

The impact of omni-channel retailing on demand planning for new products at IKEA

Henrik Persson & Emma Wilhelmsson



LUND
UNIVERSITY

Faculty of Engineering
Department of Industrial Management and Logistics

Ebba Eriksson – Supervisor, LTH
Andreas Norrman – Examiner, LTH
Mikael Gunnarsson – Company Supervisor, IKEA of Sweden

Preface

This master thesis marks the end of our Master's Degree in Mechanical Engineering at Lund University. The project was carried out in the spring of 2018 in collaboration with IKEA of Sweden.

We would like to express our gratitude to our supervisor at IKEA Mikael Gunnarsson as well as the rest of the PBSS department. Thanks for welcoming us at IKEA and helping us throughout the project.

Thanks to the representatives from companies X & Y that gave us their time and insights to the project. We would also like to deeply thank Johanna Småros for giving us a greater insight into demand planning for retail companies.

Finally, we would like to express our appreciation for our supervisor at Lund University, Ebba Eriksson. Thank you for assisting us with valuable comments and feedback during our Master thesis.

Lund 2018

Henrik Persson & Emma Wilhelmsson

Abstract

Title: The impact of omni-channel retailing on demand planning for new products at IKEA

Authors: Henrik Persson and Emma Wilhelmsson

Supervisors: Ebba Eriksson, Department of Industrial Management and Logistics, Lund University and Mikael Gunnarsson, Process Developer, IKEA of Sweden

Background: Omni-channel retailing has led to customers becoming more demanding and less tolerant than before. For instance, customers are demanding shorter delivery times, and higher precision in deliveries. Unless retailers adapt to an omni-channel approach today, their business is likely to suffer. To do so, more efficient planning of the supply chain is necessary. The first step of the planning processes is demand planning, which in turn has high influence on all the subsequent steps in the supply chain planning process for retailers. Therefore, it is of great importance that the demand planning process works well. Especially the demand planning process for new products, which have greater uncertainties in demand and are important for the long-term success of retailers.

Purpose: To contribute to the general knowledge of how working with omni-channel retailing impacts the demand planning process for new products, as well as investigate how omni-channel retailing affects the demand planning process for new products at IKEA.

Research Questions: 1: What are the challenges for demand planning of new products in omni-channel retailing? 2: How can these challenges be handled at IKEA?

Methodology: For the purpose of this study, an exploratory single case study is used to compare theory with the current situation of IKEA. A study of external companies is also done to cover the gap in theory for demand planning in omni-channel retailing. Interviews was the main method for collecting data, both internally at IKEA and externally at reference companies.

Conclusion: The result of this study is the identification of six challenges within demand planning for new products affected by omni-channel retailing. For example, online commercial activities is one challenge which refers to the uncertainty of its impact on demand. Another one is considering online sales patterns when forecasting for new products. After having identified the challenges, the analysis of IKEA was used to identify ways for IKEA to handle the six challenges. For instance, the commercial activities can be managed by careful planning and identifying which products that are most likely to be affected by the activities. By doing so, planning of safety stocks can be more strategic. Furthermore, IKEA is recommended to investigate what online-volume is needed to make forecasting on fulfilment type beneficial. IKEA also need to consider the trade-off between forecast accuracy, the demand planners work load and the technical feasibility. All the identified challenges together with ways of handling are presented in Table 14.

Keywords: Forecasting, demand planning, demand forecasting for new products, omni-channel, demand, e-commerce, new products, new product introduction

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1 Introduction

The introduction chapter introduces the background, problem description, purpose, research questions as well as scope and delimitation for this thesis.

1.1 Background

The retail sector is facing high competition in today's markets. Companies are working hard to meet the customers' tough demands on service levels at the same time as keeping costs low. Effective supply chain planning can help companies manage these challenges (Williams & Waller, 2011). The first step in supply chain planning consists of demand planning. The output of demand planning therefore affects the quality of the subsequent planning activities. Decisions for retail companies, such as purchasing of products or replenishment of stores, is done prior to knowing the customer demand. To support these decisions, retailers create demand forecasts based on anticipated demand. Demand planning is the process of creating the demand forecasts (Kilger & Wagner, 2008). Demand forecasts can be very uncertain, and the uncertainty magnifies further down the supply chain. To improve the overall quality of supply chain planning, an efficient and effective demand planning process is of significant importance (Chen, et al., 2007).

The shortening of product life cycles, faster technology innovation rate and buyers with more power, means that retail companies are more dependent on new products for competitiveness, prosperity and survival (Hultink, et al., 1998) (Kahn, 2006). Therefore, decisions about resource allocation for new product introductions are very important for companies. A successful product introduction needs to balance supply and demand. Misbalanced supply versus demand leads to either excess inventory or the inability to meet the customers' needs (Erhun, et al., 2007). Excess inventory is typically the result of over-forecasting the new product, which means there are more products in the supply chain than needed to meet the customer demand. Inability to meet the customer needs is typically due to under-forecasting. The result of under-forecasting is stock shortages, which means not enough products in the supply chain to meet the customer demand (Wagner, et al., 2014). In order to avoid these situations when introducing new products, demand planning is essential (Kahn, 2006). There are, however, several uncertainties and risks with new product introduction leading to high failure rates (Hultink, et al., 1998). These uncertainties and high failure rates make demand planning more complex for new products. Creating forecasts for new products requires much more sophisticated techniques. However, the forecasts are still uncertain and have plenty of errors (Kahn, 2006).

Retailing today is currently undergoing a lot of change when online sales are growing in importance. This change is due to both traditional store-based retailers moving into e-commerce as well as a growing sales-rate in existing online retailers. The rise of online retailers has forced the traditional store-based retailers to not only open up an online sales channel, but also to coordinate their sales channels within the supply chain as much as possible to stay competitive and cope with new customer requirements (Hübner, et al., 2016)^a (Hübner, et al., 2015). Although online retailing is not a new concept, the development of store and online retailing convergence to cope with new customer requirements has led to what is defined as omni-channel retailing. Omni-channel retailing is a seamless way of retailing where all retail channel formats are used to present a single and unified shopping experience (Bernon, et al., 2016). Accenture (2015) defines omni-channel as "a synchronised operating model in which all of the company's channels are aligned and present a single face

to the customer, along with one consistent way of doing business.” (Accenture, 2015). The customer expectations in omni-channel retailing are on the same level regarding service, information and counsel, regardless of which channel is being used (Lang & Bressolles, 2013). Retailers with a supply chain organised to support traditional store-based operations tend to struggle in an omni-channel environment regarding fulfilling customer expectations and having satisfactory customer service (Ishfaq, et al., 2016).

Retailers have a tendency of thinking their customers are always going to remain loyal. However, customers are growing less tolerant to what they face in the stores following the emergence of omni-channel shopping. Customers are easily annoyed by sales associates with lacking knowledge of products, long checkout lines, and frequent stock outs (Rigby, 2011). If conventional retailers do not adopt a seamless omni-channel approach to their business, they are likely to be swept away (Rigby, 2011). To cope with the changing customer behaviour in the omni-channel environment, such as shorter delivery times, the need for improved and more efficient planning is significant. Since demand planning is the first step of the planning processes, it is of even further importance that it works well. Especially for new products, which could be the more crucial products for long-term success of retailers and have great uncertainties in demand. There is also a great complexity in how to handle forecasts for multiple channels in omni-channel retailing.

1.2 IKEA of Sweden

IKEA was founded 1943 in Älmhult, Sweden by Ingvar Kamprad and is today the world’s largest furniture retailer. IKEA’s vision is “to create a better everyday life for the many people” and their business idea is “to offer a wide range of well-designed, functional home furnishing products at prices so low that as many people as possible will be able to afford them” (Inter IKEA Systems B.V., u.d.). At the end of August 2017 IKEA had 355 stores situated in 29 countries. IKEA also has 149 000 co-workers and estimated 817 million store visits and 2.1 million visits to ikea.com, in the same period. IKEA’s product range consist of some 9500 products with an annual renewal rate of some 2500 products (INGKA Holding B.V, 2017).

The role of IKEA’s Supply Chain is making the product range available for the customers by buying, producing and distributing it at the lowest total cost, high customer experienced quality and under good social as well as environmental conditions. IKEA of Sweden (IoS) in Älmhult creates the global range and manages the global supply chain. Being successful in satisfying customers regarding order fulfilment is a vital part of the perceived quality of the retailer and can reduce costs as well as becoming a competitive advantage. Due to IKEA’s vast global network and their large product range, it is a company with a lot to gain from having an efficiently run demand planning process. The vast networks mean that their planning processes have high complexity, which makes it an interesting case to study. With a large number of product introductions every year, there is a continuous need for a structured approach to demand planning given the uncertainties new products entail.

Despite having had an online sales channel since 2007, IKEA are relatively inexperienced when it comes to e-commerce. Their online business has evolved at different levels and pace in different markets, and also experienced different shopping behaviours and demand patterns. These factors mean there is a great uncertainty of how an omni-channel environment will affect the company.

1.3 Problem description

The original IKEA business model is based on customers visiting the stores to do their shopping. This model is currently undergoing change. IKEA is working towards an omni-channel environment, where customers are offered more and more sales and distribution channels to meet the increasing demands on flexibility (when and where to meet the customer with the order) and simplicity. There is also higher demand on the precision of the deliveries and that goods are available. Since omni-channel presents such a dramatic change in retailing in terms of complexity, the need for handling the planning processes efficiently is crucial. Demand planning is the initial part of the planning processes, which means the output from it affects the next parts. Therefore, it is of interest to make sure it is adapted to the new environment. The biggest uncertainties in demand planning at IKEA is the planning for new products. IKEA has a goal of reaching a forecast accuracy of 80%, which they are achieving on their running range. The uncertainties of demand for new products causes however the total accuracy to fall short of the goal. With the significance of business success performing better in demand planning for new products becomes increasingly important.

At IKEA, the unit Plan and Balance Sales and Supply (PBSS) are responsible for securing balance between sales and supply to contribute to full customer perceived availability. This means when, where and how the products are needed to reach the sales goals at a lowest cost. The outputs from the process are common and balanced plans for sales and supply. PBSS believe that their demand planning process might be underdeveloped when it comes to the omni-channel aspect. They are unsure of how omni-channel will affect their demand planning process, which is important to get accurate plans. Otherwise, availability cannot be ensured of both new and existing products.

However, there is a gap in the literature regarding the impact of omni-channel on the demand planning process for retailers. This gap is most likely due to omni-channel being a relatively new development, where the literature cannot fully keep up with the rapidly changing nature of retailing. Therefore, it is of interest to investigate how such dramatic change in the retailing landscape will affect the demand planning process, especially for new products. This is also why IKEA is an interesting case to perform this study on. IKEA is also relatively inexperienced when it comes to e-commerce and their high forecast inaccuracy when it comes to new products. These factors could indicate that there is significant uncertainty for IKEA regarding the process of omni-channel development.

1.4 Purpose

The purpose of this thesis is to contribute to the general knowledge of how working with omni-channel retailing impacts the demand planning process for new products, as well as investigate how omni-channel retailing will affect the demand planning process for new products at IKEA.

1.5 Research questions

- RQ1 What are the challenges for demand planning of new products in omni-channel retailing?
- RQ2 How can IKEA handle these challenges?

1.6 Scope and delimitations

The scope of the demand planning process, which is the focus of the study, is displayed in Figure 1. According to Szozda & Swierczek (2013), the demand planning process can be divided into three steps. Those are gathering information about future demand of products, creating a demand forecast and checking if demand plans are executable through comparison to company resources (Szozda & Swierczek, 2013). This thesis will only investigate the steps data gathering and demand forecasting since the final step is managed by other processes at IKEA.

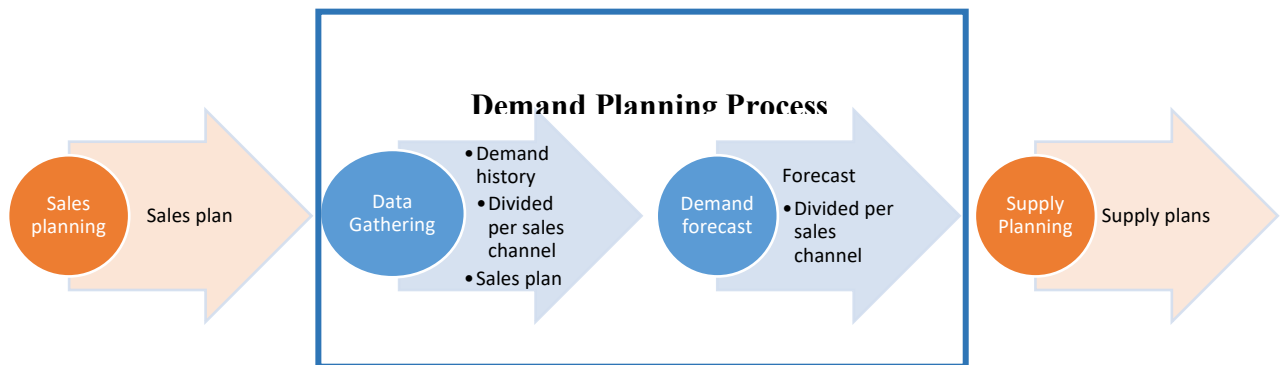


Figure 1. General demand planning process

Product introductions are usually managed in product life cycle management together with outgoing products (Stark, 2005). This thesis will, however, only focus on product introductions. The reason is that IKEA already has an ongoing project for the process of outgoing products. This thesis will also not consider IKEA food products or their free-range products, since these are managed in a different way.

As for omni-channel retailing the thesis will only investigate the forward distribution from supply to end customer. The backflow process will not be considered, since this is investigated by another project at IKEA. Furthermore, the quantitative calculations and statistical analysis part of the demand forecast will not be investigated, since this is operated using advanced computing software.

2 Theoretical framework

The theoretical framework chapter is built on the literature study. It is divided into four parts, as illustrated in Figure 2. The chapter starts with introducing new product introductions. The second part covers demand planning, defining the process and what it entails. The third part is about demand planning specifically for new products and how that differs from demand planning in general. In the fourth part of the chapter, omni-channel retailing is defined and explained. This chapter ends by presenting a theoretical framework for analysis, which covers the main aspects of each previous part. The framework will later be used in subsequent chapters.



Figure 2. Layout of theory chapter

2.1 Demand planning

For retailers to be competitive they need to meet high customer service levels while keeping costs under control. Companies manage this by anticipating and planning for the customers demand. If the company is not successful in planning for customer demand they will either miss sales opportunities or have increased inventory costs due to overstock of unsold products (Moon, et al., 2000).

There are several interpretations of what demand planning entails. According to Christopher (2011), demand planning is understanding and translating the requirements of the market to be able to ensure the availability of a product at the right time and location (Christopher, 2011). Vlckova & Patak (2011) state that demand planning is the act of using demand forecasts as a process of planning and that the demand plan describes how a company can produce/supply the product at the accurate time to an acceptable cost (Vlckova & Patak, 2011). According to Chen (2007), demand planning is the first step of planning in the supply chain and therefore has impact on the rest of the company's business. Demand is however very uncertain, and this uncertainty can be magnified in the supply chain since the results of demand planning are used as the basis for every planning activity. Therefore, it has a determining effect on the effectiveness of for example capacity and safety stock planning. Due to both the uncertainty of demand and the magnitude of impact of the demand plans it is one of the biggest challenges for a retailing company (Chen, et al., 2007). The demand planning process consists of data gathering and creating a demand forecast (Szozda & Werbinska-Wojciechowska, 2013).

2.1.1 Data gathering

Type of data

Without reliable and available information, it is not possible to execute a proper demand planning process (Szozda & Werbinska-Wojciechowska, 2013). Input into the demand forecast is mainly historical demand data. The better the quality of the demand input into the forecast, the better the forecast will be. The choice of the right data is important for improving the forecast. The forecast needs an input of actual sales to customers from each retail outlet, which is called Point of Sale (POS) data. Most retail companies have access to POS data from their IT systems (Vlckova & Patak, 2011). The forecasts should also capture systematic variation in demand accurately. These could be for example seasonality or trends. A good forecasting system should be able to identify systematic patterns without manual intervention. The forecasts should also capture the impact of events known beforehand accurately. These events could be, for instance, price changes, assortment changes or promotions. If those kinds of events are not reflected in the forecast, then the planning process need to capture them before it is relevant addressing the forecast accuracy itself (Ylinen, et al., u.d.).

Quality of data – visibility

Achieving a high degree of visibility of for example demand information will improve the operating performance and internal decision making (Barratt & Oke, 2007). In this context, it could be for example not only knowing the demand number, but also where the transaction takes place and what fulfilment type is used. According to Barratt & Oke, 2007, the factors that define the level of visibility in the supply chain are to what extent the information shared

is accurate, trusted, timely, useful, and in a usable format. Whether those factors are fulfilled is determined by the recipient of the information. Being provided with visible information will enable the recipient to make a more informed decision, thus leading to a potentially improved performance (Barratt & Oke, 2007). This could refer to the visibility of demand and inventory information shared through the supply chain. Having the demand information visible will lead to better accuracy of demand forecasts, well-adjusted production plans, better delivery performance and reduced inventory holding (Somapa, et al., 2018).

2.1.2 Demand forecast

Why forecast demand?

Forecasting the customer demand is an important part of the demand planning. If the forecast is not adequately accurate, consequences could be overstock or understock leading to higher inventory costs (Szozda & Werbinska-Wojciechowska, 2013). Safety stock is used as a buffer for demand uncertainties. Having accurate forecasts can therefore reduce inventory and lead to cost savings (Moon, et al., 1998). Companies should also ask themselves if the forecast accuracy behave in a predictable way. Understanding in what situations and for which products forecasts can be expected to be good or bad is important. Instead of using vast resources to perfect forecasts that are naturally unreliable. When there is an understanding of in which situations forecast accuracy is likely to be low, it is possible to do a risk analysis of the consequences (Ylinen, et al., u.d.). Consequences of forecasting errors are discussed below.

