted values with the corresponding lower and upper confidence limits.

Table 9. Forecasted values for the sales data of the three different Stressless models.

Date	Classic model			City Starbase model			Signature model		
Year Week	Predicted	LCL	UCL	Predicted	LCL	UCL	Predicted	LCL	UCL
2016 1	780	-750	2311	-33	-292	227	409	286	533
2016 2	3678	2118	5237	540	281	800	401	228	575
2016 3	4286	2727	5846	540	281	800	393	183	604
2016 4	4665	3106	6225	540	281	800	385	145	6266
2016 5	4343	2783	5903	540	281	800	378	112	644
2016 6	3723	2163	5283	540	281	800	370	82	660
2016 7	3913	2353	5473	540	281	800	363	54	673
2016 8	4188	2629	5748	540	281	800	356	29	684
2016 9	4002	2442	5562	540	281	800	349	5	693
2016 10	3099	1539	4659	540	281	800	342	-17	702
2016 11	3444	1884	5003	540	281	800	335	-37	209
2016 12	-52	-1612	1508	114	-145	374	-27	-414	360

The forecasted values are used together with the bill of materials (see appendix) to give the predicted units Ekornes needs to purchase from Pla-Mek. From the SPSS output we got predictions of negative sales, which is not possible. Negative sales are regarded as zero sales, but the values are not changed in table 9 so that the prediction interval is not affected. In the table of predicted units Ekornes need from Pla-Mek the negative values are replaced with zero.

Table 10. Predicted number of units Ekornes need from Pla-Mek for 19 different components.

Date	Predicted units for item number 1, 2, 5-8, 10, 14				Predicted units for item number 13, 15, 16				Predicted units for item number 3, 4, 9, 11, 12		
	Classic	City Starbase	Signature	TOTAL	Classic	City Starbase	Signature	TOTAL	Classic	Signature	TOTAL
2016 1	1560	0	818	2378	780	0	409	1189	1560	818	2378
2016 2	7356	1080	802	9238	3678	540	401	4619	7356	802	8158
2016 3	8572	1080	786	10438	4286	540	393	5219	8572	786	9358
2016 4	9330	1080	770	11180	4665	540	385	5590	9330	770	10100
2016 5	8686	1080	756	10522	4343	540	378	5261	8686	756	9442
2016 6	7446	1080	740	9266	3723	540	370	4633	7446	740	8186
2016 7	7826	1080	726	9632	3913	540	363	4816	7826	726	8552
2016 8	8376	1080	712	10168	4188	540	356	5084	8376	712	9088
2016 9	8004	1080	698	9782	4002	540	349	4891	8004	698	8702
2016 10	6198	1080	684	7962	3099	540	342	3981	6198	684	6882
2016 11	6888	1080	670	8638	3444	540	335	4319	6888	670	7558
2016 12	0	228	0	228	0	114	0	114	0	0	0

Date	Predicted units for item number 17		Date	Predicted units for item number 18, 19	
Year Week	City Starbase	TOTAL	Year Week	City Starbase	TOTAL
2016 1	0	0	2016 1	0	0
2016 2	7560	7560	2016 2	1080	1080
2016 3	7560	7560	2016 3	1080	1080
2016 4	7560	7560	2016 4	1080	1080
2016 5	7560	7560	2016 5	1080	1080
2016 6	7560	7560	2016 6	1080	1080
2016 7	7560	7560	2016 7	1080	1080
2016 8	7560	7560	2016 8	1080	1080
2016 9	7560	7560	2016 9	1080	1080
2016 10	7560	7560	2016 10	1080	1080
2016 11	7560	7560	2016 11	1080	1080
2016 12	1596	1596	2016 12	228	228

4.4 Qualitative data

In this part of the thesis I will present the results from the four interviews with respondents from Pla-Mek and Ekornes. The data is categorized according to the factors revealed from the theory, and the interviews will highlight all of the points in the circle below.

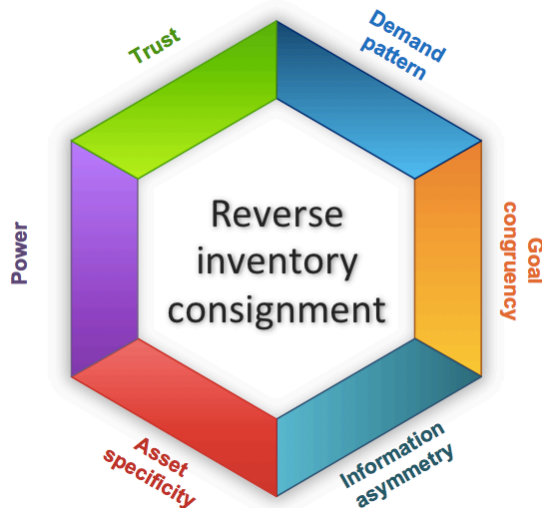


Figure 33. Alleged decision factors in the choice of implementing RIC.

4.4.1 Demand

The components produced by Pla-Mek is not standard products in the market, but custom-made. Ekornes has their own design team that works with shaping details and product development. Price fluctuations are not common on these items, but the items are easy to benchmark. In Pla-Mek's market there is hard competition on price, and Ekornes says that Pla-Mek scores very well due to low logistic costs and automation.

Pla-Mek has the opinion that purchase orders from Ekornes should be sent for several periods ahead of time, so that Pla-Mek knows future demand and are able to produce more at once. In general that is what Pla-Mek tells its customers.

"Usually we produce a bit more than what is ordered and have an extra buffer at our facilities to stay ahead, but that is only because I know Ekornes so well and believe it can be a benefit for us. Even though it is a risk we take by not being sure if we get to deliver it. ... Regarding Ekornes we know their turnover on most products, so we sometimes do our own assessment and produce without orders received. Throughout the years we have

requested orders whenever it has been a long time since last delivery. We know their needs. It has happened that we have sent a request and they found out that an order was forgotten or missed in the system."

Ekornes has not utilized their ERP-system fully. Forecasting is done on some sales data, but it is usually not used when Ekornes orders from Pla-Mek. There is not much variation in the amount that Ekornes purchases from Pla-Mek. A respondent from Ekornes said:

"... We take history into account, and usually buy what we always have done. We also take into account what is on the shelves. The variation is little ... We want to avoid suddenly finding a batch somewhere when the item has been phased out, and the risk of obsolescence."

Ekornes would like Pla-Mek to assess what should be the minimum level of safety stock taken into account the time it takes to replace a mould. By giving Pla-Mek the responsibility they would have to commit.

"I believe our company has more control than Ekornes of what is necessary to have on safety stock, and I believe Ekornes agrees to that. It is more easy for us since Ekornes has so many other products to concern about ..."

The plan is not to have Pla-Mek doing forecasting, this is something Ekornes will take care of and disclose through the ERP-system. Ekornes wish to get input from Pla-Mek on minimum and maximum values for the inventory level. Though, Ekornes believe a monthly revision will be necessary to make sure the inventory is linked to their sales and operation planning and future sales data.

"... If Pla-Mek wants to produce other batch volumes than what we have set as limits we will allow them to get the opportunity. Nevertheless, we will reduce the inventory level and gain a greater rotation by letting Pla-Mek be involved."

The few variations in demand Ekornes experience today comes from changes in the product assortment. Ekornes believe that their demand pattern has changed the last year, and that Ekornes has had different consumption of products from Pla-Mek. The tendencies

are that the demand for the classic Stressless model is decreasing, while demand for new models increase. The models have different need for plastic components and Ekornes believe this can be a challenge for Pla-Mek. Even though, it looks like when the need for some components decreases the need for others increase. A respondent from Pla-Mek told:

"The demand for components was stable before, but now the product mix is much more unpredictable. I do not believe we will deliver less, but the mix will be different. What time we receive orders today is kind of random. Though, I know Ekornes so well that in times of free capacity on our machines we start producing even without an order in place."

4.4.2 Goal congruency

From Ekornes perspective the main goal with moving parts of their inventory to Pla-Mek's facilities is to reduce the value of the inventory, hence reducing costs. Ekornes has components on stock for approximately four months ahead, which is not desirable. The inventory level has not been questioned before, since large volumes are used in production. Ekornes has many items as safety stock just in case unforeseen events occur, but now they want to increase the inventory turnover and put focus on working capital. A goal is to ensure a certain, yet lower, amount on stock and to know the reason behind it.

Another goal is to free up space at Ekornes' facilities since new models of furniture will increase the number of articles that need space in the warehouse. There is a general impression among employees at Ekornes that the tidiness of their warehouse is not so good. In addition, components that comes first in to the factory, is not the first to go out. In practice pallets can be found after a component has been phased out, and have to be thrown away. Since the inventory is manually tracked at Ekornes, the workers worry if they remember everything. Ekornes believe Pla-Mek will perform better than Ekornes in having an overview of the inventory. Another important aspect from Ekornes perspective is to get an easier ordering-system. For Pla-Mek it is important to get a more comprehensive plan to produce by.

The lead-time from Pla-Mek is four to six weeks, which is longer than Ekornes fourteen days production lead-time. Ekornes is supposed to have a safety stock level for approximately 20 days of production, but the level can be much larger. There is not

necessarily a good reason behind the level of inventory at Ekornes' facilities. Orders have been made manually and without the use of their existing ERP-system, which has caused the stocks to pile up. Ekornes believe that by moving the inventory, Pla-Mek will know what Ekornes needs, and this method will be better than what is done today: ordering manually when shelves start getting empty. Furthermore, Ekornes will only need to order items one day ahead and not four to six weeks into the future. Ekornes believe this will make it easier to see what they need for production and they will not be faced with obsolescence costs due to large inventories.

Ekornes believe that Pla-Mek will have both gains and losses by increased inventory control and higher inventory handling costs. Pla-Mek's main goal with implementing RIC is to produce more optimally, by producing less or more often, smaller or larger batches by their own choice. This way they will gain more freedom in choosing the volume suitable for their machinery, have less changeover and reduce downtime. Each time Pla-Mek switches from production of one component to another the machinery will stand still for some hours. Both parties believe common goals of reduced cost will be achieved by implementing RIC, and both parties want what is best in a total cost perspective. A respondent said:

"If our goals are not consistent there is no point, is there?"

Pla-Mek is interested in close collaboration with Ekornes, and believes a close integration is beneficial when the companies are located so close to each other. A respondent from Pla-Mek elaborates:

"I can see changes from when we started to cooperate and until today. In the early stage we worked closely towards common development. Then there was a period where we had to give the best possible price on an already constructed product. The problem at that time was that we were not able to have an impact on the solutions, and adapt the product to our production line. Now I see that we will take part at an early phase of the product development, and be able to influence solutions. So it becomes a partnership with common goals."

4.4.3 Information asymmetry

Pla-Mek has handled goods and the flow of goods before, but would need some input on how to handle an increased level of inventory. Only one person in the company has a logistical background, but she is on maternity leave. Ekornes is willing to provide Pla-Mek with information necessary to handle the inventory. This is believed to be information about Ekornes consumption, ideally components per chair or sofa. Pla-Mek will need more skills on tracking of components and control in production. It will be necessary with an orderly system of the inventory. Pla-Mek has some idea of how Ekornes demand pattern looks like through the orders Pla-Mek receive. Though, no sales numbers are shared. There has been a discussion about whether Ekornes should open up their ERP-system, so that Pla-Mek can read about Ekornes' needs and inventory. Today Ekornes struggles with their ERP-system and are not able to open up their system to Pla-Mek without doing improvements on their sales and operation planning. In the start-up phase the companies will share an excel spreadsheet with the inventory balances at each of the companies facilities.

On question about what type of information Pla-Mek rather not share, one answer is:

"It must be production related to other customers. Prioritization and warehousing, and capacity on machinery are sensitive information. We have a clear agreement about what Ekornes can check, but it has never been an issue."

Today Ekornes is not able to measure Pla-Mek's effort very well. Many orders are sent at a time, and Pla-Mek is supposed to deliver the orders at different dates. Since Ekornes have many items on stock they do not go empty, and they do not keep track of whether Pla-Mek deliver on time or not. In addition, they cannot see Pla-Mek's inventory status today. Pla-Mek believe they perform badly in Ekornes statistics:

"The system is not updated when verbal messages are delivered. That is why a report from their system might put us in a bad light. I am a bit worried about that, but I hope our good dialogue corrects it. Because most of the time we deliver as agreed."

It has never happened that Pla-Mek has been the reason behind a stop in Ekornes' production. However, if it happens some day Pla-Mek does not know what the consequences for Pla-Mek will be. By implementing RIC Ekornes aims at measuring Pla-Mek's performance by checking if they deliver according to the purchasing order. A purchase order will be sent every day for goods to be delivered by truck the next day. Ekornes believe this will make them gain more control in measuring Pla-Mek's effort, which is something Pla-Mek agrees with:

"If we implement [RIC] I think Ekornes can control if we are within the minimum and maximum level of inventory. Ekornes can always take out what they need depending on their needs."