Risks

When making demand forecasts, several different factors could cause the forecast to be less accurate than desired. Causes of inaccuracy in the forecast could be, for example, changes in the customers shopping behaviour and their preferences, and anomalies in customer orders regarding time, quantity and quality (Szozda & Werbinska-Wojciechowska, 2013).

Kerkkänen et al. (2009) describe some potential impacts of inaccuracies or errors in the demand forecast, see Table 1. The errors have an impact on planning, capacity and inventory. Measuring the impact that the errors have is however quite difficult. Therefore Kerkkänen et al. (2009) proposes that the impact of forecasting errors should be seen out of how forecasts are used in the organisation. Who uses the forecasts, where, when and how are they used. The impact of forecast errors on planning is schedule instability, which means more work needed for planning. Alternate plans need to be made for when sales deviates from the forecast. Capacity impacts are lost capacity and uneconomical use of capacity. An example is if a product sells more than anticipated and express shipments is needed for new inventory when there is a stock-out situation. These types of express shipments are generally not so economical. The inventory impacts relate to either having too much stock on-hand or lost sales when there is a stock-out (Kerkkänen, et al., 2009)

Table 1. Impacts of errors in demand forecast (Kerkkänen, et al., 2009)

Planning impacts	Capacity impacts	Inventory impacts
Schedule instability	Lost capacity	Excess inventory
	Uneconomical use of capacity	Inventory holding cost
		Obsolescence
		Reduced margin
		Lost "sales" cost

Aggregation level

The most unpredictable information in supply chain planning is known to be the customer demand. This demand uncertainty is then propagated and magnified further down the supply chain, which is known as the bullwhip effect. The planning quality is decreasing the further down the supply chain level. Therefore, to avoid the bullwhip effect, demand is aggregated to reduce demand uncertainty (Chen, et al., 2007). Aggregated data becomes more exact due to less effect of deviations (Holmström, 1998).

According to Holmström (1998), the conventional way of forecasting product demand is to define a demand forecasting unit and to determine average, trend and seasonality from historical demand data. The demand forecasting unit is composed of the demand unit and the demand group. The demand unit is the level of aggregation for example product family or SKU. The demand group is instead the level of aggregation of the market for example a region, country or specific stores. Finding the right aggregation level both for product and customer is difficult as well as important. More detailed demand is less accurate due to the larger effect of deviations. This inaccuracy is why forecasts are usually done at an aggregate level (Holmström, 1998).

Time periods

The decision on what demand period to plan on is important. A competitive market needs a frequently updated forecast, but this does not mean that the demand period should be shortened. A shortened demand period could lead to the forecasting of an individual customer transaction. When that is the case the forecast more or less determines if a certain customer will buy the product in question a week earlier or later (Holmström, 1998). The time-period of a forecast, also referred to as the forecasting horizon, also has an impact on the quality of the forecast. The reason for this is that a longer forecasted time-period is a less reliable estimate than a shorter one. For instance, using demand data from today to forecast the customer needs of tomorrow is more reliable than using it to forecast the customer demand of next week (Chen & Wolfe, 2011). The forecast accuracy is also affected by the forecasting horizon. A longer forecasting horizon means that changes which are not yet known will have an impact on forecast accuracy. Therefore, short-term forecasts are more accurate than long term ones (Ylinen, et al., u.d.). Retailer order-forecasts are required in multiple time "buckets", which can also be referred to as levels of time. For instance, in order to generate monthly forecasts, the historical order data is aggregated into monthly buckets (Jin, et al., 2015). This gives a shorter and more reliable forecasted time period.

For fast moving products, it is possible to identify a systematic sales pattern for short time periods. Compared to a slow-moving product, the demand is much less influenced by random variation due to the high sales volume. When the sales volumes are high, forecasts are more accurate. For low sales volumes, small random variations will lead to large forecast errors. The same effect can be seen when aggregating over SKU's or over time (Ylinen, et al., u.d.).

2.1.3 Success factors for demand forecasting

Moon et al. (1998) have identified some key aspects in order for retailers to perform better at forecasting. The main aspects are stated in this section.

The role for achieving business success

An important aspect in demand forecasting is to understand what the forecasts mean for reaching the desired business results. Having good demand forecasts is a good way of reducing uncertainty. The benefits of good forecasting regarding retail distribution and store replenishment includes reduced safety stocks, improved product availability and minimised waste (Moon, et al., 1998). Since the need for clearance sales are reduced, good forecasts also include improved margins. However, unless the other parts of the planning process are equally good, near-perfect forecast is not enough to achieve excellent business results. Elements such as safety stock, lead times, batch sizes or planning cycles also have an impact on business result. If these parameters do not receive enough attention a limit will be reached. Additional improvements in forecast accuracy will only have marginal benefits for the business results (Ylinen, et al., u.d.).

Cross-functionality

The demand planning process benefits from cross-functionality. Involvement of other disciplines such as marketing and sales people will be valuable for the process. The more different disciplines are synchronised with the demand planners, the more other functions can be positively influenced. For example, if a demand planner is informed about a sales activity in a store, he/she can consider the activity in the forecast. The forecast will then be more correct, and the company avoids the risks of a demand mismatch (Vlckova & Patak, 2011).

Communication across different functional areas is however often difficult due to employees being unable or unwilling to do so (Moon, et al., 1998). Moon et al. (1998) distinguishes three different levels of cross-functional forecasting. The lowest level is communication, where different functions merely communicate using for example one-way reports to inform each other about their respective results. The middle level is coordination, where different functions meet to discuss the forecast. However, a common scenario in coordination is that the function owning the forecast will try to influence other functions to accept the forecast it has created. The highest level is when different functions collaborate, meaning that each function receives equal significance. Collaboration is most likely to occur if the forecasting process is an independent function and not part of for example the marketing department. The goal of the collaborative effort is to create a consensus forecast, taking the constraints of different functions into account (Moon, et al., 1998).

Type of forecasting technique

Many companies rely heavily on the opinions of experienced employees to create forecasts. By doing so, quantitative tools such as regression and time-series analysis tend to be ignored. An effective sales forecast requires both quantitative and qualitative tools used appropriately for a company's unique business environment. If the forecast process is solely built on numerical analysis of demand history and relating factors, qualitative information could be lacking. Examples of that qualitative information are market updates and other reasons for a change in demand (Moon, et al., 1998).

Measurement

“What gets measured gets rewarded, and what gets rewarded gets done” (Mentzer & Bienstock, 1998). Without tracking or measuring forecasting performance it is difficult to identify if it is contributing to business success. Surprisingly few companies have a systematic way of measuring forecasting performance. Even if measures are implemented, they have a tendency of not being used when trying to identify areas of improvement or assessing performance. Measures in companies may also be based on a general estimation, without a clear indication of how it was calculated or what level of aggregation was used. Even if they are properly calculated, ideas may lack on how they can be used in an improving manner. Furthermore, few persons contributing to forecast development in companies actually spend time reviewing how the performance has evolved. This makes it troublesome to identify sources of forecasting errors (Moon, et al., 1998).

Since different disciplines within a company have different interests, effective measures evaluate accuracy at different aggregation levels. To track the accuracy at each point at which forecasts may be adjusted is of importance as well. Forecasting accuracy should furthermore be assessed based on its impact on business performance. A good forecast alone is not enough to achieve business success. Other parts of the planning process need to be adequately good (Ylinen, et al., u.d.). Improving forecast accuracy typically requires both human and financial resources, which means it should be approached from a return-on-investment point of view. Ultimately, measuring and tracking the forecasting accuracy will aid in building confidence in the forecasting process (Moon, et al., 1998).

Level of system knowledge

It is not enough to acknowledge the importance of forecasting for business success. The idea needs to be reinforced by policies and practises. Forecasters tend to be told that their job is important but experience a lack of follow up and reward on how accurate the forecast is. Determining how familiar users and developers are with the forecasting process is one way of identifying how important forecasting is to a company. If the people working with the forecasting process are not very familiar with it, they might not see the impact their inaccuracies could have. They are then less likely to do what it takes to perform good forecasts. Performing the task will become more appreciated once they understand where and how the forecasts are used, as well as the consequences of unsatisfactory work (Moon, et al., 1998).

2.2 New product introduction

2.2.1 Classification of new products

There are different ways of classifying new products, according to Guiltinan (1999), most new products fall into four categories; (i) new-to-the world products, (ii) products that are new to the company but have an existing market, (iii) extensions to existing product lines, (iv) improved products which re-enter established markets (Guiltinan, 1999).

Kahn (2006) however group new products in seven categories. Kahn (2006, p. 7) state: “by definition, there are seven different types of new products, including cost reductions, product improvements, line extensions, new markets, new uses, new category entries, and new-to-the-world products.” A product within the product improvements category is a replacer of an old product, whereas a line extension is a product that has the standard features of a current product but with some new feature as well, perhaps a new colour. A new category entry is a product which is already on the market but is new for the company.

The different types of new products all have different effects on customer demand. Cost reductions and product improvements allow for the easiest demand estimates since the company already has sales history. For line extensions the company has data on the popularity of the line but adding a new product may cause cannibalisation of sales on running products. For new uses and new markets, the company has some sales data on the products. However, there is some uncertainty of how the new markets will embrace the product in its new usage. The products for which demand estimates are very difficult are the new category entries and new to the world products. Here the company has no sales data and therefore need to search externally or make assumptions (Kahn, 2006).

2.2.2 Processes for developing new products

According to Cooper (1988), new product success rate is dependent on a systematic new product process which takes the new product project from idea to product launch. This process should include step by step activities needed for a successful new product project. The process created by Cooper consists of six stages presented in Figure 3.



Figure 3. Six stages of the new product process (Cooper, 1988)

1. Assessment – An assessment of the market and technology situation is made.
2. Definition – Before product development begins product requirements and design is defined. In this step market analysis for product design, competition and testing of the product concepts produced is done.
3. Development – Product development is executed, and product concepts are generated.
4. Testing – A prototype is tested for quality and user input.
5. Trial – A test production run is made to check if production is economically and physically possible.
6. Commercialisation – Planning for production and product launch (Cooper, 1988). This step requires the most resources for the company such as time, money and

management attention (Hultink, et al., 1998). The strategies for this step are presented in the next section.

2.2.3 Launch characteristics

Hultink et al. (1998) classify launch strategies for new products as strategic launch decisions and tactical launch decisions. The strategic launch decisions are made before product development and set the strategic base of the project. Tactical launch decisions take place in the commercialisation stage of the new product development (NPD) process and control how the launch should happen, for example in what channel and market. Strategic launch decisions consider product strategy, market strategy and firm strategy. Questions that are part of the strategic launch decisions are what, when, where and why. These questions are central before a product development project and can be called the protocol for new products or the product innovation charter. Product strategy decisions are degree of innovativeness as well as time to market. Market strategy is decisions about the target market, market growth and product life cycle. Firm strategy is frequency of product launches and if the NPD project should be market or technology driven as well as aims of the new product launch and innovation strategy. Common for the strategic launch decisions are that they are both hard and costly to change in the later stages of the project.

Product, price, promotion and distribution are included in the tactical launch decisions. These are also commonly referred to as the marketing mix (Hultink, et al., 1998). The tactical launch decisions all affect demand outcomes for a product. For example, promotion affects how aware the customers are of a product at launch. The tactical launch decisions have the function of leveraging opportunities on the market, for example setting a high price when there are no competitors. They can also differentiate the product when there are competitors on the market, for example more focus on promotion, lower price than competitors or better distribution and service (Guiltinan, 1999).

2.2.4 Alignment of new product development and supply chain management

According to Hilletoft & Eriksson (2011), the success of NPD lies in a holistic view from strategy formulation to commercialisation. The NPD process is managing the flow of new products as well as ramp-up of supply, manufacturing, distribution and other sales activities that all make up the support of commercialising a product. These support functions need to be involved earlier and to a greater extent to shorten time to market and decrease the costs of NPD. Another way NPD should be connected to supply chain management is to provide customised supply chain solutions for the end-customer's needs and requirements. A company does not only offer a physical product but an entire value package including services such as home delivery and assembly. Therefore, when a company investigates the market need for a product they should also investigate what type of service the customers want for the product. Different customer segments may have different service requirements and therefore a company might need to be able to provide multiple supply chain solutions. To achieve this information exchange between new product development and supply chain management must be effective (Hilletoft & Eriksson, 2011).

Van Hoek and Chapman (2006) also believe that the alignment of new product development with supply chain is important, especially when companies are pressured to diversify the product offer. Areas in which the alignment is important are shipping product to market to meet launch date, having sufficient inventory for launch and enough parts and components for production. Figure 4 explains how the alignment can look.

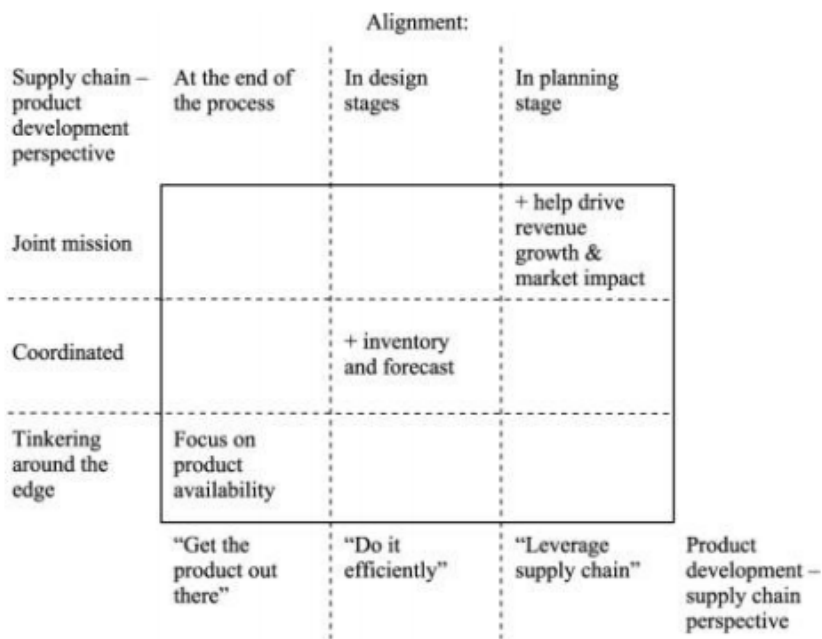


Figure 4. Alignment of NPD and SCM (van Hoek & Chapman, 2006)

In most cases new product development and supply chain are only aligned at the end of the NPD process. The perspective from product development on supply chain is to ensure the availability of the product at launch. The importance then is only to make the product available at the right time and at the right quantity. Due to the un-availability of historical data for forecasts the supply chain planning for a new product is difficult. There is no data on how great demand of the product will be or how long it will be bought, i.e. its length of life cycle. When focus is only on securing availability of products for launch date, inventory risks are ignored. If demand turns out to be lower or the product life cycle is shorter this can lead to stockpiling of inventory which decreases product profitability. Instead of only having alignment at the end of the new product development process companies are beginning to try for complete alignment. Complete alignment means that focus is no longer solely on availability but also inventory and forecasting. Greater coordination between NPD and SCM leads to better efficiency. Companies can map out the new product development process and the supply chain for new products to compare and see where the processes can be coordinated. The ultimate goal is to have new products as a joint mission for new product development and supply chain, top right corner in Figure 4. Working on a joint mission will leverage the supply chain and lead to greater revenues and market impact (van Hoek & Chapman, 2006). Kahn & Mentzer (1996) also state that during new product launch logistics need a high level of collaboration with NPD, to meet customer demand efficiently. Logistics managers should encourage teamwork, creating common goals and sharing of ideas as well as resources (Kahn & Mentzer, 1996).

2.2.5 Risks associated with new products

Erhun et al. (2007) identify two main categories of risks for new products: demand and supply risk. Demand risks results from uncertainties of how the market will perceive the product. Supply risks are the challenges for the company in getting the product through

production and to the market. These risks exist possibly due to the company being inexperienced with the technology of the new product. The risks are presented in Table 2 below. The factors that affect demand risks are connected to the product and its market. The macroeconomics and business environment affect people's shopping behaviours, for example their buying power. The product's features such as quality, design, performance as well as price compared to competing products are all factors affecting the consumer's willingness to buy. If the product is launched with bad timing, for example if a competitor comes first to market and steals all market shares this will also have effect on customer demand. The supply risks include the company's ability to work together with their supply chain partners. The company must make sure that their partners are able to handle for example production of the new product. The product might cause a need for the producing party (either in-house or a supply chain partner) to adapt parts of the production. Technical problems in production may delay the product launch which therefore causes a lack of supply. The company also needs to make sure that internal processes are developed for go to market activities. This includes developing a product suitable for manufacturing and having necessary distribution capacity (Erhun, et al., 2007).

Table 2. Risk factors for new products adapted from (Erhun, et al., 2007)

Risks	Factors	Definition/Example
Demand	Environmental	Demand due to macroeconomic and business forces (Overall business climate)
	Competition	Overall threat from competitive products
	Product/Platform Pricing	Pricing compared to alternative products
	Timing	Timing relative to alternative products
	Marketing Indicators	Positioning and measures of market response
	Product Capability	Performance, quality, longevity, reliability, compatibility and complementarity with other products compared to competition
Supply	External Alignment & Execution	Acceptance and drive from supply chain partners
	Internal Execution	Ability to supply the product in volume

Both risks have effect on the success rate of the product. If the demand is greater than the supply then an out-of-stock situation will appear, leading to lost sales as well as potentially dissatisfied customers. Low product availability will also increase lead times, and the company might have to pay expensive freight costs to handle the stock shortages and get the products to the customers on time. There is also a greater risk that mistakes are made when the products are sent in a rush to cover for the delay. If the supply is greater than the demand, then the company has excessive inventory which corresponds to unnecessary carrying costs and risk for cash flow problems. The profit margins may also be affected when price reductions are made with the aim to unload excessive stock. Long-term effects could mean personnel reductions which could damage moral and cause productivity issues These risks are

handled by balancing demand and supply through supply chain planning. The first planning step is demand planning (Wagner, et al., 2014).