Lack of control due to the fact that Ekornes handle the ordering process manually can cause major problem for Ekornes. In example, if Pla-Mek suddenly receives orders from Ekornes Pla-Mek might have to stop and shift their production. This is costly for Pla-Mek, since it involves hours of downtime on machinery. If the ERP-system automatically sends orders, Pla-Mek will see Ekornes needs at all times. Then, Ekornes believe Pla-Mek will prevent major problems from happening. One respondent from Pla-Mek elaborates:

"We depend on seeing forecasts. So that we do not fill up the inventory if it is supposed to be adjusted downwards, or they see that sales change. This is sort of a problem today, we produce to order and suddenly Ekornes do not want to have it delivered on the original date. When it is not corrected ahead of time, it is difficult to adapt our production. We do have to prioritize what we should produce at any time."

4.4.4 Asset specificity

The specific assets Ekornes has invested in the relationship with Pla-Mek are moulds with a total value of approximately 40 million NOK. These are hollow containers used to give shape to the liquid plastic when it cools and hardens. The moulds will need some modifications if other suppliers than Pla-Mek shall use them.

Pla-Mek has its location close to Ekornes. Ekornes says:

"... We really appreciate it, since it makes our lives much simpler."

It was an employer at Ekornes who suggested that Pla-Mek should move to the facilities that they are in today. This has shown to be very important for Ekornes, since logistics costs have been reduced. The fact that Pla-Mek is located close to Ekornes makes them more competitive. An example of the benefits to Ekornes is that a worker who lives close by Pla-Mek's facilities will drive a truck with supply every morning, on his way to Ekornes. After work he brings the truck back, so that Pla-Mek can fill it up for the next morning. One of the reasons behind Pla-Mek's moving was the lack of space in their warehouse. They invested in a new production line specific for the production of components to Ekornes, and there was not enough space for it at their previous location. Pla-Mek also has two other production lines specific for Ekornes components. Many of the machines used in production of components are customized and so are robots and other equipment. In the future Ekornes wants to have more components assembled at Pla-Mek, so that the components can go straight into Ekornes production. This will involve further investments in manufacturing equipment.

A downside on Pla-Mek's behalf is that the inventory is voluminous and will require a lot of free space. Pla-Mek does have some free space available, but it is likely that more will be needed if RIC is implemented. If so, Pla-Mek would have to invest in a supplementary warehouse in addition to shelves and other equipment.

4.4.5 Power

Ekornes is the leading party in the relationship with Pla-Mek, since they are Pla-Mek's main customer, and both parties are aware of it. Considering bargaining power, Pla-Mek is not in a good position. At times Ekornes has accounted for 80 % of Pla-Mek's turnover, today they account for approximately 50 %. A respondent from Ekornes said:

"It's like this: if we say they have to be there for us, they will be there. That is where we are."

On the other side, Pla-Mek said:

"It is a bit scary to have such a large customer, if we loose Ekornes it will have major consequences for our company. We have to be realistic, because we can never know what the future holds."

In a way Ekornes is also dependent on Pla-Mek, since they do not have any other supplier for their plastic components today. Pla-Mek wants to incorporate their knowledge into the finished components, and believe this will make it more difficult for Ekornes to change supplier. Pla-Mek thinks it would be hard for Ekornes to move to another supplier and achieve the same quality. Pla-Mek tries to take responsibility by doing risk assessment, having a good fire detection system and maintaining order in their building. If additional actions are necessary, their customer has to demand it.

Ekornes say that Pla-Mek is extremely important to the company. Other suppliers exist in theory, but due to asset specificity it is difficult and costly for Ekornes to use different suppliers. If Ekornes want to change its supplier, it is likely to lead to increased costs. There is also a possibility to insource the production of components, but Ekornes strategy is not to have this type of industry in their own production. One respondent from Ekornes emphasize the dependencies and how there is open dialogue between the companies:

"If we do some changes in our product range we definitely inform Pla-Mek. If they want to make some changes we will approve no matter what to make sure we have the communication needed to be confident in each other."

One respondent emphasize on Ekornes dependency to the components Pla-Mek supply:

"Imagine if Pla-Mek goes bankruptcy, what should we do? We would have to take over. Quite simply, this shows how important this supplier is to us. We stand for more than 50% of their turnover."

Through the large volume Ekornes purchases, Pla-Mek has started to become very good at automation. Automation makes the company able to produce larges quantities in a shorter amount of time. Having Ekornes as their customer makes Pla-Mek able to work on smarter solutions.

4.4.6 Trust

The cooperation between Ekornes and Pla-Mek is characterized as "very close", and with a "great dialogue". A respondent from Ekornes says that Pla-Mek is easy to deal with.

"... We have always had a good dialogue, so if Pla-Mek is thinking about doing something they are always asking us first. We want them to be competitive for the future, and we know we have a great responsibility, and they know they have a big responsibility. Pla-Mek is perhaps the supplier we have the closest dialogue with. We have regular meetings every Friday, where we discuss the projects we are working on and problems we face."

Furthermore, the respondent elaborates:

"There will always be times when relationships are on trial. In a marriage problems are doomed to occur, but we overcome. Pla-Mek will probably think that we are unreasonable at times and require a lot from them."

However, according to Ekornes the relationship has not really been on trial, but there have been some episodes of deviation on the products. Even though, large problems are avoided due to the good dialogue between the companies.

Ekornes does not see many disadvantages from moving the inventory of molded plastic components to Pla-Mek's facilities. Although a respondent mentions:

"We lose in a way, perhaps, control. We have to trust that Pla-Mek is doing a proper job. If we have a day without components the production will stop! Then we are talking about millions per day in lost production."

The respondent continues:

"I think I will make some phone calls to ensure that we really are getting the items that we need, at least in the beginning."

According to Ekornes Pla-Mek is delivering on time, at least in the past. Though, after Pla-Mek moved to its new facilities incidents has made Ekornes drive over to Pla-Mek in the late evening to pick up articles, in order to avoid production stop the next day. One respondent from Ekornes says that this is due to unforeseen event related to Pla-Mek's moving to new facilities. Also, Pla-Mek gets credit for being flexible. For example, one respondent from Ekornes tells us that if Ekornes forgets to order something, Pla-Mek has shown willingness to work all night to help out:

"If it was not for Pla-Mek our production would have stopped many times because of our own mistakes. And a kind of system like [RIC] will reduce the risks of production stops to a far greater extent than what has been hitherto. It will not give us the possibility of failing in the way that we have done before, since Pla-Mek is watching the inventory levels. They will know if there is enough on stock. Implementing [RIC] will be a completely different way of doing the business, involving greater flexibility for Pla-Mek, and I believe, it will be safer for us."

Pla-Mek on the other hand will gain more control by having the inventory located at their place. A respondent from Pla-Mek deliberates:

"By implementing [RIC] we will know if Ekornes has what they need, I think it will be beneficial for our company. Very rare, but sometimes Ekornes forgets to put in an order and suddenly become empty of components. When this happens we have to shift our production very fast to produce these components, and other things are put on hold. This is not ideally."

Furthermore, Pla-Mek seem to believe that RIC will connect the companies closer together and a stronger relationship will make it safer for the company. In addition, one respondent at Pla-Mek says:

"Ekornes challenge us a lot, and it is positive because it is easy to become stagnant and do what has always been done. It is important to be challenged."

5.0 Discussion

In this chapter I will connect the empirical data from the interviews and the time series analysis to the theoretical framework. The discussion that follows will be based on the figure below, in order to answer the research question: "How should a buyer and a supplier decide whether to implement reverse inventory consignment?".

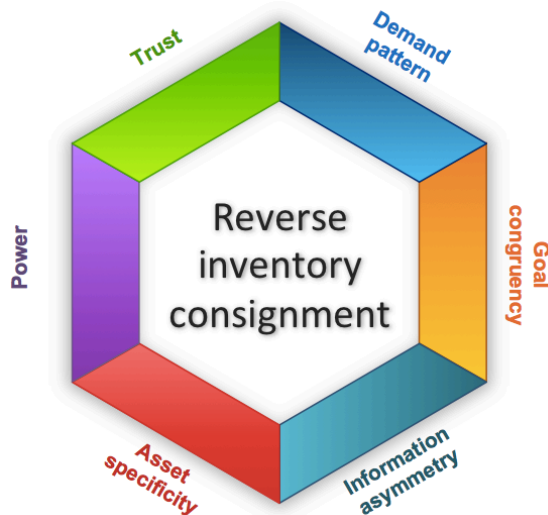


Figure 34. Alleged decision factors in the choice of implementing RIC.

5.1 Demand pattern

The interpretation of the time series analysis conducted in section 4.3 showed that the demand of Ekornes' three Stressless models Classic, Signature and City Starbase are predictable. In addition, the ARIMA models seem to predict the demand very well. The demand is relatively stable apart from the seasonal variations. The estimations could be further improved by having data from different markets and take prices into account. However, according to Ekornes they are introducing many new models in near future. When new models are introduced the demand for those models will be difficult to predict in the beginning, since no historical data exist. Even though, we can assume that new models will not affect the total demand, since this did not happen when City Starbase and Signature was introduced in 2014 and 2015.

According to Wallin et al. (2006) the buyer should have physical possession of the inventory if demand is unpredictable, since it will ensure the ability to respond as needed to demand. Due to the distance between Ekornes and Pla-Mek, Ekornes has easy access to the inventory and can easily respond to demand whether the inventory is located at Ekornes or at Pla-Mek's facilities. The lead-time is almost the same, whether the inventory is located at Pla-Mek or at Ekornes. Hence, from the buyer's perspective it should not affect the decision of implementing RIC whether demand is stable or unstable.

From what the respondents mention it is obvious that Ekornes has not been using a good system for forecasting, or at least, not has implemented it to the purchases from Pla-Mek. Unpredicted demand, in addition to an unmanageable warehousing situation, has led them purchasing unnecessarily large volumes from Pla-Mek. This has caused situations where Pla-Mek has had to change its priorities in production in order to meet the needs of their customer. Pla-Mek want to have insight into their future sales, so they can plan a long time in advance and produce optimally. The more predictable demand is, the easier it will be for Pla-Mek to plan production so that downtime is reduced and costs are saved.

From the interviews it seems that Pla-Mek has more control over what Ekornes needs than Ekornes itself, and that this control can be even greater by moving the inventory to Pla-Mek's facilities. The reason is that the respondents points out that Pla-Mek will keep better track of the inventory levels than Ekornes. If Ekornes make use of good forecasting models and share the data with Pla-Mek, demand will become more predictable. The result will be fewer changeovers in Pla-Mek's production. This indicates that moving the inventory will make Pla-Mek's demand a bit more predictable than what the situation is today, given that they have long- and short-term information about expected sales.

Even if sudden changes to demand should happen Ekornes is likely to receive its supply of plastic components from Pla-Mek. In fact that Ekornes stands for most of Pla-Mek's turnover seem to trigger Pla-Mek's capability to adapt to sudden changes in demand. This is why Ekornes' decision to implement RIC is not impacted by the predictability in demand. RIC's benefit of reduced inventory levels for Ekornes can also be achieved by using their ERP-system to keep track of inventory levels and by tidying up the warehouse.

5.1.1 Summary of demand pattern

One decision factor is the possibility to forecast demand for the components Ekornes is going to purchase from Pla-Mek. If demand is unpredictable, Pla-Mek will risk having to adjust to sudden changes and not gain a cost advantage from reduced downtime in their production line. RIC will increase the demand predictability for Pla-Mek, which support an implementation of RIC. From Ekornes perspective the predictability of demand do not affect the decision of choosing RIC since Pla-Mek is located close to their facilities.

Table 11. Decision factors concerning demand pattern.

Alleged factor	Decision factor	Decision factor for whom?		Do the assessment of the factor favour RIC?
		Buyer	No	
Demand pattern	Predictability of demand	Supplier	Yes	Yes
				Not a relevant factor

5.2 Goals congruency

From the theory we know that goal congruency can have different impact depending on the nature of the relationship, and that it has greatest impact if the companies expect opportunistic behavior *ex post* (Jap 2001). Ekornes wants to reduce the level of safety stock and increase the inventory turnover. In addition, they want Pla-Mek to set the level of safety stock based on their assessment. However, Pla-Mek will gain a higher level of minimum sales if they increase the minimum inventory level, since Ekornes will own the inventory. This can cause a problem since we in general can question the goal congruency between a buyer and a supplier. The buyer wants to purchase at the lowest possible price and the supplier wants to gain high revenue.

Even though opportunistic behavior is a possibility, it looks as if there is a great deal of goal congruency between Pla-Mek and Ekornes. From the interviews it seems that the main reason why Ekornes want to implement RIC is to reduce costs. This corresponds to Pla-Mek's goal with implementing RIC; to be able to plan production more optimally so that costs are reduced. In addition, if Ekornes facilitates for Pla-Mek to become more cost efficient, Ekornes can save costs by achieving lower prices on the components. Though, Ekornes still want Pla-Mek to earn enough to be competitive. Moreover, if RIC helps Ekornes to become more cost efficient, the company can increase their sales, which in turn

will increase Pla-Mek's sales to Ekornes. This shows that there is goal congruency between the parties. According to theory, goal congruency is a decision factor for implementing RIC (Chopra & Meindl 2016). A respondent who says that RIC should not be implemented without goal congruency also supports this. When goals are aligned Pla-Mek is more likely to work towards the common goals instead of seeking its own interest (Jap 2001). Hence, goal congruency can mitigate opportunistic behavior, which is good for the implementation of RIC.