2.3 Demand planning for new products

Decisions about resource allocation for new product introduction are some of the most important decisions for a company. Since new products are what keeps a prosperous business alive. In order to make these decisions, forecasts are essential. Creating forecasts for new products requires much more sophisticated techniques than for existing products. The forecasts also tend to be uncertain and have plenty of errors (Kahn, 2006).

According to Kahn (2006), it is also important to clearly distinguish new product planning from new product forecasting. The planning process is where the company's management's goals and expectations as well as the sales volume of the new products is stated. It also covers what the management wants to achieve with the new product launch in more qualitative terms. The forecasting process on the other hand gives an estimate of what the sales could be and serves as a test for how realistic the plans are. There is often a tendency of companies to inflate the forecast due to too high expectations for the new product (Kahn, 2006).

2.3.1 The forecasting process for new products

Forecasting for new products requires different inputs than for existing products and therefore can benefit from having its own separate process. This might also help in making new product forecasting a company-wide effort (Kahn, 2006). The process is tightly linked to the steps of new product development and varies as the steps progress and the product is taking shape (Mas-Machuca, et al., 2014).

The objective of forecasting at the start of the new product development process is to assess the market opportunity. These forecasts are estimates on which to base the decision of whether to go ahead with product development or not. To produce these forecasts, assumptions need to be made to scope and derive market opportunity. During step two and three of Cooper's NPD process ideas for new products and product concepts are generated. When ideas for new products are created focus is on estimating sales potential for these. Assumptions from the previous step should be revised and updated along with the sales potential. As the concepts are being evaluated in step 4 of the NPD process, tests are conducted to validate and verify assumptions for the forecasts. New assumptions are added if required. The forecasts that are produced at the end of this step are the basis of the decision making to move into trial production. The trial production step requires a lot of resources from the company and therefore the forecasts are critical. The forecasts in the later parts of product development are more on a unit level to plan for production capacity. Forecasts are also made with a financial perspective to determine preliminary marketing budget and sales ratios. In the commercialisation step the unit sales volume is in focus to plan for logistic operations such as procurement, production and transportation. An evaluation of the interaction between marketing activities and customer demand must be made since the marketing activities must be included in the demand forecasts (Kahn, 2006).

2.3.2 Forecasting techniques for new products

According to Kahn (2006), there are four major forecasting techniques for new products: judgmental techniques, customer and market research techniques, time series techniques and

regression modelling. Judgmental techniques and customer/market research techniques are qualitative methods while time series techniques and regression modelling are quantitative.

Judgmental techniques

Judgmental methods create forecasts of future sales out of the opinions of educated experts. The goal is to utilise the experience and intuition of these experts. Even though this technique seems simple it can be hard to reach an agreement within the organisation due to differences in judgment. The most popular judgment techniques are Delphi method, jury of executive opinion, sales force composite, assumption-based modelling, decision trees, Markov process models and scenario analysis (Kahn, 2006). Judgmental forecasting techniques run a risk of being biased due to the dependencies on user experience. Therefore, it is good to combine judgmental forecasting with some other quantitative forecasting method (Mas-Machuca, et al., 2014).

Customer/Market research techniques

This technique uses external data as well as judgment to create the forecasts. Focus is on data from current or potential future customers. The collected data can help to make well-based assumptions for the forecasts. During the new product development process, the customer tests: concept testing, product use testing and market testing, may be done with the products. These tests are used to collect, analyse and interpret data which can be used both for product development and forecasting. Other customer/market research techniques are: conjoint analysis and quality function deployment (Kahn, 2006).

Time series techniques

For products where some type of sales data is available quantitative analyses can be made. Cost reductions and product improvements are types of products where sales data is available. For other types of new products sales data can be gathered by looking at a similar product. This method is often used by companies for line extension products (Mas-Machuca, et al., 2014).

Regression analysis

Another type of quantitative analysis is the regression analysis. Regression analysis looks at the relationship between multiple variables. This technique is used to look at how sales vary depending on other variables such as marketing promotions, price and seasonality (Kahn, 2006).

Lynn et al. (1999) conducted a survey which concluded that forecasting technique a company uses for new products depends on industry and business context. High-technology businesses were more likely to use a qualitative method relying on internal data such as internal expert judgement and internal brainstorming. Whilst low-technology businesses preferred to use more quantitative methods based on data from customers and sales people such as customer/market research techniques. The survey also showed that for both low-tech and

high-tech businesses the successful products were linked to the usage of multiple forecasting techniques (Lynn, et al., 1999).

2.3.3 Demand forecasting for new products compared to existing products

Despite high-tech computer software, big-data and advanced statistical analysis forecasting for new products is still difficult and error-prone (Kahn, 2014). Kahn (2002) state that the average accuracy of new product forecasts one year after launch are 52%. Despite the problems with forecasting it is still needed for companies, especially in the commercialisation stage. The product forecasts are needed for all parts of the logistics planning and operations (Kahn, 2002). Kahn (2014) describe the issues with new product forecasting and compares it to forecasting for existing products. The parameters compared between forecasting for new and existing products are: data, analytics, forecast, plan and measurement. The results can be seen in Table 3.

Table 3. Comparison of forecasting for new versus existing products adapted from (Kahn, 2014)

	Forecasting Existing Products	New Product Forecasting
Data	History	Assumptions
Analytics	Statistical	Judgmental
Forecast	Point	Range
Plan	Certainties	Contingencies
Measurement	Accuracy	Meaningfulness

Data

New products do not have the demand history existing products do (Assmus, 1984). There is no data on pricing, promotions or seasonality. Instead data from similar products are often used but this is only an assumption that customer demand will be similar for the products (Mahajan & Wind, 1988). To be able to make any forecast for the new product assumptions need to be made. An example of an assumption may be that the sales for the new product will be five percent higher than another existing product. Assumptions can also be market related such as the assumption that a new product will achieve a ten percent market share (Kahn, 2006).

Analytics

Analysing the data for existing products is done through quantitative statistical analysis by creating a forecast in advanced software. Forecasting for new products is mostly done through qualitative analysis (Mas-Machuca, et al., 2014). The forecasting technique Jury of Executive Opinion is a top-down technique created by opinions and predictions from executives and experts. Another technique is the Sales Force Composite which is instead bottom-up based on forecasts from usually salespeople that are aggregated. There are also other techniques such as assumption-based models and diffusion models (Kahn, 2014).

Forecast

Forecasts for existing products can focus on a specific demand value which can be followed later in the planning. For new product the forecast instead provides a range which also depicts the uncertainty of the forecast. The range communicates the worst-case and best-case outcomes (Kahn, 2014).

Plan

For all products the demand forecast serves as a plan for operational decisions. The safety stock plan for existing products is based on previous forecast errors and is done to guarantee certainty and product availability for customers. Plans for new products are more focused on risk management due to the large uncertainties in the forecast. The company must have contingency plans for new products for example what should the company do if the demand is lower than expected (Finney & Joseph, 2011).

Measurement

The measurement of demand forecasting for existing products is usually accuracy, meaning the actual demand compared to the forecasted demand. Forecast accuracy can be measured easily through the company's demand forecasting software. It is more difficult to achieve a good forecast accuracy for new products than mature products with a stable demand (Ylinen, et al., u.d.). As mentioned before forecast accuracy as a measurement for new products is very low, at around 52%. Instead of measuring forecast accuracy for new products companies should measure meaningfulness. Meaningfulness means being aware of what assumptions the forecast is based on and what plans the different forecast scenarios need (Kahn, 2014).

2.4 Omni-channel retailing

2.4.1 Sophistication – moving from multi-channel to omni-channel

The ongoing digitalisation and the introduction of an online channel has brought dramatic change to retailing. The changes involve new customer requirements on several different aspects (Accenture, 2015). To accommodate these changes, what is referred to as multi-channel strategies have become increasingly popular among retailers (Verhoef, et al., 2015). Multi-channel strategies meant that store-based retailers had to decide about opening an additional sales channel online and online retailers to decide upon opening offline stores (Avery, et al., 2012). However, managing customers across channels is an issue that has broadened the scope of multi-channel retailing (Neslin, et al., 2006). In recent years, the retailing landscape has experienced further change, with retailers facing the integration of new channels such as smartphones and social media in both the online and offline retailing (Verhoef, et al., 2015). Due to these developments, retailing is moving from multi-channel to omni-channel retailing (Rigby, 2011). Some of the main distinctions of omni-channel retailing compared to multi-channel are described in the following paragraphs.

A channel in omni-channel retailing is a mean through which the retailer and the customer interact, or a customer touchpoint (Verhoef, et al., 2015). Because of new technologies, omni-channel involves more channels than multi-channel. Additionally, the natural borders between channels start to disappear in omni-channel retailing, leading to changes in competitive strategies. For instance, it may be difficult with channel specific goals and

objectives when the borders between channels are blurred. Old barriers such as consumer ignorance and geography will also be broken down by the new channels, further highlighting the importance for companies to rethink their competitive strategies (Verhoef, et al., 2015).

In omni-channel retailing, customers are seamlessly and interchangeably using different channels during the search and purchase process. To control this usage is virtually impossible for retailers. For example, a customer can see a product he or she likes in a store when shopping while simultaneously looking for better offers for similar products online on their phone. In order to provide a seamless experience, companies need to consider that using different channels and devices simultaneously, constantly and interchangeably is included in the omni-channel experience for the customers (Verhoef, et al., 2015). In conclusion, the main differences between multi-channel and omni-channel retailing are summarised in Table 4.

Table 4. Differences between multi-and omni-channel retailing. Adapted from (Verhoef, et al., 2015)

	Multi-channel Management	Omni-channel Management
Channel focus	interactive channels only	interactive and mass-communication channels
Channel scope	store, online website, and direct marketing (catalogue)	store, online website, direct marketing, mobile channels, social media, TV, radio etc.
Separation of channels	separate channels with no overlap	integrated channels providing seamless retail experiences
Objectives	channel objectives (i.e. sales per channel, experience per channel)	cross-channel objectives (i.e. overall retail customer experience, total sales over channels)

2.4.2 Customer requirements

Today's customers are more complex than before in several areas. For instance, they are more knowledgeable, demanding, collaborative, diverse, interactive and on the move. There is also access to information of price and assortment, as well as reviews from other customers making the customers well informed. Customers are increasingly interested in value and prioritise convenience which results in demand for precision and shorter delivery times. There is also larger variety for the customers to choose from which means they are more empowered. Customers are also often on the move and want the ability to access consumption and services anytime and anywhere. Customers expect personalised interactions, targeted promotions and marketing, flexibility and convenience (Accenture, 2015).

Deloitte (2015) performed a survey with Swedish customers in where they concluded that 50% of the respondents are shopping online for convenience reasons. Their observations of the Swedish market also concluded that customers want deliveries whenever and wherever they want, multiple delivery options and clear return management. Customers put high pressure on the companies' supply chains to be agile enough to manage customers' ever-changing preferences and demand for better service levels and availability as well as faster delivery (Deloitte, 2015).

In today's omni-channel environment, customers want what's best from both retailing worlds. They want the benefits of online retailing; a large assortment to select from, customer reviews and tips, and extensive product information. From the other perspective customers also want the benefits of physical stores; personal service, having shopping as an event and experience, and the ability to touch products. An important part of survival for traditional store-based retailers is using the stores to their advantage. A challenge for them is that many people consider store-shopping a chore, i.e. an experience they would rather avoid. If the shopping experience in stores instead could be exciting, entertaining and emotionally engaging, then significant success could be achieved for those retailers (Rigby, 2011).

2.4.3 The omni-channel distribution structure

The high-performance expectations from online customers regarding last-mile deliveries is something omni-channel retailers typically have struggled with (Ishfaq, et al., 2016). Omni-channel retailing requires companies to coordinate order management, fulfilment and logistics processes to align the physical (store-based) and virtual (online and mobile) channels. Realigning the retailer's supply chain processes requires careful planning and execution given its high complexity in the current environment (Ishfaq, et al., 2016). However, being successful in satisfying customers regarding order fulfilment is a vital part of the perceived quality of the retailer and can reduce costs as well as be considered a competitive advantage (Lang & Bressolles, 2013). The importance of optimising logistics operations is further emphasised given customers' increased expectations on aspects such as delivery times (Hübner, et al., 2015). In comparison to other issues regarding e-commerce, the logistics aspect has so far received a limited amount of attention (Bask, et al., 2012). However, operating as an omni-channel retailer presents an increased complexity in terms of logistics (Hübner, et al., 2016)a.

As shown in Figure 5, customer deliveries in omni-channel retailing can be divided into three different concepts based on where the product is delivered (Hübner, et al., 2016)a. The first one, store delivery, relates to traditional in-store buying where the store obtains deliveries from either the retailer's DC or the supplier (Hübner, et al., 2016)a. The other two, home delivery and store pickup, relates to the e-commerce aspect. These categories are referred to as e-fulfilment systems by Lang & Bressolles (2013), which can be structured depending on where the preparation of the order takes place. The dispatching locations for home deliveries can be the retailer's store, retailer's DC, or the supplier. Direct deliveries from the supplier are called drop-shipment strategies, which have the benefit of improving supply chain and inventory efficiency (Hübner, et al., 2016)a (Swaminathan & Tayur, 2003). The store pickup concept is integral in omni-channel retailing, given its integrating characteristics and possibility of reducing the "last mile" of the delivery. The store pickup can be conducted in two ways. The first one is click-and-collect, in which the order is prepared and sent from a retailer's- or supplier's DC to the store for the customer to pick up. The second one is click-and-reserve, in which the store inventory is used and reserved from the online sales-channel. (Hübner, et al., 2016). This makes for a much more complex distribution system to coordinate multiple dispatching locations as well as destination concepts. As opposed to single-channel retailing, where the distribution process is relatively linear. The advantage with store pickup is lower transportation costs due to the store pickup orders being included in the replenishment of the store's inventory (Hübner, et al., 2016)a.

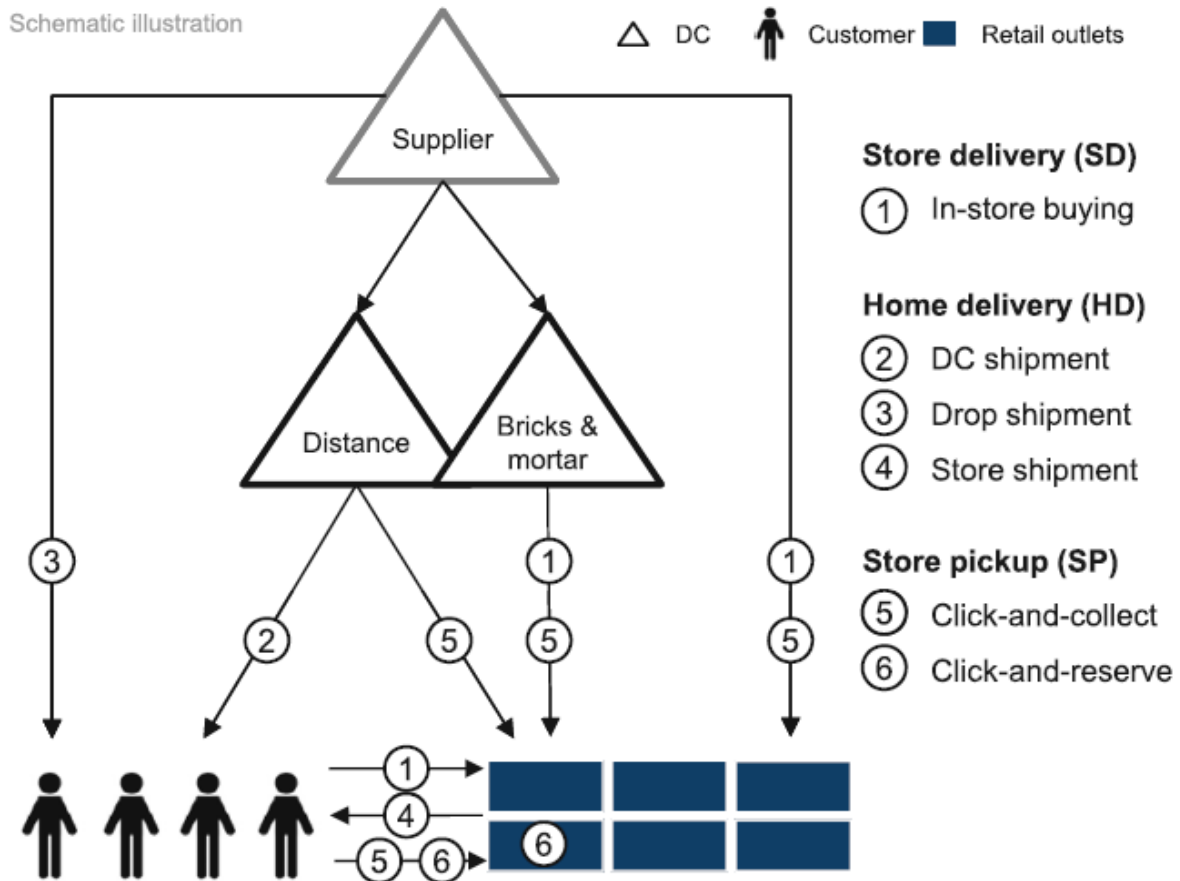


Figure 5: Distribution structures in omni-retailing (Hübner, et al., 2016)a

2.4.4 Demand uncertainty

Customers today are demanding an increasingly efficient and seamless omni-channel experience from retailers (Hutchinson, et al., 2015). In the online shopping platforms, switching to an alternative store is only a click away and the switching costs are low (Zheng, et al., 2017).