Consistent with their goals Pla-Mek will benefit from control over the inventory, which will make the company able to better utilize capacity. Ekornes will save cost of inventory handling, free up space and gain more order in their warehouse, and will not need to purchase more than needed. This matches Ekornes' goals from the interviews. From this we can assume that the benefits for the parties are equally good. Though, the drawbacks of RIC are not evenly distributed. An implementation of RIC entails that Ekornes will lose control over the inventory, but according to the interviews the company will be able to measure Pla-Mek's effort better. Hence, this drawback will not impact their decision to implement RIC. Pla-Mek, on the other hand, will be faced with increased costs of handling inventory and will probably need to invest in more warehousing capacity. The supplier will have to assess if these financial drawbacks are less than their financial gains of better utilization of capacity by implementing RIC. I will not be able to conclude if this is the case with Pla-Mek. If Pla-Mek's gains are larger than their costs or losses, it is likely that Pla-Mek will like to implement RIC.

From the discussion above it seems to be that RIC will favour Ekornes a bit more than Pla-Mek. If RIC is in favour of one of the parties it can lead to conflicts, and we know from the theory that conflicts can cause the parties to seek their self interest instead of working towards common goals (Kang & Jindal 2015). Due to this, the parties should make sure that both companies have equal benefits from the implementation, so that future conflicts are avoided. From this we can say that as long as one party do not overrule the other, more benefits to one party is not likely to be a determinant of the implementation of RIC.

5.2.1 Summary of goal congruency

Goal congruency seems to be an important decision driver of RIC. Since Pla-Mek and Ekornes aim to reduce costs for both parties, we can imply that RIC should be implemented. RIC will involve benefits to both the supplier and buyer, but the supplier will be faced with more drawbacks. Even though, as long as the benefits outweigh the drawbacks RIC should be implemented, and it will not matter if one party is better off than the other.

Table 12. Decision factors concerning goals.

Alleged factor	Decision factor	Decision factor for whom?		Do the assessment of the factor favour RIC?
Goals	Goal congruency	Buyer	Yes	Yes
		Supplier	Yes	Yes
	Financial gains are larger than losses	Buyer	Yes	Yes
		Supplier	Yes	Not able to conclude
	Does it favour one party more	Buyer	No	Not a relevant factor
		Supplier	No	Not a relevant factor

5.3 Information asymmetry

When Pla-Mek will be in control of Ekornes' inventory, the company will be dependent on information from Ekornes about their expected sales (Rungtusanatham et al. 2007).

Envision a situation where Pla-Mek has produced right above the minimum level of inventory and Ekornes has not shared information about expected sales. All of a sudden Ekornes takes out a huge amount from the inventory so that the inventory level becomes below the minimum level. Pla-Mek, who did not know about this in advance, would suddenly have to start producing more components. We know from the interviews that an unanticipated shift in production is costly, since it involves hours of downtime on machinery. This imaginary example highlights the disadvantages of hidden information for the supplier if RIC is implemented. At the same time it highlights the importance of forecasting.

Through their long-term relationship, Pla-Mek usually knows how much Ekornes purchase. However, as Ekornes is introducing new models with a different component mix the sales for some components can change. Ekornes can no longer trust that Pla-Mek

knows their demand from historical purchases, but need to share their predictions for the future. Therefore, sharing information from forecasting is likely to play a crucial role for the companies to implement RIC. The safety stock Pla-Mek holds will not necessarily be enough if sales data is not shared, hence Ekornes can risk going out of stock if information is held back. Though, we know from the interviews that Ekornes is willing to provide Pla-Mek with the information necessary to handle the inventory. This means that Pla-Mek, to a large extent, will not be faced with information asymmetry. Symmetric information supports an implementation of RIC for the supplier. Although, information asymmetry will always be present to some degree (Jensen and Meckling 1976).

In the interviews Pla-Mek says that they rather not share information about the capacity on machinery and prioritization of their customers. If Pla-Mek demands an increase in the minimum inventory level, Ekornes will not be able to verify if it is necessary. This is why Ekornes may risk opportunistic behavior from Pla-Mek, if Pla-Mek holds information back. It is likely to give Ekornes increased opportunity costs from capital tied up in inventory. When Pla-Mek is not willing to share all necessary information, Ekornes should be careful of implementing RIC due to the risks of opportunistic behavior from Pla-Mek.

Since Ekornes is very dependent on the components from Pla-Mek, Ekornes has incentives to control Pla-Mek's effort, such as the inventory level at any time. Today, Ekornes does not check if Pla-Mek delivers on time, since Ekornes has too much on stock and will be safe anyway. The large inventory makes the action of Pla-Mek hidden (Douma & Schreuder 2008). According to the interviews, an implementation of RIC will increase the visibility and make it easier for Ekornes to check how well Pla-Mek is doing, since components will be delivered every day. This corresponds to the theory about frequency of transactions, and that it is easier to assess the quality performance of the other party when transactions happen frequently (Wallin et al. 2006). Knowing Pla-Mek's effort will be a benefit for Ekornes, and increased visibility supports an implementation of RIC. Pla-Mek, on the other hand, will not be in need of controlling Ekornes effort since Pla-Mek are the one who will be controlling the inventory.

Actions can be hidden intentionally, and prevent the parties from implementing RIC. If, for instance, Ekornes expect Pla-Mek to share sensitive information they obtain from RIC to Ekornes competitors, Ekornes should reconsider implementing RIC. Sharing such

information can make Ekornes vulnerable, since Pla-Mek can take advantage of the knowledge they obtain. If Pla-Mek expects Ekornes to take advantage of Pla-Mek by implementing RIC, Pla-Mek will resist. Due to the close collaboration and trust between Pla-Mek and Ekornes, none of the parties seems to expect hidden actions in the relationship.

5.3.1 Summary of information asymmetry

It seems to be that it is crucial for the supplier to receive information about the expected demand from the buyer if implementing RIC. Ekornes is willing to share this information and will benefit from doing so, as it will ensure enough on stock. The assessment of the information-sharing factor indicates that the supplier should decide to implement RIC. Ekornes, on the other hand, can risk that Pla-Mek act opportunistic when holding back some information about their capacity. Information asymmetry can make it costly to implement RIC, and this is why the buyer should be careful of implementing RIC when the supplier is not willing to share necessary information.

The buyer is dependent on measuring the effort of the supplier, and the opportunity to do so will increase by implementing RIC. From the buyer's perspective, this suggests that RIC should be implemented. The supplier on the other hand will not take the buyers effort into account when considering RIC. In the case of Ekornes and Pla-Mek hidden action is not anticipated, but in general it seems to be an important factor for both parties when implementing RIC.

Table 13. Decision factors concerning information asymmetry.