According to Canetta et al. (2013), introducing an e-commerce channel for a traditional retailer can result in a greatly changed demand pattern. The changed demand pattern is both for overall sales turn over but also for the characteristics of individual customer orders. For example, both order frequency and quantity as well as their variability vary from offline demand. Demand uncertainty is expected to increase due to the handling of many different customer segments at the same time. A wider ordering time window means customer orders arrive at much more varied times (Canetta, et al., 2013). Tarn et al. (2003) state that since anyone on their computer is a potential customer this makes the customer base vast which also contributes to greater uncertainty of demand. Other demand characteristics that have changed with e-commerce are: higher number of order transactions, smaller order sizes, high probability of fluctuating customer demand and increased seasonality of customer demand (Tarn, et al., 2003). Hübner et al. (2015) also states that online demand is less predictable and more volatile than regular in-store demand (Hübner, et al., 2015).

2.5 Theoretical framework for analysis

The theoretical framework in Figure 6 shows the key findings from the literature study for each section of the unit of analysis. The demand planning part mentions the most important aspects regarding input data, together with key aspects regarding how companies should work with demand planning. For instance, measurements and the importance of working cross-functionally. The new product introduction section covers the distinctive issues concerning new products to highlight their importance for the business. The two previous sections create the third part, demand planning for new products. In that part, the different process characteristics are described which differentiate from demand planning for existing products. Different forecasting techniques and inputs are described, as well as how the uncertainty is increased. Lastly, the characteristics of omni-channel retailing are also described, such as the different fulfilment options it entails as well as the changing customer requirements that has brought it.

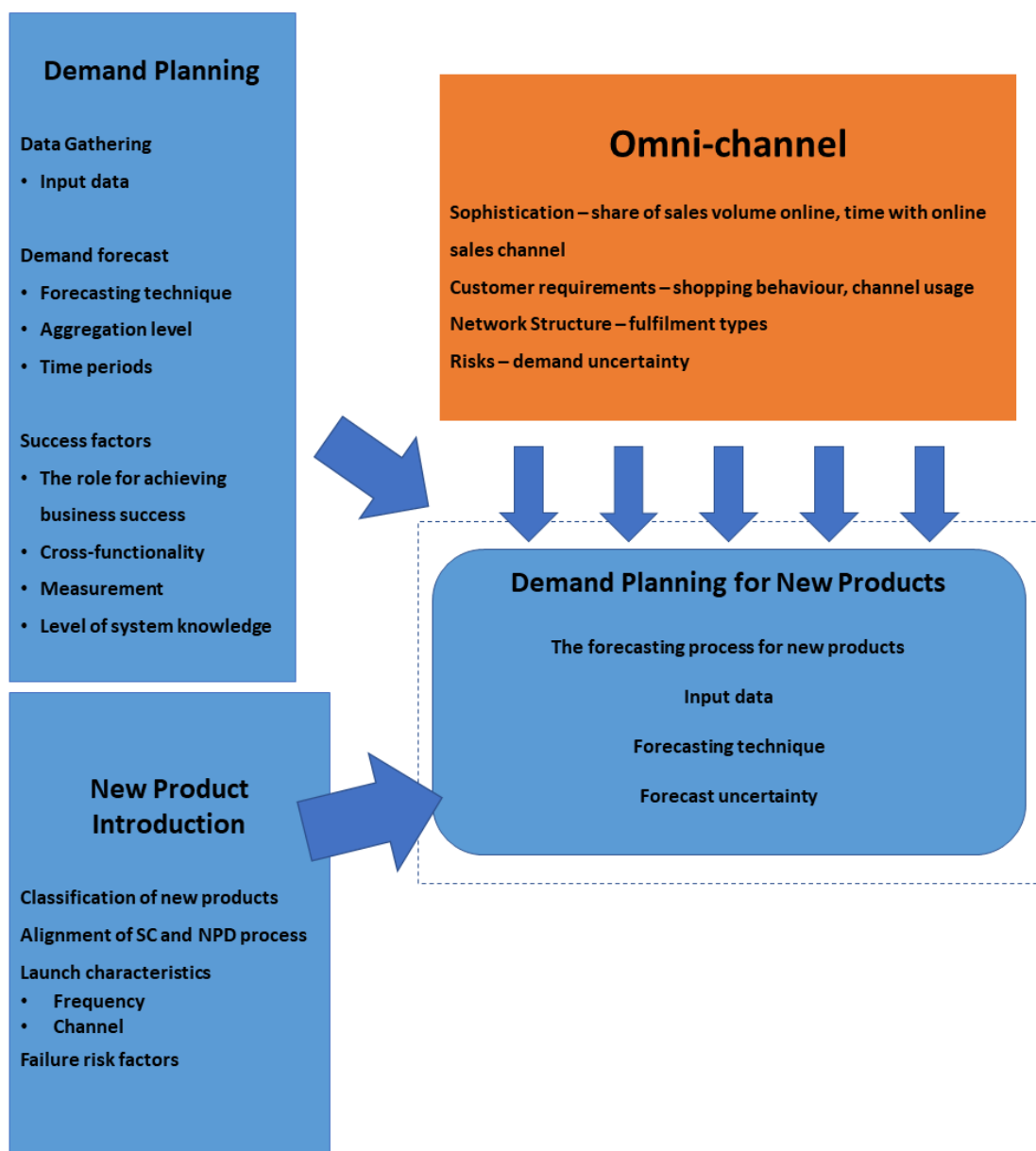


Figure 6. Theoretical framework

3 Methodology

The methodology chapter describes the methodology of this thesis. The selection of research strategy is first explained as well as the different components of the research design. Then the procedure of data collection and analysis of that data is described. At last, the ways of ensuring research credibility is explained.

3.1 Research strategy

This thesis is studying the challenges of omni-channel for demand planning for new products. Demand planning for new products is not a new concept and has a wide theoretical base with many scientific publications. Omni-channel is a newer concept but also has a theoretical base with scientific publications. However, together they create a new area of research which has a very limited amount of scientific publications. Because of that, the thesis is exploratory. The goal of an exploratory study is to develop ideas for further research (Yin, 2009).

Yin (2009) explains that there are three criteria to look at when choosing research strategy. The criteria are: type of research question, level of control investigator has over events studied and focus on current or past events. The research strategies which fit the different types of criteria are presented in Table 5.

Table 5. Research strategies adapted from (Yin, 2009)

Strategy	Research question	Control of events?	Focus on current events?
experiment	how, why	yes	yes
survey	who, what, where, how many, how much	no	yes
archival analysis	who, what, where, how many, how much	no	yes/no
history	how, why	no	no
case study	how, why	no	yes

The case study strategy is good to use when contextual conditions are part of the studied phenomenon since the study does not need to separate context from the phenomenon as for example in experiments. Phenomenon and context are not always easy to differentiate in practical scenarios. Another strength of case study strategy is the ability to use several different types of data sources, such as documents, interviews and observations (Yin, 2009). This study focuses on how omni-channel impacts demand planning for new products at IKEA, which the research questions reflects. For this type of research question a case study is suitable according to Table 5. The thesis studies how demand planning for new products is handled at IKEA and how omni-channel affects it. The investigators do not have an impact on how IKEA are working and therefore do not have control of the studied events. The phenomenon is demand planning for new products and the context it is studied in is omni-channel retailing. The study is also focusing on current events at IKEA. To support all these factors, an exploratory case study is the choice of research strategy for this thesis.

3.2 Research design

3.2.1 Unit of analysis

A fundamental part of case studies is to define what the case is. According to Yin (2009), this component of a case study is called the unit of analysis. By accurately specifying the research questions, a selection of the appropriate unit of analysis can be made. If that is not possible, then the research questions are probably either too vague or too numerous (Yin, 2009). The unit of analysis of this thesis is the process of demand planning for new products in omni-channel retailing.

The unit of analysis consists of three different scientific topics represented by the three different circles in Figure 7. Each circle will be studied individually through the literature study, as well as the connection between demand planning and new product introductions. There is a gap in the literature for the connection between omni-channel retailing and demand planning as well as demand planning for new products. To cover this gap, external data is collected from IKEA as well as other companies.

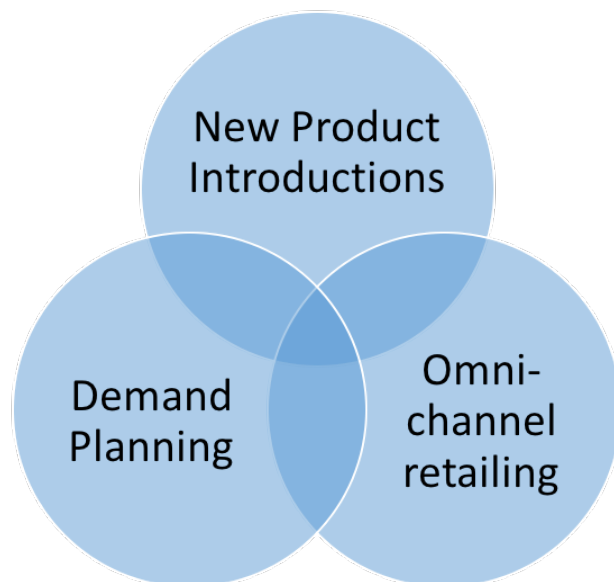


Figure 7. Unit of analysis of thesis

3.2.2 Building theory - literature review

The purpose of the literature study is to build an understanding of the theoretical concepts of logistics areas relevant for the thesis topic. The search for literature is done using databases such as: Web of Science, EBSCO Host and Emerald. Google scholar is also used as a complement. Key search words will be: demand planning, multi-channel, omni-channel, new product introduction, product phase in, product introduction & demand planning. At first the literature search is done for each topic. The topics are then combined to find literature fitting the unit of analysis. There is however no scientific literature covering the topic demand planning in omni-channel retailing.

Relevant physical books are used to gain a wider logistics knowledge, although more specific and up-to-date knowledge concerning the research questions is found in online sources.

A structured approach is used to conduct the literature review, namely the five-stage methodology of Rowley & Slack (2004) which consists of the following steps.

1. Scanning documents – Getting familiar at a broader sense and might give insights about key topics that should be included in the literature review.
2. Making notes – of the key concepts and key messages of the literature
3. Structuring the literature review – identifying the key themes and organise the material accordingly.
4. Writing the literature review – after a broad structure is established. Should integrate three different types of material: an understanding of key concepts, quotations (for special impact), and content written in our own words.
5. Building the bibliography - ongoing process throughout the review.

(Rowley & Slack, 2004)

3.2.3 Selecting the number of cases

Regarding the number of cases, the study can either be a single or a multiple case study. Each of these come with their own advantages and disadvantages. According to Voss et al. (2002), a fewer number of cases gives greater depth into the observation. There is occasionally an opportunity to study several contexts within the case involved in a single case. A single case study makes it harder to generalise the conclusion, theory or models developed. Other issues of only using a single case are, for example, the risk of misjudging a single event or exaggerating data that is easily available. On the contrary, multiple cases give less depth of the study given resource constraints. However, multiple case studies help prevent observer bias as well as generate greater external validity (Voss, et al., 2002). External validity means that there is a degree of generalisability of the findings in the study that extends beyond the case study conducted (Yin, 2009).

For this thesis, a single case study has been chosen and conducted at IKEA. The reason for studying IKEA as a single case is to achieve greater depth in their situation. The greater depth is needed since the second research question is aimed at how IKEA should handle demand planning for new products. Additionally, this thesis aims to use three external reference companies for the qualitative interviews. The reason is to fill the gaps discovered in the theory, as well as to get more insights into the unit of analysis. By using multiple companies, the findings are triangulated to achieve a higher validity. Since the first research question is general and there is a gap in the theory, the gathering of information from a few external companies is necessary to fill that gap.

3.3 Data collection

3.3.1 Internal data collection at IKEA

Interviews are conducted to gather an understanding of the current demand planning process at IKEA for new products, as well as information on how they are operating within an omni-channel context. Since the study is single case, various types of data are necessary to obtain a holistic view of the situation (Patel & Davidson, 2011). Therefore, various people associated with the thesis topic at IKEA are interviewed. Internal documents and reports are also studied to cover various types of data. The internal documents are accessed through the internal IKEA database or sent by the interviewed people. They consist of for example, work method descriptions for demand planners, process descriptions for demand planning and PowerPoint slides about the forecasting system.

The positions interviewed at IKEA are people working directly with demand planning in an operational capacity, as well as people working with the process itself. To gain information of the effects of omni-channel on IKEA's business and how they are adapting to this, interviews are made with people involved in this. The supervisor at IKEA aids in finding the people who work with demand planning and omni-channel. In some cases, the people interviewed also suggested other IKEA employees suitable for the study. The interviews are presented in Table 6.

Table 6: Interviewees at IKEA

Description of position	Date	Length	Purpose
Group Customer Fulfilment, RSI Specialist	2018-03-22	2h	Omni-channel trends & effects on IKEA
Solution owner demand forecasting system	2018-04-17	2h	Demand forecasting & system
Collaboration area leader	2018-04-26	1h	Sales Planning & Demand planning
Demand Planner, Bed & Bath	2018-04-26	1h	Operational Demand Planning
Process Developer PBSS	2018-05-07	1,5h	Demand Planning Process
Process Development Manager	2018-05-07	1,5h	New Product Introduction
Country customer experience manager	2018-05-08	1,5h	Omni-channel effects on IKEA retail Sweden
Demand Planner, Lighting & Home Smart	2018-05-09	1h	Demand Planning Process & Operational Demand Planning

3.3.2 External data collection

As explained in 2.2.1, the external data collection has the purpose of gathering information within the gap in theory, which can be analysed. Therefore, the objective is to provide insight into how companies work with demand planning for new products in an omni-channel environment.

For the external reference companies, only a key informant is interviewed for each one. The time constraints of the project mean that three companies are used for this type of data collection. When selecting companies, it is important to think of what characteristics should define them (Voss, et al., 2002). To be able to apply theory from these cases on IKEA, the cases selected should resemble IKEA to a certain extent. The companies selected should either be retail companies with relatively frequent product introductions operating in an omni-channel environment, or consultancy companies providing solutions within the unit of analysis of this thesis. The companies should also be willing to provide information for the thesis and have someone that works with the demand planning process for new products. The interviews are presented in Table 7.

Table 7. External Interviewees

Company	Role	Date	Length
RELEX Solutions	Co-founder & CMO	2018-04-18	1h
Company Y	Project leader	2018-05-04	1,5h
Company X	Logistics Manager	2018-05-04	1h

3.3.3 Data collection protocol

Conducting the interviews in a proper manner is an important part, determining who should pose the questions, who should take notes, and deciding if the interview should be recorded (Voss, et al., 2002). Each interview is attended by both thesis students to make sure that the findings are as reliable as possible. The interviews are conducted with one person being the interviewer and the other taking notes. This could, according to Eisenhardt (1989), allow for observing from different viewpoints. The interviewer will gain a closer connection with the interviewee while the one taking notes will get a broader perspective (Eisenhardt, 1989). The person taking notes may pose follow-up questions. The interviews are recorded, if allowed by the interviewee, to make sure that nothing is missed.

To guarantee the validity and reliability of the qualitative study the data gathering needs to follow a protocol. This protocol decides the type of interview structure as well as how the interview questions are posed. They can be either structured, semi-structured, un-structured. This protocol also needs to address triangulation, collect data from other people or sources (Voss, et al., 2002). The main protocol in the qualitative interviews is a semi-structured interview guide which is used to gain coherence. The reason for using semi-structured interviews is that it makes sure that all areas of focus are covered. It also gives room for the interviewees own interests or new and interesting areas that may come up during the interview. The questions in the interview guide should be open-ended, clear and not leading. The interview guide is sent to the interviewee at least a week before the interview so that they have time to prepare.

When the data has been collected it needs to be documented and interpreted. If the volume of data is large this step might be laborious. A comprehensive transliteration of the interviews needs to be done, which includes listening to the recording and coding it by writing down

information from it. This should be done closely after the interview to make sure the information is as fresh as possible (Voss, et al., 2002).

3.4 Data analysis

According to Eisenhardt (1989), analysing data plays a central part when constructing theory from case studies. However, it is the most difficult as well as the least codified part of a case study. A within-case analysis helps with coping with a big amount of data. The within-case analysis consists of becoming closely familiar with the content of each case, which should result in the emergence of unique patterns. However, there is no standard format for within-case analysis (Eisenhardt, 1989).

Since there is no standard format for the within-case analysis, this theory follows an adapted approach. The analysis consists of both pattern-matching and explanation-building. Explanation-building analyses the studied data by building an explanation about the case while pattern-matching have one or more predictions compared against empirically based patterns (Yin, 2014). In this thesis, theory building is used for parts of the analysis where the literary sources are limited as recommended by Eisenhardt (1989). Pattern-matching is used to compare theory to IKEA's practice, as well as the external data collection companies.

To summarise, this thesis will analyse the data according to the following steps:

1. The data from the reference companies and IKEA is analysed and compared to the theoretical framework. The companies' challenges and strategies for demand planning for new products in omni-channel retailing will also be identified. The aim is to create empirical reference to cover up for the gap in theory.
2. A cross-case analysis is performed by comparing the challenges identified at the different companies to answer RQ1.
3. The challenges identified in RQ1 are combined with theory and applied to IKEA's context in order to answer RQ2.

3.5 Research quality

To assure the analysis of the thesis is trustworthy and credible, the data collection has to be validated and reliable. A summary of how this is ensured during the research is described in table 8.