Alleged factor	Decision factor	Decision factor for whom?		Do the assessment of the factor favour RIC?
		Buyer	Supplier	
Information asymmetry	Do the other party want to share relevant information	Buyer	Yes	No
		Supplier	Yes	Yes
	Increased visibility of the other party's effort	Buyer	Yes	Yes
		Supplier	No	Not a relevant factor
	Anticipation of hidden action	Buyer	Yes	Yes
		Supplier	Yes	Yes

5.4 Asset specificity

Pla-Mek's commitment to Ekornes is high, since they have invested a lot in both physical and dedicated asset specificity. It can also be discussed if Pla-Mek has invested in site-specific assets, with their location close to Ekornes. The company did not move only because of Ekornes, but Ekornes did have a major impact on the decision. By having Pla-Mek located close to Ekornes, Ekornes saves transportation costs since a worker can pick up goods on his way to Ekornes. Considering this, and the discussion in chapter 5.1, we can say that the closeness in location is a positive driver to implement RIC for the buyer. If Ekornes is in need of items in short notice, the distance will have an impact. In Pla-Mek's decision to implement RIC the location is not likely to have an impact.

Pla-Mek has invested a lot in physical assets specificity, and so has Ekornes. Though, Ekornes' investments only need some modifications to be used in relationship with other suppliers. On the contrary, much of Pla-Mek's investments cannot be redeployed, such as manufacturing equipment and the new production line. Since Pla-Mek has invested so much into the relationship, they are very dependent on Ekornes and need to take this into account when considering implementing RIC. If the buyer initiates RIC, a supplier with a huge amount of specific investment should choose to implement RIC, in order to avoid risking the relationship. If the situation was the other way around, the buyer should implement RIC on the same reasoning.

An implementation of RIC is likely to involve more investments for Pla-Mek, since the company will need extra warehousing capacity and equipment. How costly RIC will be will impact the decision of each party, and the need for further investments is not in favour of Pla-Mek to implement RIC. Ekornes, on the other hand, will not need to invest more specific asset to the relationship due to RIC, unless Pla-Mek specifies the necessity in the RIC contract. If Pla-Mek is able to get Ekornes to invest more in the relationship to Pla-Mek, Ekornes will have fewer incentives to change supplier. Even though, RIC can make Ekornes a bit more dependent on Pla-Mek, since Pla-Mek's effort in inventory management will have an impact on Ekornes service level towards their own customers.

Wallin et al. (2006) emphasize that the uniqueness of an purchased item affect a company's bargaining power, which again affect the choice of inventory management approach. The more unique the products are, the more advantageous it is to own the inventory. Since we know from the empirical data that the components Ekornes purchase from Pla-Mek has involved large investments from Pla-Mek, we can say that the components are very unique products. In addition, Pla-Mek incorporates their knowledge into the components, which makes them even more unique. From this we can argue that Ekornes should own the inventory, and that affects Ekornes' decision to implement RIC in a positive way.

5.4.1 Summary of asset specificity

The close location between the Pla-Mek and Ekornes has a positive impact on Ekornes decision to implement RIC. Moreover, the uniqueness of the components Pla-Mek supplies gives Ekornes incentives to implement RIC. Pla-Mek has invested more assets into the relationship compared to Ekornes, which makes Pla-Mek more dependent on Ekornes than the other way around. The discussion indicates that the dependency should make Pla-Mek decide to implement RIC. On the other hand, RIC requires further investments from Pla-Mek and this has a negative impact on Pla-Mek's decision to implement RIC.

Table 14. Decision factors concerning asset specificity.

Alleged factor	Decision factor	Decision factor for whom?		Do the assessment of the factor favour RIC?
		Buyer	Supplier	
Asset specificity	Location	Buyer	Yes	Yes
		Supplier	No	Not a relevant factor
	Dependency due to specific investments	Buyer	Yes	Not a relevant factor
		Supplier	Yes	Yes
	The need for further investments	Buyer	Yes	Yes
		Supplier	Yes	No
	Uniqueness of products	Buyer	Yes	Yes
		Supplier	No	Not a relevant factor

5.5 Power

When deciding whether RIC is an appropriate inventory management approach, the companies should not only look at what they would like, but also take into account the context they are in. The reason is that the theory says that power can make the companies do something they rather not do (Dahl 1957). For instance, a company might not prefer implementing RIC but due to the power relation to another company they might not have a choice.

The power relation between Ekornes and Pla-Mek can be described by using resource dependency theory. If Ekornes are not able to obtain the components Pla-Mek supplies, their production will stop. Hence, they are very dependent on Pla-Mek. Since many of the components require investments in specific product lines or machinery, there are no other suppliers that can produce the components in short notice. On the other hand, Ekornes owns the molds, so they are able to use other suppliers if they plan for it. Though, it is so costly that Ekornes choose to only have one supplier. From theory we know that when there are few suppliers to choose from and the components are unique the buyer should own the inventory (Wallin et al. 2006). Since Ekornes stands for most of Pla-Mek's turnover, we can say that Pla-Mek do not have many alternatives to their collaborative partner either. The few alternatives to collaborative partner indicate that implementing RIC is a good idea for both companies.

The interviews showed that if something happens to Pla-Mek so that the company cannot supply Ekornes, Ekornes is capable of finding new solutions. In worst case, the company can take over if Pla-Mek goes bankrupt or Ekornes can insource the production of components. Pla-Mek, on the other hand, will be faced with larger consequences if they lose Ekornes as their buyer. Pla-Mek will lose half of their turnover. This shows that dependency is not equal between the parties and that power is imbalanced, and not in favor of Pla-Mek (Katila et al. 2008). A respondent from Ekornes says that the company can make Pla-Mek do what Ekornes demands, likely because of the imbalanced power in the relationship. In worst case, Pla-Mek can face the risk of losing their supplier if they do not agree to what Ekornes want. If the power balance was turned the other way around, Pla-Mek could demand that Ekornes implement what is in Pla-Mek's best interest. Hence,

power will be an important factor from both a supplier and buyer perspective when deciding upon the implementation of RIC.

As we know from both theory (Piplani 2006) and the qualitative data, RIC will make Ekornes more tied to Pla-Mek and Pla-Mek will gain more control. From this we can say that if RIC is implemented, the power balance can become adjusted. Hence, Ekornes is likely to become more dependent on Pla-Mek if RIC is implemented. This will be beneficial to Pla-Mek, since companies usually want to reduce the power others have over them. The impact RIC has on the power balance should be considered in the decision of implementing RIC.

Since we know from the interviews that Pla-Mek is a bit more dependent on Ekornes than the other way around, the theory says that Pla-Mek is likely to be more motivated to reach goals given by Ekornes than Ekornes is to reach goals given by Pla-Mek (Emerson 1962). Pla-Mek’s dependency may lead the company to forgo its immediate self-interest for the benefit of the relationship to Ekornes. Since the least dependent party is the one who suggests the implementation of RIC, it is likely that the more dependent party will have motivation to make RIC succeed. Hence, dependency is an important factor when deciding to implement RIC.