There are three types of tests applicable to this research study; Construct validity, external validity and reliability. The construct validity can be assured by having multiple sources of evidence in the case study. For example, questions might be asked to multiple people from a company or sending out surveys as well as conducting interviews. External validity means if the results can be generalised. External validity is achieved in this thesis by using the same questions and logic for all the external companies, as well as for multiple people within the same area at IKEA. Reliability is to what extent the case study protocols have been followed and if it can be replicated with the same results (Yin, 2014). To guarantee the validity and reliability of the qualitative study, the data gathering needs to follow a protocol. This protocol decides the type of interview structured, semi-structured, un-structured as well as how the interview questions are posed. This protocol also needs to address triangulation, collect data from other people or sources (Voss, et al., 2002).

Reliability has been ensured by following the data protocol, recording the interviews and having both investigators present for all interviews. External validity has been assured by collecting data from three external companies to ensure the results are valid. For the internal data collection at IKEA, interviews are made with several people for every area, to validate the results from those. The same questions have been asked to multiple people to ensure external validity. Data has also been collected from internal documents and databases to gain construct validity.

Table 8. Ensuring research quality

Research quality	Activity
Construct validity	Triangulation through multiple sources of data
External validity	Interview guide, interviews with three external companies, interviews with several demand planners within IKEA
Reliability	Following the data collection protocol, recording the interviews, having both interviewers present

4 Empirics from external data

This empirics chapter provides the data collected from the external company interviews. The chapters 4.2 and 4.3 are missing the sub-section demand planning for new products. This is instead incorporated into the section demand planning since they are fashion retailers and most of their business consists of new products.

4.1 RELEX Solutions

RELEX Solutions was founded in 2005 by Johanna Småros, and her two research associates Mikko Kärkkäinen and Michael Falck. RELEX provides retail planning solutions, such as automatic store replenishment solutions and assortment planning. They are mostly working with retail companies, but also some wholesalers and manufacturing companies. They are also working with forecasting for some producing companies. The interview was held with Johanna Småros CMO of RELEX Solutions, who has forecasting as one of her areas of expertise.

4.1.1 Demand planning

Småros states that demand planning is important for companies as a way to tackle uncertainties. These uncertainties are handled through some type of buffer, which is usually a warehouse with safety stock. The larger the variation in demand, the bigger the safety stock needed. Forecasting is usually done to make better plans in order to minimise costs.

Data gathering

Companies are often working with having a reference product when creating a forecast for a new product. By doing so, sales data can be used as input to the forecast. Otherwise, there would be none. It is also important to consider sales patterns for different products, such as what the sales curve looks like. Another aspect to consider is if the product will sell more in the beginning after the launch and later drop off, or vice versa.

Demand forecast

The sophistication level of the demand planning processes RELEX's clients have when they first start working with RELEX vary. Some have a fully manual process from the beginning, whilst others have a simpler model for forecasting. An example of a simpler model can be exponential smoothing. Many companies come to RELEX with difficulties of forecasting the effect of promotions. RELEX are working with time series models which aids in making forecasts accurate for low volumes. For the fast-moving consumer goods (FMCG) business forecasts need to include weekday patterns and holiday trends. Factors such as weather trends for products like ice-cream also need to be included.

New products are traditionally difficult for companies in demand planning due to the high failure rates. There are many different types of new products. The different types all lead to different customer demand characteristics, which needs to be included in the forecasts. There is a big difference between forecasting for a completely new product and an existing one with, for instance, just a small colour change. When planning for a completely new product,

it is no longer a forecasting question. For completely new products the company needs to make a market analysis or use some other qualitative technique. Afterwards, management needs to make a business decision on the assumptions for the forecast of the new product.

There are two time-aspects in demand forecasting: forecast buckets and planning horizon. Forecast buckets is the level of detail of the forecast and planning horizon is how far in the future it is planned. What time horizon to use for forecasting depends on what type of product is being forecasted. For fresh products, the forecast buckets need to be on a daily level. In some cases, they may even need to be more frequent. For other businesses, for example a specific bed which sells two per day, there is no need to be specific of when in the day it will sell. When products sell at a low volume, customers might buy either one day or the other, which can lead to a forecast error of 50% when forecasted on a daily level. There is no need to have smaller forecast buckets than the replenishment frequency. The correct planning horizon for a company depends on what the company is planning for. Longer forecasts are needed when planning for purchasing for a distribution centre or planning for production, but that is done at an aggregated level. RELEX longest forecasts are for 18 months when planning budgets and maximum 12 months for the operational forecasts. The operational forecast should not be longer than 12 months. After that, the uncertainties with assortment, promotions and even new stores make them unusable.

Success factors

The retailers' level of focus on forecasts varies between companies depending on how flexible the supply chain is. If the suppliers can deliver products a couple of times a week, then forecast inaccuracies are more manageable for the company. If the company instead also owns the production or has responsibility for most of the supply chain, then the economic effects of the forecast inaccuracy are much bigger. Long lead times also means that inaccuracies in the forecasts get amplified since purchases from suppliers need to cover longer time periods of demand. It will also take the company longer time to supply more stock if the purchase was too small, which can be the result of larger sales than forecast. Småros believes that companies need to know how important forecasting is for their business. In many cases, companies are too focused on forecast accuracy. Their businesses could instead gain from spending resources on focusing on safety stock to buffer for the inaccuracy.

4.1.2 Demand planning in omni-channel retailing

Companies that have order online and pickup in store are using the store's stock for online orders. The companies need to, from a supply chain perspective, count that demand as a part of the stores demand when planning for the store inventory. From a business and reporting perspective, however, the demands need to be separated between stores and online.

RELEX are recommending their customers to have separate forecast for online and store demand. The reason is that the online demand and store demand can be very different, for example, how customers are reacting to campaigns and promotions varies in the different channels. A big challenge with the online channel is that the sales volume is low compared to the physical channel. Subsequently, forecasting is more difficult for the online channel, since forecasting for low volumes means that random variations have a much larger effect. That effect can lead to a forecast error of 100%. Dividing the forecasts after fulfilment type would therefore create a larger forecast inaccuracy. If the volumes for pickup in store are very small compared to store sales, then they can be seen as the store demand's random variation and do

not need to be forecasted for. If the volumes instead are low but non-negligible, then perhaps the companies need to look at an aggregated level for online sales. For example, they could look at all online sales of a country. At the aggregated level they can see a pattern for the campaigns and then apply that stable pattern to the lower level, such as specific postal code areas.

Sophisticated forecasting systems have the ability to make forecasts on more levels to fit with the expanded network of omni-channel retailing. To get a good forecast separated on delivery mode (pickup in store, home delivery, pickup point), the forecasting system needs to be a best-of-breed system. Regular ERP systems are not advanced enough. When a company buys a new forecasting software system, they need to be aware of what forecasting options there are. For instance, companies need to know what level is best for their business to forecast on. They also need to know what trade-offs are made on that level in terms of forecast accuracy.

The risks of demand uncertainty in e-commerce is mainly due to the large effect of random variation in the low forecast volumes. Online demand is, however, also more volatile for price sensitive products. Customers can easily make price comparisons online and pick a retailer with a lower price.

The main issue with the expanding network in omni-channel is that retailers do not always have a good ERP system. A good system is needed to handle the new streams and which transaction that should be registered to what stream out of a sales transaction perspective. This is needed in order to capture POS-data from the different sales transaction points to feed it to the forecast.

Regarding forecasting time periods in omni-channel they should fit what is forecasted for. If the forecasted business changes with omni-channel and needs faster response and update, then the forecast can be made in smaller time buckets. If the supply chain is not so agile and suppliers are only delivering once a week or every other week, then there is no point in updating the forecast faster.

RELEX believe the biggest challenge with omni-channel is how the forecasting needs will look in a few years. The bigger the volumes from the online channel, the bigger effect they will have on the supply chain. The companies need to make an analysis of their future forecasting needs. Whether or not the current forecasting technique will be sufficient enough for the future. The alternative is for companies to invest in a system that could potentially cover the future needs without truly knowing what those needs are.

4.2 Company X

Company X is a fashion and home furnishing retailer selling mainly to the Scandinavian countries.

4.2.1 Demand planning

The supply chain department at company X is a support-function for the rest of the organisation. Supply chain is covering the scope from supplier to customer, ensuring the ordered products land at the right channel, at the right time and at the lowest cost. Demand planning resides in the team Warehouse and fulfilment. There are two main forecasts made at the company; one in purchasing and one lower level demand forecast made by the supply planners. The purchasing forecast is a one-year forecast to plan for what needs to be purchased for all markets. It is updated quarterly. The lower level demand forecast plans for

each store's unique demand. The lower level demand forecast is used for allocation of the products in the supply chain.

Data gathering

Inputs to the lower level demand forecast are sales data from the ERP-system as well as inputs on commercial activities and campaigns from marketing and the sales department. The inputs show if these activities are for a specific market, store or only online. There is also a process which checks aspects such as geography, weather and activities in the local markets which can have effect on the sales. These aspects are also inputs into the demand forecast. The forecast for purchasing is mainly based on sales history but it also has the budget and the company's business plan as input.

When the company is working on the collections they need to keep in mind how the assortment should be allocated and what stores will sell the product. The fashion business is weather dependent and there are some geographical differences between the company's markets. Not all stores sell the full assortment and the different stores also have different customer segments. The company is working on giving the purchasing forecast more inputs on allocation of the products within the markets. They are also working on inputting allocation of the purchasing spend. When planning for campaigns the company also needs to be aware that the campaigns have different effects on different markets. The sales pattern for online is different from store. There is a need for timing to sync with the warehouse to keep the lead-times short for the online market.

Demand forecast

The company does not have a specific demand forecasting system. Instead they are using their existing system: ERP-system and BI-tool along with self-developed tools. The operational forecast for the warehouse is made daily to get the picks for e-commerce right. Picking e-commerce orders correct is important to achieve short lead-times. The ERP-system has the sales data per SKU and can calculate a demand forecast based on this data. If a new product is associated to an old product then the same method can be used for the new product. The processes are then developed around this system of forecasting and replenishment levels are decided on. These replenishment levels can be adjusted and modified on a daily basis, but the plan is to follow the demand curve. The forecast is therefore quantitative and based on statistics which is important for the company. The company believes that the demand planning process could be simplified by using a demand forecasting system. However, a demand forecasting system requires big investments both for the system itself, training for the supply planners and maintenance of the system. The company has put a lot of energy and work into getting a good demand planning process and they believe that it is pretty accurate. It is also flexible and there are possibilities for adjustments and keeping track of the stock at the warehouses.

The demand plans are separated for e-commerce and store sales. The long-term purchasing forecast is made at an aggregated level. The short term one is done at store-level.

Success factors

The purpose of the logistics/supply chain department at company X is to act as a support-function for the rest of the organisation. The main purpose of demand planning is to maximise sales by allocating the products to the right place at the right time. Some products

are popular online, and some sell better in stores. It is therefore important that the people planning for both purchases and allocating products think about where the products sell the most when doing the demand planning. The demand planning team needs to ensure that the products are allocated correctly ahead of time, since demand plans are made to keep the cost of logistics through-out the supply chain as low as possible.

4.2.2 New product introduction

The company is working with seasonal collections. Their products are classified as either repeat or running. The products which are sold all year round are called running and could comprise of porcelain and basic shirts for example. Repeat products are bought more than once a year but are not sold during the entire year. Repeat products may undergo some alterations between buys. Then it is up to production and purchasing if the product should get a new article number or if it should be considered the same article.

The product design is done in-house. However, the company is working closely with their suppliers and taking advantage of their product development competencies. The suppliers are often very skilled in product development since they also have other customers. Collaborating on product development means lower costs and lead times.

Since the company is a fashion retailer, new products are launched almost every week. In total, it amounts to about 8000 to 9000 new articles per year. The products are usually launched in all channels and markets at the same time. However, new collections can also be tested in parts of the markets to lower risks. Not all markets and stores are selling the full assortment. Tests have also been made on unique releases of new products on the online channel. Company X is working on launching products depending on the weather and climate.

4.2.3 Omni-channel retailing

Sophistication

The company x has had an online channel since 2012. They are selling online in all of their markets. In the future the company is planning on selling online in more markets than they have stores. The online channel stands for ten percent of the sales shares today but is growing constantly. The touchpoints which the company has with their customers are store, web-page and various social media channels (Instagram, Facebook). The social media channels give the customers the opportunity to see the products. They also provide them with a link to the web-page where they then can make their purchase.

Customer Requirements

The company also believes that it is important to truly know one's customer. Some customers are omni-channel consumers, and some are not. Not all customers want to be served the same way. Meaning that some consumers are happy with the traditional stores while others want a seamless experience in all channels. This is an area that the company believes they need to explore further. The company has recognised that the customers today are demanding low prices, flexibility and fast deliveries.

Network Structure

The fulfilment types that the retailer is offering are: normal store sales, online sales delivered to a postal service pickup spot and home delivery from the store. The home delivery from store are mostly for city stores where people can come to buy during their lunch breaks or might not want to carry porcelain or bigger things on the bus or subway. The company is working towards offering home delivery for online sales as well as click-and-collect. It is important to the company to keep its promises to the customer. If the customer is promised that delivery will leave the warehouse the same day if an order is placed before a certain time, then this promise should be kept regardless if there is a sales peak of 300%.

It is important for the company to make sure that the warehouse and distribution is keeping up with the growth of the e-commerce channel. Otherwise the warehouse and distribution capacity will be too low to supply to their customers. The warehousing part of the business was earlier based on handling store fulfilment. It has over the past two years undergone a major change to adapt to omni-channel. The warehouse must be able to handle fast fulfilment and deliveries along with efficient returns handling. The warehouse is allocated to both the stores and the online channel and this is to keep down the lead times and to increase flexibility. The products which go to the stores can share shelf with the online products. The online orders are however reserved since they have already been bought by the customer. The warehouse flow is controlled centrally but optimisation of staffing, picking and expediting is done by the warehouse personnel. It is very important for the company to keep control of both costs and lead times of their logistics operations due to the omni-channel customer's requirements.

4.2.4 Demand planning in omni-channel retailing

The e-commerce channel is growing quickly, and this has effect on company X's demand planning. According to the retailer, there are companies which see a 100% growth of their online channel. The fast changes which have happened in the business cause the historical data to not reflect the as-is situation. A challenge for the company is to forecast the online sales since the growth is so large that the forecasting models are not reacting fast enough. The models therefore have to be combined with manual input for growth in order to be accurate. Commercial activities online create higher peaks than in-store and there is no sales history for these peaks yet. Being unsure how customers will respond to campaigns in the different channels create difficulties for the company's demand planning process. There is also a greater variation in demand from online sales which is not always possible to predict through the sales data. The forecast sometimes produces numbers which sometimes seem too big, but the demand planners need to believe these numbers regardless. There have been times when a non-paid celebrity has posted pictures on social media of the company's products and this spiked the demand noticeably. Those kinds of situations are hard or nearly impossible for the company to predict. All of these uncertainties make it hard for the retailer what quantities to purchase for the different channels and what level of stock to hold.

4.3 Company Y

Company Y is a fast fashion retailer with business all around the world.

4.3.1 Demand planning

There is no structured process referred to as demand planning at company Y. In terms of this process, the company recognises that there is a lot of work to be done moving forward. Their process for it currently starts with the purchasing department making a forecast on a high product level such as a category. A category could for example be shirts.

Data gathering

The forecast is mainly based on historical sales and how much the company believe the products will sell. They also look at cannibalisation effects to see how the assortment sells together. For example, when launching a new white t-shirt, sales of other white t-shirts might be affected.

The different organisations within the company that provides input into the forecast are purchasing, sales and marketing. When the company makes forecasts for their new articles, they use sales data from a reference product as an input. To evaluate risk when launching an assortment, they often assess the potential of their products according to the Boston matrix. Some kind of risk analysis may be used as well to complement how they think the new products will sell.

Demand forecast

Company Y does not have a forecasting system. Therefore, creating the forecast requires a lot of manual work with computational programs such as excel to make calculations. The experience of senior employees working with the forecast is of great importance to the company and is something they strive to hold onto. The forecast made from purchasing is then broken down into suitable sales forecasts, which is a basic method.

The company aggregates their forecast on the whole assortment. The discussions they have starts in totals then it is broken down into more detailed components. The disaggregation of the forecast is done centrally. The countries can have their say and leave input, but they do not have decision rights.

When the company starts up business in a new country, they use a reference country to plan for the new sales. Regarding how they divide their assortment, they have what they call planning markets. Those can be either individual countries or clusters of countries with similar customer segments. For instance, the Nordic countries might receive the same assortment.

The company also has separate forecasts for store demand and online demand. However, their forecasts are not separated on fulfilment mode. They do follow up how different delivery and fulfilments differ in terms of cost though. They also keep fast fulfilment modes in mind when they do their planning, such as next-day deliveries. The reason for that is because there is a ceiling for how much a warehouse can stock. Furthermore, the inventory used for the click-and-collect concept is from the separate online storage, which means those sales are included in the online forecast.

The forecast horizon for the planning markets is seasons, for example autumn season. Then it is broken down into weekly levels. So, the original total volumes are broken down into markets and down to weeks. Afterwards, the weekly forecasts are connected to warehouses in order to check against the warehouse capacity among other things.

Success factors

The company's business is based on a push model, which means they purchase a number of items and then more or less push them out to the market. The company has started to divide their purchasing orders into smaller batches to move more towards a pull system. For example, the initial aim might be to buy two million items but based on lower sale numbers than expected they end up ordering merely one million. Typically, they book up the capacity then have some kind of deadline of when to decide to go or no-go for that production volume. This kind of flexibility is something the company is considering heavily now. With their push model, there is a risk of missing some fashion trends occasionally. Therefore, they have started looking at how they can react faster.

A lot of work is being done to synchronise sales activities as well. The company has no supply chain department. It is instead divided into three parts. Purchasing, that quantifies the whole market and obtains the assortment. The sales organisation, that spread out the assortment so that the right product is at the right warehouse and the right store, based on the total quantity. The third organisation is logistics, that has the responsibility of the physical flow from point a to point b. The ones making the forecast and the ones steering the supply is the same organisation. So, the supply chain merchandisers are sitting in the sales organisation and are also working with the commercial plan. If there is a delay in the process, then there is a method for how to prioritise. The global merchandise organisation works on that together with logistics, then roll it out to the local logistics and sales organisations. There are weekly meetings between logistics and sales in order to work out how to assure that products are in stock, to cope with the activities in the commercial plan.

Sales activities can happen suddenly and unplanned, although there is no point having a sales activity if the stock is not available. The sudden campaigns can be advantageous instead. For instance, if sales are going slow then a free shipping campaign can be launched to increase sales. The global forum regarding these questions, consisting of the sales and logistics organisations, meet every week to discuss aspects such as sales and availability. Then the local ones meet every week or every other week as well to discuss the same topic going forward, in connection with the forecasts. Since they are having these discussions with sales and logistics in the same room, the company believe they have come far in this area. The two organisations have an opportunity to understand each other's challenges, for example how logistics are affected by a sudden sale push or why customer promises are broken occasionally.

Regarding measurements, the company has internal goals of how they want the forecast to be. Those goals are difficult to achieve though. This is due to the fact that e-commerce is very deal-driven, which means there is a tendency of quickly evolving ups and downs. For instance, planning for extreme peaks like black Friday always backfires for the company, leaving them with large backlogs. Those kinds of peaks are very difficult to understand. Another aspect of it is that even if they sell better than planned, the logistics department that has assigned resources according to the plans first calculated, may have problems.

The forecasting model is used for every article. The company believe most employees understand the outcome of the forecasting method, although they might not understand how the method itself work. Historically it has also gone well for them despite the basic structure of the model. There are however some issues they have experienced, such as over-stock. Therefore, they believe the model needs to be investigated.

4.3.2 New product introduction

The company has no particular classification of new products. They instead refer to it as broadening the assortment in terms of different concepts, such as men clothing or underwear.

Since the company is a fashion retailer, new products are launched very frequently. A new product is considered every product with a new article number. The business idea is to change their assortment in cycles with turnovers of eight to ten weeks. There is a solid base of running products as well though. Currently, the company is investing a lot in broadening the assortment. Especially for e-commerce, since having a larger assortment is a lot easier and cheaper online than in a store. In the store, the space is also more limited. Therefore, they are looking to broaden the assortment with thousands of new articles per year. Their assortment online is only a fraction of some of their competitors' that are pure online retailers.

Regarding product design, the company performs this themselves. In the past they used to have a bit of external design. They have also sold some other brands before. Their own brands, however, are designed by themselves and can only be bought at their own stores or website. The company has the whole assortment available in the online channel, as well as some additional articles. However, there is also a very small part of the assortment that is available exclusively in stores.

4.3.3 Omni-channel retailing

Sophistication

The company has a history of selling through catalogue driven postal order systems. They launched their online sales channel 20 years ago. Right now, their online sales represent 12-15% of their total sales and they are operating an online sales channel in 37 different markets. Their postal order system means that their whole infrastructure was built for catalogue sales. When they later changed to e-commerce, they already had e.g. warehouses and customer service centres in place.

Customer requirements

The changes in customer behaviour they have noticed at the company is mainly in the search phase before a purchase. Customers do their research before a purchase more intensively now and compare different deals from different companies. Some parts of the assortment are also selling better online than in their stores. The company believe it is challenging to avoid letting the traffic on the website and the conversion rate of that traffic drop down. They want to see those two parameters remain aligned.

Network structure

The company believes their distribution network has been affected by the omni-channel environment, both in terms of their warehouses and the fulfilment structures. They have continuously had a strong focus on achieving good availability of goods. The company's distribution and last mile services are focused on the customer offer. The customer's demand of high service levels and short delivery times affects the placement of the warehouses and how to use them. In order to achieve a good availability, centralisation has been an appreciated method for them. However, more nodes in the distribution network are needed in

order to meet the customer requirement on short lead times. That balance of when to build new warehouses and when to consolidate is something they are constantly dealing with. Their number of warehouses has expanded a lot in recent times. The growth of e-commerce is challenging for the whole company and is putting completely different demands on their warehousing network and the distribution. Questions are also being raised about the store network. The company has about 4000 stores at the moment all over the world. How to use them in an omni-channel environment is another challenge for the company.

Company Y interacts with their customers through multiple touchpoints. On these touchpoints, e.g. desktop, app and phone, the experience is the same for the customer. However, their catalogues do not hold the full assortment anymore. They have been adapted to carry a selected assortment relevant to the segment purchasing from them.

The different fulfilment offers are for example standard delivery, next-day delivery, time slots (where the customer book a time slot when they want the product), cash on delivery, click-and-collect and home deliveries. The retailer is currently piloting same-day delivery as well. The fulfilment offers are regionally customised according to region-specific demands, so what fulfilment offer is available depends on region and market.

The company recognises they are not organised as an omni-channel organisation. They believe the customer should be converted from a potential customer into a paying customer where he or she is. For instance, if the customer enters the store, then that is where he should be converted. If the customer enters the website, then that is where he should be converted. However, if the customer cannot find what he wants in the store then he has different kind of features to push him towards the website, and vice versa. Those features are something they are working very actively with. The last thing they want is for the customer to leave the store and enter a competitor's store instead. Therefore, their strategy they have had for a long time can be summarised as trying to maximise the offer per channel, in order to have the best offer where the customer is. Accordingly, they have two separate channels running to maximise the sales.

Another change which is happening is the current business system that is running on two IT platforms will be on the same system for next year. An integrated IT platform will make it easier to implement new features. In the past, it has been difficult with two separate systems. Therefore, they are trying to integrate the channels more to present the customer with one view of the company.

4.3.4 Demand planning in omni-channel retailing

Company Y knows their forecasting is not optimal. They are also convinced online sales will continue to grow, although there are uncertainties of how fast it will happen. They are to a large extent looking at what the role of the stores will be in the future for them. Perhaps showrooms or concept-stores will be alternatives for them moving forward. Either way, what happens in terms of the stores is likely to set the base for what their working routines will be. Regarding the physical and online channel, they believe it is easier to keep them separate at the moment, since integrating channels puts different demands on steering processes. Challenges that might appear regarding demand planning relate to the integrating aspects of the omni-channel concept. For example, if the stores take 10% of the online sales and they can ship it from the store, should the online channel buy 10% of the goods for next season or should the stores have 10% more inventory? This is something the replenishment process must keep in mind. The first option might not be hugely appreciated by the stores. Another level of complexity is that perhaps a warehouse in a different country that can serve part of a

country better than the ones in that same country. All these different dimensions of complexity in terms of planning is why the company keeps the different channels separate.

5 Empirics single-case study

This empirics chapter provides the data collected from the single case study at IKEA. The structure of this chapter is according to the theoretical framework.

IKEA Range & Supply is a core business within Inter IKEA Group, responsible for developing and supplying the global IKEA range. In order to do this, they work throughout the whole value chain from supplier to customer. The IKEA Range & Supply organisation is described in Figure 8. The organisation is designed as a matrix. There are five main activities, called matrixes; commercial, range & design, development, supply and new business & innovation. These matrixes work over ten different business areas (BAs). Each of the BAs is divided into smaller units, so called home furnishing businesses (HFB), see Figure 9. These HFBs all have their own business and business leader. The eight different categories are working across all BAs to consolidate the purchases of material and draw benefits from the larger volumes.

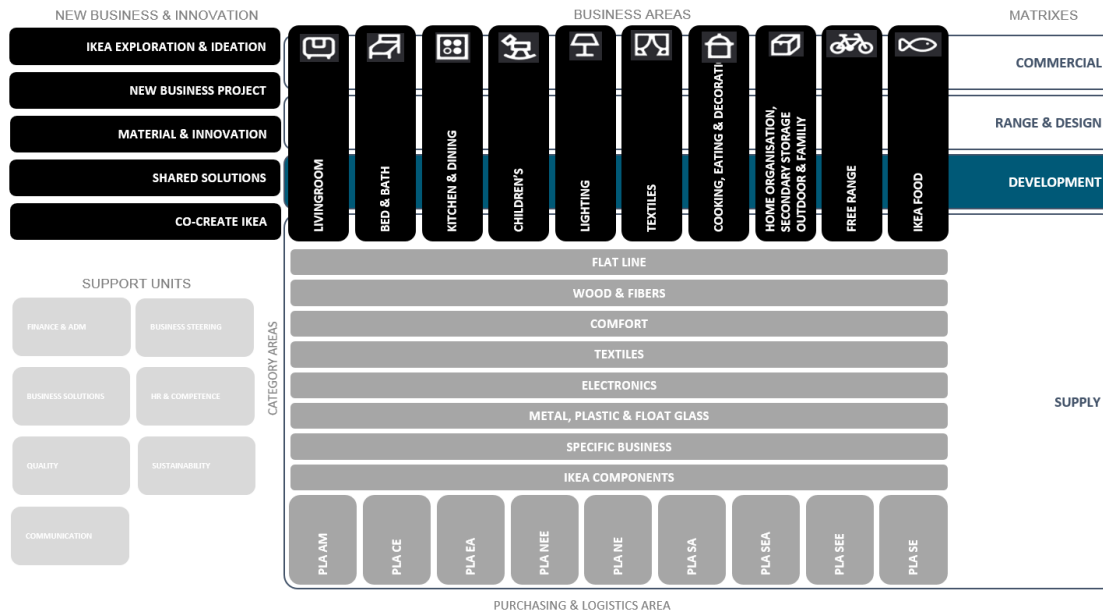


Figure 8. Range & Supply Organisation



Figure 9. Business Areas and Home Furnishing Businesses

5.1 Demand planning

IKEA has a demand planning process to plan for and build a smarter, slimmer and more cost-effective supply chain. The demand planning process creates the demand plan, quantifying what is planned to be sold in the future. It is based on the sales plan, historical sales data, the present situation and factors that impact the future, such as economic conditions, range changes and commercial actions from the sales plan. The demand plan is created both centrally at IKEA and by the individual stores. However, this process is currently undergoing change. The forecasts will soon only be produced centrally, with the possibility for the stores to make adjustments.

At IKEA there are 60 demand planners. Each demand planner is responsible for his or her own range of products. The demand plan is created on defined levels and time perspective, which are strategic, tactical and operational planning.

As Figure 10 shows, the process starts with analysing and assessing the various input data. Afterwards, a demand forecast can be created based on the input data. Reviewing the demand forecast is done continuously and is part of the daily work of the demand planner. The next step is to define forecast uncertainty. The purpose of defining forecast uncertainty is to minimise the risk when launching new articles. The define forecast uncertainty step is mainly done for new products and is discussed further in section 5.3.4. In the final step, the demand plan is finalised and handed over to the need planning process.



Figure 10. The demand planning process at IKEA

5.1.1 Data gathering

The input data for the demand planning process originates from several different areas within IKEA and is illustrated in Table 9. For instance, the business navigation process or central navigation steering defines the overall business goals for the entire business, including what demand planning need to adapt to. From product development, information about the product is given to the forecast. Information about the product can be, for example, sales start date and which selling units will be selling the item. The forecast also gets data of actual sales from the stores systems.

Table 9. Input data to the demand planning process

Supplier of information	Input information
Product development	Sales start date
	Sales end date (for discontinued articles)
	Selling units
	Sales channel
	Range information
	Commercial classification changes (for improvements of existing articles)
	Sales target per new item (for new articles)
Business navigation	Business plan
	Action plan
Store system	Actual sales
PBSS sales planning process	Sales plan
PBSS balancing of plans process	Constraints and possibilities

Another input into the forecast is the sales plan. The sales plan works as a support for the demand forecast in predicting the future. If any conditions change, the sales plan supports the forecast to understand the changes. These changes are the commercial plans of the stores. The changes can be, for instance, price changes or merchandising changes. The sales plans are created by a sales responsible sitting in an HFB at IKEA together with a sales leader. The sales responsible works as a link to the stores in a certain country. The sales plan is defined as an index, as for example, a country's sales of a product may grow from 100% to 110%. Creating these sales plans can be difficult due to the need for communication between IKEA's central planning and the different countries. There are 60 demand planners receiving the sales plans at IKEA. In the HFBs, there are 60 sales responsables creating the sales plans together with 600 sales leaders. The quality and level of detail of the sales plan can vary depending on who has created it and depending on the demand planner's requirements. The demand planners sometimes question the quality of the sales plan due to inconsistencies in level of detail.

5.1.2 Demand forecast

Creating the forecast

At IKEA, the demand forecast is created by a software system provided by an external software company. The software has a structural analysis technique based on what is called the Lewandowski algorithm. IKEA has reviewed and looked for other algorithms for the demand forecast model, but always returned to the same algorithm. Different algorithms all have different features, which highlights the importance for finding one that is suitable for their business. The Lewandowski model has been accredited as the best one for retail. Changing algorithm would mean a need for a lot of training for the demand planners.

The basic principle of demand forecasting is that the demand planners need to look at the history and distinguish what is an event and what is seasonality. The decomposition is subsequently added to a model. Figure 11 displays the procedure.

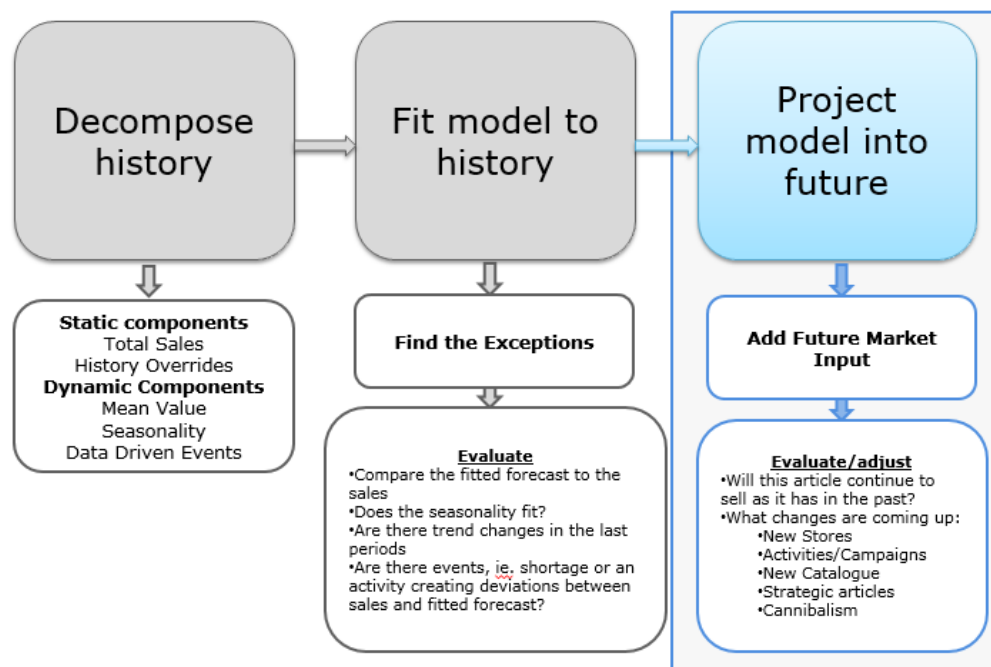


Figure 11. Demand forecasting at IKEA

IKEA's forecasting model is using actual sales in the system which the algorithm turns into a forecast for the future sales. The model also calculates a moving average, which the demand planner uses to increase or decrease the forecast. There is also a mean value dynamic that the demand planner can change to steer how dramatically the forecast adjusts to deviations between the sales and the fitted history. The algorithm identifies a seasonal pattern and, therefore, the demand planners need to clear the history of all the data that is not seasonal. That data is typically related to a commercial event. The procedure is called history cleaning, i.e. deleting what is not representative in the history of what they plan to do. The system mostly does this work automatically. Some events, however, need to be adjusted for manually by the demand planners in the forecast. For instance, if a country opens a new store, then sales will increase. Since it is not reflected yet in the history, the demand planners need to adjust for it manually.

The demand planner monitors the forecast by getting lists of deviations from the system. These lists display where the actual sales have deviated from the forecast. The lists can be sorted on, for example, demand planner, article name or article number etc. The system sorts out the most important deviations by itself. However, it is the demand planner's job to analyse these deviations and see why it has happened, as well as see if the forecast needs to be adjusted. These monitoring activities occur in the step "create and review demand forecast" in the demand planning process.

For some product categories, for example kitchens, the products are linked to each other. When a kitchen is sold at IKEA, it consists of hundreds of different articles. Consequently, if the sales of one article is affected by an event then the other articles might be affected as well. In the current system there is no feature to compensate for such effects. Therefore, demand planners must have complete knowledge of their range and the linkages within it.