5.5.1 Summary of power

The few alternatives to collaborative partners indicate that RIC is a good idea for both Ekornes and Pla-Mek. The power is imbalanced in the relationship between the two companies, where Ekornes is the most powerful party. The imbalance will make the most powerful party, Ekornes, able to impact Pla-Mek’s decision. However, RIC is likely to even out the power balance that is today, and this will be beneficial to Pla-Mek.

Table 15. Decision factors concerning power

Alleged factor	Decision factor	Decision factor for whom?		Do the assessment of the factor favour RIC?
Power	Alternative to the collaborative partner	Buyer	Yes	Yes
		Supplier	Yes	Yes
	Impact on power balance	Buyer	Yes	No
		Supplier	Yes	Yes

5.6 Trust

From the interviews it is clear that Ekornes trust Pla-Mek to a high degree, but Pla-Mek do not directly say if they do the same or not. However, Pla-Mek seems to agree that there is a good dialogue between the companies. Shown by the interviews, RIC will require that Ekornes trust Pla-Mek because Ekornes will loose some control of their inventory. Further, if Pla-Mek does not follow the minimum-maximum inventory level it can lead to major consequences for Ekornes. Ekornes risks that all of their production stop if they cannot obtain components, which involves loosing a lot of money. Hence, if Ekornes do not trust Pla-Mek it is risky to let them be in control of the inventory, and that is why trust is a major decision factor in the choice of implementing RIC. Since trust is present in the relationship, it positively impacts Ekornes' decision to implement RIC. From the theory, Morgan and Hunt (1994) state that the cost of terminating a relationship has an indirect effect on trust through the direct influence on commitment. Pla-Mek is definitely committed to the relationship with Ekornes, since Ekornes stands for more than 50% of Pla-Mek's turnover. Hence, instead of trust we can say that commitment should be used as a factor in Pla-Mek's decision to implement RIC.

Ekornes rely to a high degree on Pla-Mek to deliver on time. Pla-Mek has shown that the company will do everything in its power to avoid not being able to deliver to Ekornes. Hence, Pla-Mek's performance is good. If the research had shown that Pla-Mek did not deliver on time, Ekornes should consider safeguarding against late deliveries at their own facilities. That is why Pla-Mek's punctuality will play a role when Ekornes is deciding whether to move the inventory of plastic components to Pla-Mek's facilities. In the interviews, Pla-Mek says that their performance is good, even though it does not show in Ekornes' systems. This implies that Ekornes can implement RIC without risking late deliveries. Pla-Mek on the other hand, does not seem to rely completely on Ekornes when it comes to the delivery dates. The dates are often changed after an order is made, which affects Pla-Mek's ability to plan production. The reason why Ekornes postpone the delivery dates is that Ekornes often realize that they did not need the amount that was ordered. This can change if inventory is moved to Pla-Mek, since Ekornes will order for only one day at a time. When implementing RIC, it is more likely that Ekornes will order only the amount that is needed. Besides this, no other indications were found in the

empirical data that indicates that the general performance of Ekornes should impact Pla-Mek's decision to implement RIC.

RIC can tie the companies closer together and strengthen the role of Pla-Mek towards Ekornes (Piplani 2006). Pla-Mek is interested in close collaboration with Ekornes, so that Pla-Mek can be part of the product development process from the start. In this way, the products can be adapted to Pla-Mek's production, which will strengthen Pla-Mek's role. It seems to be that RIC will make Ekornes commit more to Pla-Mek, and this will affect Pla-Mek's decision in a positive way through dependency. Ekornes might also benefit from closer collaboration, since it likely will increase Pla-Mek's commitment and increase the trust between the parties. From this discussion we can argue that since RIC leads to closer collaboration, both Ekornes and Pla-Mek should agree to implement RIC.

5.6.1 Summary of trust

Ekornes trust Pla-Mek, and this makes it safe for Ekornes to move the inventory of molded plastic components to Pla-Mek's facilities. Pla-Mek's commitment to Ekornes indicates that Pla-Mek also trust Ekornes in a way. This entails that Pla-Mek should have a positive attitude towards RIC. While Pla-Mek is likely to deliver on time either way, an implementation of RIC makes Ekornes stick to the agreed delivery dates. This facilitates for an implementation of RIC. Furthermore, RIC will make the companies collaborate more closely, which both parties will benefit from.

Table 16. Decision factors concerning trust.

Alleged factor	Decision factor	Decision factor for whom?		Do the assessment of the factor favour RIC?
Trust	Trust	Buyer	Yes	Yes
	Commitment to the other party	Supplier	Yes	Yes
		Buyer	Yes	Yes
	Punctuality	Supplier	No	Not a relevant factor
		Buyer	Yes	Yes
	Will it lead to closer collaboration	Supplier	Yes	Yes

6.0 Conclusion

The purpose of this thesis has been to find out how a buyer and a supplier should decide whether to implement reverse inventory consignment. Based on the theoretical framework, six general decision factors were discovered. When assessing the empirical data against the theory, it became possible to go in depth on these factors and see if they favoured RIC in the relationship between Ekornes and Pla-Mek. In the discussion of the six general factors, we identified 16 specified elements. Hence, we cannot say that only six factors have an impact on the decision to implement RIC, since many other elements play a role within those six decision factors. The six main factors, in addition to the 16 elements are shown in the figure below.