Aggregation level

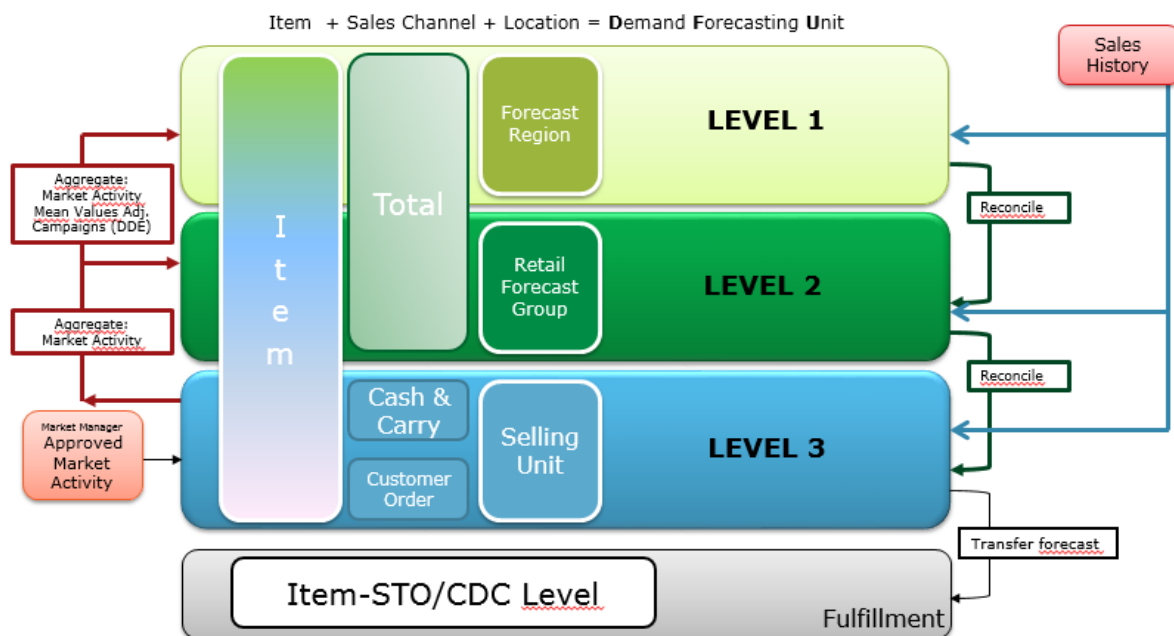


Figure 12. Aggregation of forecast

The demand forecasts are called demand forecasting units, see Figure 12. It is the demand for a specific article number at a specific country, as well as a specific sales channel. For example, a demand forecasting unit could be the demand number for cash and carry of an article number in Germany. The demand planners work on the region and country level, level 1 and 2. Level 3 is created solely by the forecasting system. On the highest aggregation level, which is level 1, there are around 7000 forecasts. At the next level, there are another 700 000 forecasts. At level 3 there are an additional 7 000 000 forecasts, although these are handled by the system. The levels are top-down connected by reconciliation. The top-level acts as an umbrella or master. For example, if the level 1 Europe forecast is 300 000 articles a week, then the sum of all the forecasts of that product for all the countries belonging to Europe is 300 000. The countries' forecasts are a share of the total region forecast. For level 1 and level 2 the forecasts are a sum of cash and carry and customer order. Cash and carry is what IKEA call the traditional in-store buying. Every other way of purchasing is referred to as customer

order. The customer orders are divided per store as well. The online sales are connected to the customer orders of a store through their postal code within the area close to the store.

The market activities, also referred to as commercial activities, come into the forecasts through a program called market manager. They enter on the level that they are planned to be performed, which is usually store wise. Afterwards, that information is aggregated upwards into the higher levels. IKEA are only working with aggregating their locations. For their products, they have the forecasts on article number. Forecasting on article number is done to make it simpler for the demand planners to tune the forecasts.

Time periods

The forecasts are done on a two-year planning horizon and have three years of historical data. The reason for having a two-year horizon is to understand the capacity requirements in the future. The two-year plans are not very accurate for the last months, since a lot of information is unknown for these final months. For example, the ranges can have changed since when the forecast was first created. The forecasting system is updated in weekly buckets, which means the sales of the previous week are loaded into the system every week. Therefore, every week the demand planner has an updated system with last week's sales and a forecast based on that. IKEA do currently not see any need to update the forecasts more frequently.

Some of the HFBs at IKEA are doing long-term plans on a longer planning horizon than what is done in the forecasting system. Long-term planning is, however, done differently in every HFB. What role is responsible for it is different in the HFBs as well. The purpose of the long-term plans is to secure capacity for IKEA within the supply chain, as well as show the future development ambition of the HFBs. It also has the aim of synchronising tactical plans by knowing the plans of each HFB.

The role for achieving business success

Demand planning is one of the most important processes at IKEA. This is the first part of the supply planning processes, securing to meet the customer promise as efficiently as possible. IKEA has a lot of problems with the bullwhip effect due to the size of the company and the long lead times. There is a tendency to over-forecast and in every part of the process safety measures as for example additional stock, is added. Over-forecasting has led to situations where they have had more inventory than their physical storage capacity. Having excessive inventory is a cost for IKEA and should therefore be avoided. However, under-forecasting leads to missed sales, which is also a cost for IKEA. This is why demand planning is such an important process for IKEA in order to achieve business success.

IKEA has ABC-classification of their forecasts to prioritise them for the demand planners. The A articles have the biggest sales volume and subsequently a prioritised forecast. C products could have low sales volumes. For example, they could sell five pieces a year, which would make them hard to forecast. Consequently, the forecast deviations for these articles can be huge. In that case, it is not worth for the demand planner to spend too much energy on these forecasts. The ABC classification is also done in terms of revenue, where the A category should stand for about 70% of the demand planner's revenue. The demand planners plan their work after the ABC-classification.

Cross-functionality

For the demand planners in their daily work, most of the communication is within the team in the HFB. The communication is also with the sourcing developer, need planner and sales responsible, that are all working with the same product range. There is not much contact with demand planners from other HFBs though, except when products affect each other in some way. The products can be inter-dependent for example by having common parts or by being included together in a set-up, such as lights in a wardrobe. In those cases, the demand planners need to communicate their forecasts with each other. There is no official way of doing this, instead it is the responsibility of each demand planner.

All the commercial activities that are included in the forecast should be communicated and planned for in the sales planning process, although this is not always the case. This is partly due to allowing the stores to be entrepreneurial, which is an important feature in IKEA's business model. Whether the activities are planned or not, they feel they need to let the local store managers do what they deem necessary to compete in their markets. The stores have their own budget frames and possibilities. Meaning if the store manager wants, he or she can move an article to a hotspot within the store which will have an effect on the sales.

Furthermore, there is something called a forecast collaboration network at IKEA. That is a forum where one demand planner from each HFB is represented as well as other stakeholders which have input to or are affected by the forecast. The forum is way of collecting thoughts and issues from people working with planning, for example, commercial activities, new products and outgoing products. The demand planners share what is discussed with the rest of their organisation. The purpose of the forecast collaboration network is to strengthen collaboration between different parts of the organisation and make decisions to improve the demand planners' work.

Type of forecasting technique

The demand forecasts are created in the forecasting system which is running a time-series algorithm. In some business areas, demand planners also make a long-term plan which can be an additional three years. The long-term plans are not created by any system. Instead, they are created by using the experience of the demand planners or others within the HFBs. This experience is used to create a quantitative plan in an excel spreadsheet.

Measurement

IKEA has two ways of measuring the forecast performance: forecast accuracy and forecast bias. They measure the forecast accuracy in eight-week lags and four-week buckets. In week one they look at what they will sell between week eight and 12, and then this is measured from week 13 to 17. This means that in week 13-17, the sales history for week eight to 12 enters the system and can be compared to the forecast produced in week one. If they planned to sell 100 products but only sold 80, the forecast accuracy is 80%. The forecast bias is an aggregation of the totals of the forecasts which shows if the forecast is being over-forecasted or under-forecasted. A forecast bias of above 100% means over-forecasting.

The main KPI for the demand planners is forecast accuracy. The goal is to reach 80% forecast accuracy for their entire range a demand planner is handling. On a country level it is 70%. A demand planner can choose to look at the forecast accuracy for a specific article but

if it has a low sales volume it will be hard to reach 80% forecast accuracy. The operational demand planners believe that the forecast accuracy is a good KPI for seeing how their work is going. However, it should not be overanalysed since there are a lot of things that affect forecast accuracy. To show an example of the forecast measurements at IKEA, Figure 13 shows the forecast accuracy for the entire range of HFB 10 Lighting & Home Smart. The red line is forecast bias, which is the difference between forecast and sales. Since it is above 100%, it shows that the demand planner is over-forecasting.

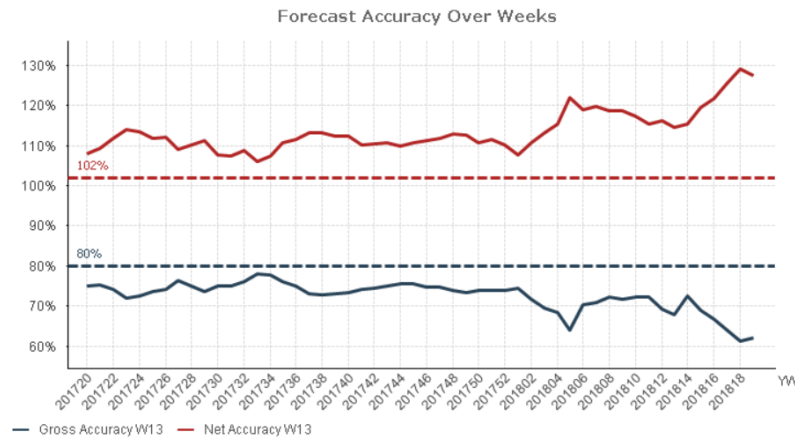


Figure 13. Forecast accuracy and bias for the entire range of HFB 10

Level of system knowledge

The forecasting system is an industry standard application which is, according to the demand planners at IKEA, easy to understand. The biggest problem for IKEA is to assure competency within demand planning. At the moment IKEA do not have a detailed competency profile for demand planners and due to this, assessments of an applicant's competency are subjective which results in varying levels of expertise within demand planning.

Understanding the implication of the demand planner's role in the entire IKEA business may be hard due to the large size of the company this is something that the operational demand planners agree with. They also point out that there are a lot of stake holders which have opinions about the forecasts and if the demand planner does not stand up for his/her forecast it is easy to get run over. There is a tendency amongst more junior demand planners to produce higher forecasts to secure supply to cover up for insecurities.

5.2 New product introduction

5.2.1 Classification of new products

There are no specific classifications of new products at IKEA during the product development phase. The only known definition is replacers, which is when an existing product gets a direct replacer. Besides that, there are informal ones such as colour-change. The company has articles that are referred to as complementary articles, which is for example a chair that consists of a frame and clothing. Both those articles need to be finished at the same time since on their own they are not functional. The only time new products are officially being classified at IKEA is during the step of the demand planning process called 'define forecast uncertainty', see section 5.3.4.

5.2.2 Alignment of the supply chain and the new product development process

The product development process at IKEA can take anything between 6 months and 3 years from idea to finished product. The time it takes depends on the level of complexity of the project. For instance, if it is a new kitchen system, which has high complexity, then the process is likely to take a much longer time than if it is just a minor change to an article.

A POD-team (Product Offer Development team) develops new products at IKEA. The team is a part of a HFB and work together throughout the product development process. The POD-team can look different depending on which HFB it belongs to, but it usually has the cross-functional structure displayed in Figure 14. The product developer is leading the product development project. The project controller is responsible for making sure that the project keeps to the time-lines and budgets, as well as handling the administrative duties of the project. The product development engineer is leading the technical development of the project. The supply chain responsible task, handled by a sourcing developer, analyses supply chain opportunities and limitations. The supply chain responsible role also has a responsibility of leading and securing supply chain activities, as well as optimising sourcing and the logistics set-up. Lastly, the “meeting the customer responsible” ensures a great meeting with the customer as well as drives the total commercial agenda for all relevant sales channels. The “meeting the customer responsible” role is usually taken by a sales responsible. The sales responsible acts as a link to retail in the different countries through the sales leaders. The roles in the POD-team all have connections to external stakeholders, which aid the product development. Some of these stakeholders are pictured in Figure 14.

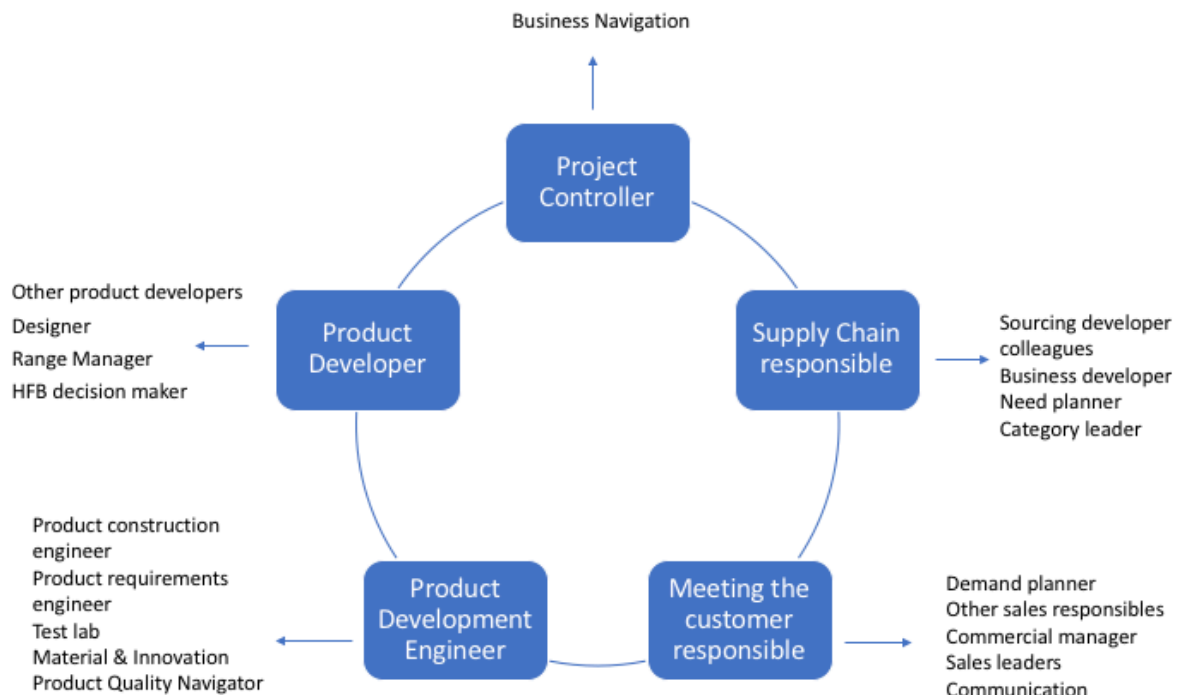


Figure 14. The POD-team structure

The product development process at IKEA ends with a business case approval, which happens eight months prior to sales start date at the latest. At this point, the product is fully developed and has a sales start date, initial forecast, DWP (dimension, weight & packaging), and a production plan. The project is then handed over to the PBSS-process, which is

responsible for making the products available at the store and online. For IKEA, it is important that the product development process is not delayed since sufficient time is needed for production and the distribution activities. After the business case approval, the business tool PIA (Product Information Assistance) is used to add all the information regarding an article. Examples of such information are article number, sales start date and the forecast. Furthermore, an article can exist in three different phases in PIA; created, approved and sellable. When the phase is manually changed to approved, the information is sent to all the other supply systems.

5.2.3 Launch characteristics

IKEA has a 25% renewal rate of their product range resulting in an annual launch of 2500 articles. However, there are many more article numbers since some articles have different numbers for different countries. For example, plugs are different in different countries which means they will have separate article numbers, even though it is the same product. New products are launched four times a year at specific product change dates (PCDs). These dates are the 1st of February, April, August and October. One of the reasons for having four PCDs is that the average customer visits IKEA four times a year. Therefore, the company wants the customers to experience new articles every time they visit the store. The main strategy for IKEA has been to launch their whole product range in both the stores and online at the same time. However, the full range is not available online in all the online markets yet. There is currently an ambition to make the whole range available online.

The IKEA range is classified into mandatory and optional products. The mandatory products are mandatory for every store to sell. The optional products are, however, not relevant for all the markets. Therefore, IoS usually asks the different countries if they are interested in selling the optional products. By doing so, the different countries are given a chance to have their say and choose by themselves. Through the ambition to make the whole range available online this would include the articles which are optional for stores to sell. Subsequently, the range will eventually be larger online than the stores.

5.2.4 Failure risk factors

IKEA has identified several unique risks for new product introductions. Depending on the degree of innovation and complexity of the article, the risks differs a lot. From a forecasting perspective, if it is merely a minor change of an existing product, the demand uncertainty is relatively low. As opposed to a larger change, where the demand uncertainty is relatively high. From a production perspective, there is a risk regarding the manufacturing process as well. A small test series is manufactured first to make sure everything is under control. However, the test series does not eliminate the risk of an error once the mass-production starts. Whether or not IKEA has previously worked with a supplier also affects the risk for new products. If it is a brand-new supplier, then it takes some time for them to understand how to work with IKEA and vice versa.

Additionally, there is a risk of delays in the product development process. For instance, failure of tests that take place towards the end of the process is a risk. There is also the risk of the development process ending up being more expensive than first anticipated. If that is the case, then the business case could become weaker than the initial one.

Moreover, there are also risks related to launch decisions, both in the stores and online. The product volume that is distributed to each store before the launch include both what is

planned to be sold, as well as what the store plan to use for promotional activities. If promotional activities are not planned, then there is a risk of shortages of sellable products. To avoid that kind of availability issue, IKEA is working a lot with synchronising the global and local plans. By doing so, the retail side can realise what will happen and consequently promote another article in the store.

Furthermore, the company has many global sales starts, which means a new product is launched simultaneously everywhere in the world. Since the risks increase with a co-ordination of that level of complexity, good foresight is needed in the planning processes.

5.3 Demand planning for new products

According to IKEA, predicting if a new product will be a success is very difficult. Further complexity is added when predicting where that potential success will happen as well, since that is where the assortment should be placed. Therefore, demand planning for new products is important for the company.

5.3.1 The forecasting process for new products

Forecasting for new products start in the previously mentioned POD-teams within the product development process. There, an initial forecast is created for how much is planned to be sold world-wide per year of the new product. The initial forecast number is defined by what is planned to be sold and how it is planned to be sold. The process is iterative since changes made along the product development process needs to be updated in the forecast. For instance, if the design or the price of the product changes, then it can affect the customer demand. Therefore, it needs to be reflected in the forecast. The initial forecast is registered in PIA before being broken down into less-aggregated forecasts by demand planners. When the forecasts are broken down further, certain aspects need to be considered. For example, some products are not sold at every location. The information of what countries and what stores are planning to sell the product need to be added to the forecast. In some cases that information is not available at the right time due to communication misses between the stores and central IKEA. If that is the case, additional uncertainty is imposed on the demand planners.