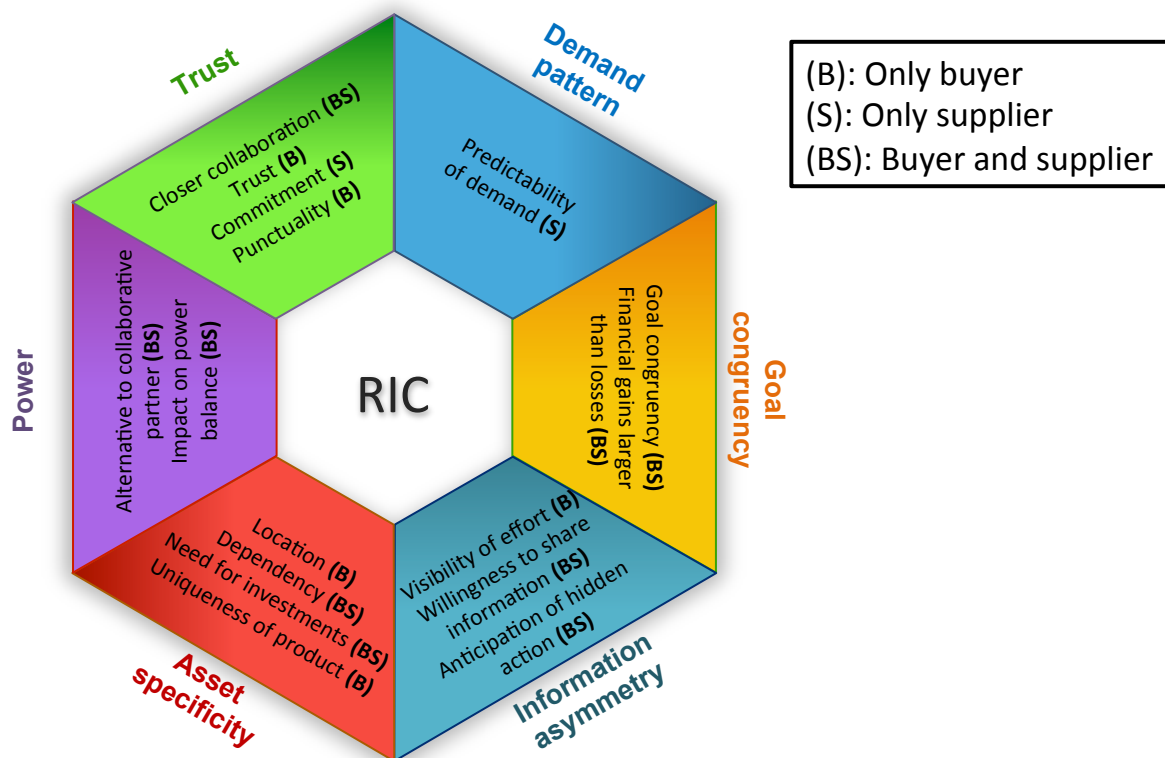


Figure 35. Decision factors to be considered in the choice of implementing RIC.

All of the six main factors, except demand pattern, have an impact on both parties decision to implement RIC. My discussion revealed that the demand pattern would only impact the supplier's decision. Since Pla-Mek is located so close to Ekornes, Ekornes will have the ability to receive deliveries in short notice whether the inventory is located in house or at Pla-Mek's facilities.

The discussion explains that RIC would cause the power balance to be adjusted, which will be beneficial to Pla-Mek but not to Ekornes. Even though, Ekornes' increased dependency to Pla-Mek might not play a huge role, since Ekornes will continue to be the most powerful party. Moreover, trust and commitment is present in the relationship, and this is a prerequisite of Ekornes decision to implement RIC. Since RIC ties the companies closer together, both parties can benefit from implementing RIC. Even though, RIC requires more specific investments for Pla-Mek, which is a drawback. Moreover, Pla-Mek's resistance to share information about capacity and priorities in their production might be a negative factor in Ekornes assessment of the decision to implement RIC. Nevertheless, these drawbacks are less than the positive impact RIC will have on the companies. Since goal congruency is present, an implementation of RIC is likely to contribute to the common goal of increase total supply chain profit.

7.0 Further research

If Ekornes and Pla-Mek decides to implement RIC, it will be useful to investigate what should be the optimal maximum and minimum level of inventory. In addition, further research can reveal whether it will be beneficial for the buyer to produce close to the maximum or minimum level. Since this thesis is a case study, it will be interesting to investigate if this research is applicable to other industries than the furniture- and molded plastic parts industry. Moreover, if these factors can work as determinants for choosing other inventory management approaches.

8.0 References

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Appendix

Appendix 1: Outliers in the ARIMA models

Outliers

			Estimate	SE	t	Sig.
MAGIC	2013 6	Local Trend	-9,882	1,407	-7,021	,000
CLASSIC	2013 48	Additive	-2670,855	667,502	-4,001	,000
	2014 28	Additive	-2521,213	678,545	-3,716	,000

Outliers

				Estimate	SE	t	Sig.
CITY	2014 2	Transient	Magnitude	-426,470	63,969	-6,667	,000
STARBASE			Decay factor	,941	,016	58,421	,000
	2014 44	Transient	Magnitude	345,556	88,039	3,925	,000
			Decay factor	,865	,055	15,622	,000
	2015 32	Additive		-476,838	132,445	-3,600	,001

Outliers

				Estimate	SE	t	Sig.
MAGIC	2015 10	Transient	Magnitude	241,610	60,884	3,968	,000
SIGNATURE			Decay factor	,889	,157	5,648	,000
	2015 28	Additive		193,898	53,574	3,619	,001
	2015 32	Additive		-187,677	53,574	-3,503	,001
	2015 49	Additive		-225,393	43,753	-5,151	,000

Appendix 2: Interview guide

This interview will be used in connection with my master's degree thesis at Molde University College. I will focus on the relationship between Pla-Mek and Ekornes, and investigate the idea of moving the inventory of components to Pla-Mek's facilities. It is up to you to choose if the interview is to be recorded. I ensure that the tape will be deleted as soon as the writing of the thesis is finished. All of the information you come up with will be held confidential and I will keep your identify anonymous.

Warm-up questions

1. What is your background?
2. What is your role in this company?
 - Most important tasks
3. How long have you been working in your current position?

About the inventory

1. What is the reason behind moving the inventory of components to Pla-Mek's facilities?
 - a. What do your company want to achieve?
 - b. What are the pro's and con's?
 - c. What do you believe the other company want to achieve?
 - d. Who do you believe will benefit the most by moving the inventory?
2. What knowledge do you believe it takes to handle the inventory of these components?
 - a. Do you believe Pla-Mek holds this kind of knowledge?
 - b. How will your company ensure that the inventory will be handled in a good way?
3. What costs do you think is associated with handling the inventory?
4. How is the inventory level going to be adjusted?

Relationship

1. What are your thoughts about the cooperation between Ekornes and Pla-Mek?
2. What type of information do your company share with the other party?
 - a. Are there any types of information you rather not share?

3. How do you characterize your company's trust in the other party?
4. Do you know of any incidents where the relationship has been on trial?
5. How do you see your company's position in regard to the other party?
 - Bargaining power.
6. In the market today, what other options are there for your company in the choice of supplier for these components/buyer for components?
7. What kind of competitive advantages are created by you collaboration with the other party?

Demand and uncertainty

8. How is the variation in the market for these components?
 - Price or competition.
9. How do you regard the variation in the level of quantity your company purchase/sell to the other party?
10. What is your company's attitude towards risk related to these components?
11. How easy is it for your company to check if the other party is doing what it tells you?
 - Performance measurement.

Specific investments

12. Have you company made any specific investments related to the relationship with the other party?
 - Site/factory
 - Machinery or transportation devices
 - Knowledge
 - a. What does it take for these assets to be used outside of this relationship?