The demand planners have a challenging task dividing the forecasts further since there are no historical sales for new products. To compensate for that, a reference product is used to compare with. After the forecasts have been broken down into country level, the break down into store level is done automatically by the system also based on the reference product. Furthermore, the forecasts are also broken down into how much will be sold in stores and how much will be sold by customer order.

5.3.2 Input data

The difference in input for demand planning for running- and new products is significant for IKEA. As previously mentioned, new products lack historical sales data. To handle that, a reference product is chosen by the demand planner. The reference product should have some similar features, such as design, function, or price.

The challenge with making forecasts for new products is mainly that it is done based on assumptions. For instance, the initial forecast is based on how well the development team believe the product will sell. The company believes their over-forecasting usually starts with the initial forecast because of an overly optimistic development team. All the following splits

of the forecast are also based on the assumption that the new product will behave similarly to the reference product. Those assumptions are causing the forecast accuracy to be lower for new products compared to existing ones. IKEA also notices that new products can affect the existing products through cannibalisation. Demand planners therefore also have to consider if sales of a similar existing product may be affected when a new product is introduced.

5.3.3 Forecasting techniques for new products

When making assumptions for new products, IKEA is using qualitative techniques. The assumptions are made in the POD-teams as well as in the scope of the new product development project. They are made by the demand planner and the sales responsible, although sourcing and product development can also be involved. Together they aim to reach a consensus forecast, which is crucial since it steers the whole business case. The degree of change determined the difficulty in making the assumptions. For instance, a colour-change to a product is much easier to predict than a completely new one.

Otherwise, the forecasting technique is the same for all types of new products at IKEA. Once the initial forecast is created and historical sales data from a reference product is added, the new product is handled in the forecasting system the same way as the existing products.

5.3.4 Forecast uncertainty

The initial forecast for a new article is complemented with additional information about its forecast uncertainty. This is done in the part of the demand planning process called “Define forecast uncertainty”. The purpose of this part is to support the identification of articles with high forecast uncertainty in the initial forecasting process. When it is done properly, the risk of poor availability, disinvestment and poor supplier relations is minimised. Subsequently, good customer availability to the lowest possible cost can be ensured. However, the demand planners rarely use this part of the demand planning process.

The starting point of it is when the initial forecast is created for a new article. The forecasting uncertainty can have any among three different levels of uncertainty. The first level is equal to low forecast uncertainty, which is the case for when a running article is replaced. The second level is medium uncertainty, which is the case when a new article with existing function and price level is launched. The third level is equal to high uncertainty and is appropriate for new articles with a new function and/or a new design. Determining the level of forecasting uncertainty is the demand planner’s responsibility. The define forecast uncertainty step ends after the previously mentioned roles have agreed upon a forecast uncertainty classification.

Once the forecast uncertainty is agreed, the sales responsible or “meeting the customer” responsible brings the classification to the POD-team to assist other planning processes. The classification is supposed to form a basis for different scenarios of launch decisions. For instance, if the uncertainty is low then the article should be launched globally given that required capacity is available. In contrast, if the uncertainty is high, the article might be suitable for launch in a limited number of stores with an increased safety stock.

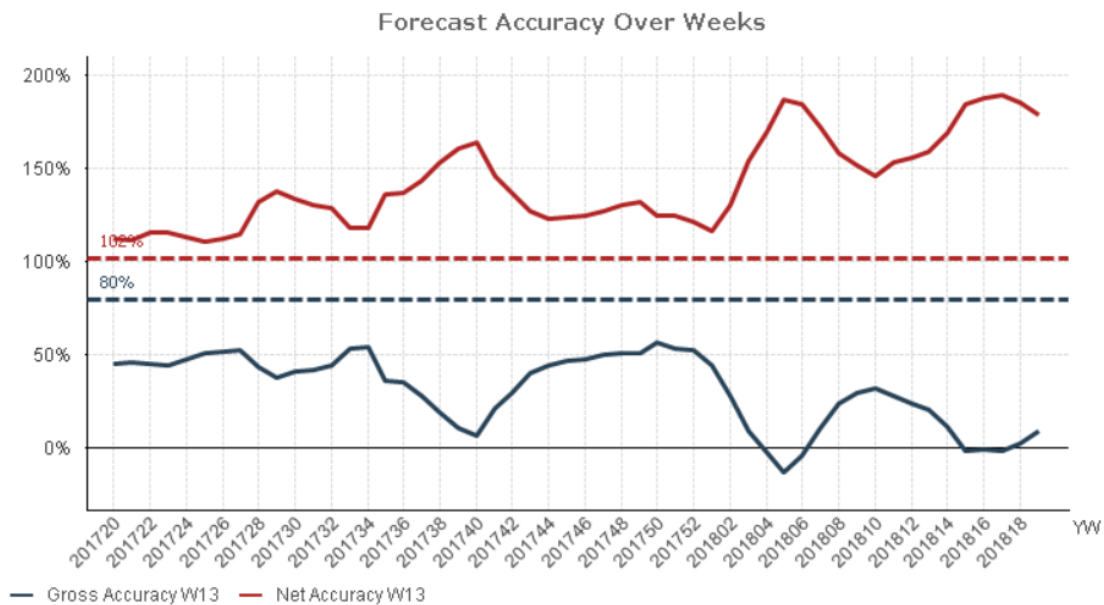


Figure 15. Forecast accuracy for new products

Figure 15 displays the issues which IKEA has with low forecast accuracies for new products. This figure displays the forecast accuracy of all new products for HFB 10 Lighting & Home Smart. The forecast accuracy for the new products is below 50%.

5.4 Omni-channel retailing

5.4.1 Sophistication

IKEA has historically been a pure store-based retailer. However, in 2007 IKEA started selling through an online channel as well. IKEA are establishing e-commerce step by step in the different markets. Today, there is an online sales channel in all their 29 markets.

They have three main channels; stores, support centre and online. Each one of these have different fulfilment offers presented in section 5.4.3. The definition of what is considered e-commerce is becoming increasingly blurred for IKEA. This is because using more than one channel for a purchase is becoming increasingly common. For example, in Sweden 65% of customers that visit the stores have done preparation online before purchasing. They also know that 30% of the customers inside the store use their smartphone to visit the IKEA website while shopping. The boundary between online and offline is not completely blurred though since about 7% of the global total sales are pure online sales. However, IKEA is decreasingly sorting their business into channels and instead refer to the whole spectre as retailing.

To help integrate the online channel into the IKEA Group, a programme called Multi-channel Transformation Programme was set up. The programme is cross-functional and cross-organisational and consists of eight streams. The streams are Customer experience: Customer Relations, Range & Supply, Customer Fulfilment, Customer Experience: New Web & Digital, Group Finance, Group IT, Marketing & Communication, and Business Navigation. The strategy for the programme is to create “One IKEA for me”. That means they will be available when the customer wants and where the customer wants. With that as guideline, different solutions can be constructed to improve the customer interaction. The focus areas of the programme are therefore to have seamless and unique touchpoints and achieving great accessibility to the IKEA offer. The company is using both digital and physical touchpoints

to interact with the customers, such as social media, their website, as well as support centre functions like calls and chats. Besides their regular stores, there are also touchpoints that are not full-scale. For instance, in Stockholm they have a very small store, only focused on kitchens.

5.4.2 Customer requirements

According to IKEA, customer behaviour has changed since omni-channel retailing has emerged. One of the main changes is that the customer is more well-informed than before since there is a transparency that enables comparisons to be made. They also believe customers do not think in channels. Instead, they consider seamlessness in the shopping experience as important. How they want a product also depends on the situation. For example, a customer can see a product in the store but then want to get a second opinion from another person before buying it online later. If the product then is not available to buy online, that would be an issue for the customer. IKEA has identified customers' expectations on availability to be immense, expecting products to be available anytime in any channel. These expectations are a very challenging aspect for the company since it puts higher demands on the supply chain.

Personalisation is another requirement that has become increasingly important for customers. Customers want to be seen as individuals with their own unique needs and preferences instead of being seen as part of a group. They want offers that are relevant for them when they have time and are in the mood. The dynamic has shifted from previous decades when the producer had the power to decide what would happen. Today's well-informed customers are the ones telling manufacturers and retailers what they want. However, it is challenging for companies to accommodate their supply chain fully after their customers' demands. Offering personalisation requires more flexibility in the manufacturing and ordering processes. The level of expected personalisation depends on what category of product is in question. For furniture, IKEA has not recognised personalisation to be a significant change following omni-channel. However, they still have a concept called "make it your own". Customers can take a standardised product and together with decoration and minor tweaks make it their own. IKEA also have a concept called "IKEA hacking", where customers are modifying IKEA's modular furniture to make it their own.

IKEA also believes that customers today have increased expectations on reliability and precision. Companies need to make a precise promise on delivery date and keep that promise. For instance, IKEA used to be able to offer a delivery time such as "about 5 Weeks". Nowadays, this kind of offer is not short nor precise enough to stay competitive.

Furthermore, IKEA believe influencers and marketing in social media also are becoming important for attracting customers. Companies must be active on social media with sell-links ready in their posts. Having a link for a direct purchase included in a social media post is important for increased availability since many customers find it inconvenient to search for the product themselves.

Another aspect to consider is what the buying behaviour for a new product is. There might be a situation where certain products should be made available mainly online. This is especially important to consider for more niched products that have a distinctive customer segment. That means if the customer segment for a certain product that is launched is active online, it might not be necessary to have a large inventory in the stores of that product.

Moreover, IKEA believe their stores will undergo a change in their role. They will however continue to be important interaction points in the distribution network. The stores are IKEA’s biggest sales channel. The stores also one of IKEA’s most important competitive advantages since this is where their staff is ready to offer their competence and service. Therefore, IKEA believes they will become more about the people and transfer of knowledge. Basically, the sharing of home design competence, ideas and inspiration will take a more significant role compared to how it is today.

5.4.3 Network structure

The IKEA distribution network structure has undergone significant change following the emergence of omni-channel retailing. The former distribution network is portrayed in Figure 16. In that network, the products are delivered from the suppliers either through distribution centres or by direct delivery to the stores. There are two types of distribution centres: high flow and low flow. Which distribution centre the product is allocated to depends on its sales volume. The products which belongs to online customer orders as well as customisable products that are ordered in stores (for example kitchens) are handled through a CDC (Customer Distribution Centre) and from there shipped to a customer’s home.

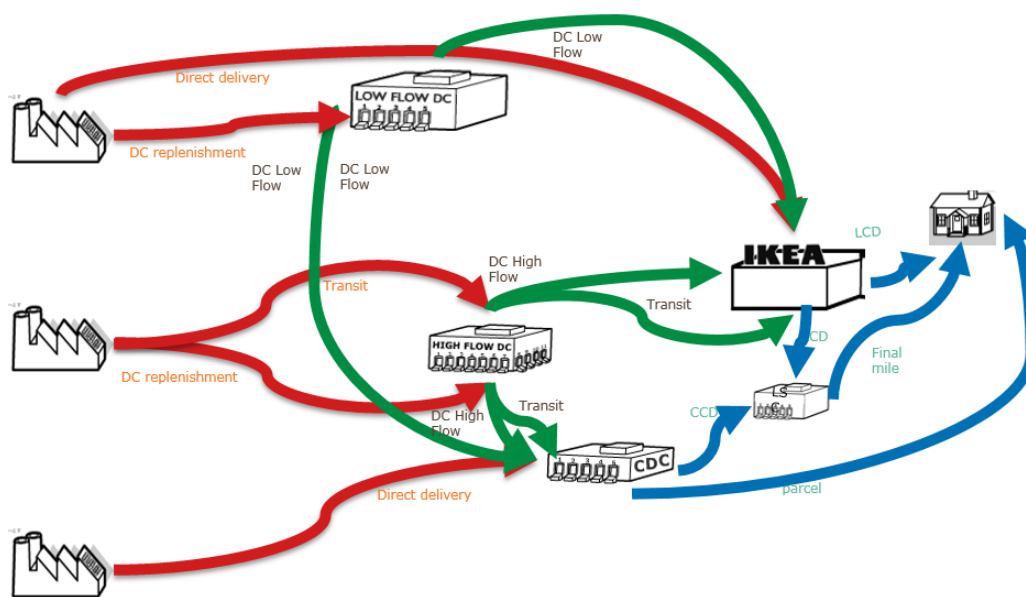


Figure 16. IKEA's old distribution network

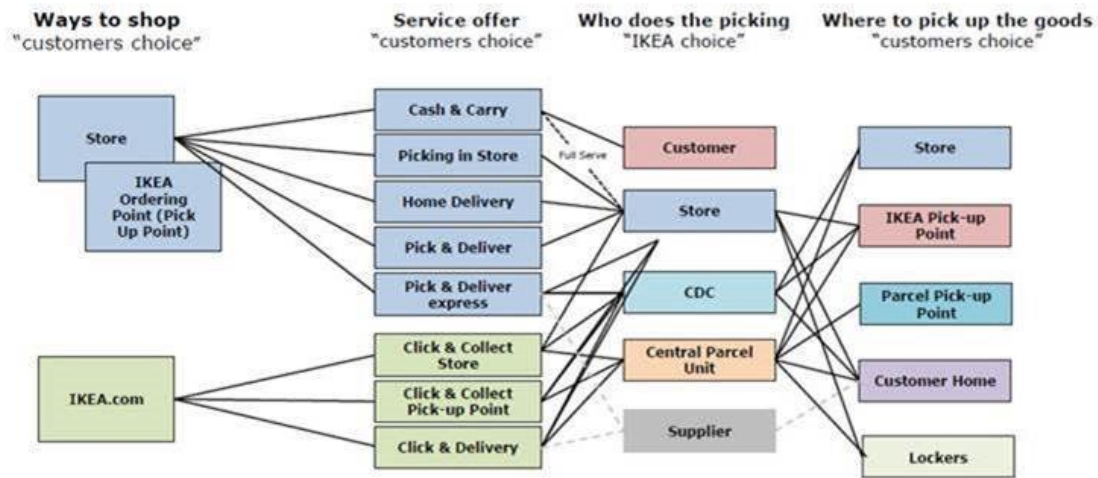


Figure 17. IKEA new distribution structure

In the new distribution network displayed in Figure 17, online orders are also handled through a CDC. However, differentiation is done depending on the size of the products in the order. If the size of a product is smaller than 150x60x60cm and 20 kg, then they are handled in a CPU (central parcel unit) instead of a CDC. Third part logistics companies operate most of the CDC's. For home deliveries, the orders are shipped from a CDC to transportation hubs. In order to reach the online customers quicker and in new markets, IKEA are continuously establishing new CDCs and CPUs. This is also a response to their growing share of e-commerce among sales.

IKEA's omni-channel implementation has come further in certain markets compared to others. This is due to the fact that customer demand on order fulfilment and the last mile differs among different markets. Therefore, different markets have implemented different distribution structures. For instance, in the Swedish market there are 12 different fulfilment offers based on the different channels. Firstly, there is a possibility to place an order through the service centre. For store-based concepts, the customers can choose to buy in store and take the product home themselves, buy in store and pick it themselves before getting it home delivered, or buy in store and have it picked by an employee before either having it home delivered or taking it home themselves. Regarding online orders, the customers can choose to buy online and have the product delivered. It can be delivered to either a postal service pickup spot or to their home. The product can also be carried inside the customer's home if it is a large parcel, which is often the case for IKEA products. There is also a possibility to pick up online orders in stores, in pickup lockers, or at a pickup point. The strategies for the pickup stores are not fully developed yet. Moreover, the pickup points currently have a parent store. Meaning that if the stock is checked in the store it is not possible to distinguish if it is in the pickup point or at the store. Another aspect to consider regarding the pickup points is if there will be anything else sold there. For instance, the company could sell other small items at the pickup point to try and maximise the sales.

Additionally, the stores might also be used more for different last mile fulfilment concepts due to their strategically placed locations. How IKEA should ideally operate by having the stores act as small warehouses to complement the larger central ones is something they

consider a challenge. The click-and-collect orders are currently being picked from the store's inventory. However, sales are forecasted as customer orders and therefore not included in the stores demand forecast.

5.4.4 Risks

A risk for IKEA is that their store locations are far from the city centres. According to the company, the current remote locations are not the future. However, the last mile delivery set up needs to be in place before making such changes. That is a challenge for IKEA. Since many of IKEA's products are bulky furniture, there must be a solution in place for taking the bulky products home inside the city centre.

Omni-channel has meant that the IKEA distribution network has developed in complexity, with new nodes to consider. However, the network is developing differently in different markets. The risk with the differently developed markets is that it makes centrally performed planning very challenging. Instead, different considerations need to be taken for the differently developed markets.

Another risk, which is magnified by the omni-channel environment, is the difficulty in planning for online sales activities. These can cause big problems in their supply chain when not properly forecasted for. An example of a sales activity is what happened on Black Friday in Sweden. During that day, IKEA in Sweden offered free delivery to their customers when buying online. As an effect of that activity, they expected a 500% rise in sales. Instead, the increase ended up being on 1600%. Since the system IKEA are using in Sweden is old, the availability status is not real-time but updated every night. This meant that when customers ordered that day, they received a confirmation even though there was an out-of-stock situation. When the problem was realised, the delivery times unexpectedly increased for the customers. Situations like this are harmful for IKEA's reputation.

5.5 Future of demand planning and omni-channel effect

Market context

E-commerce is expanding into more and more countries and the markets all have different levels of e-commerce volume and fulfilment offers for the customers. The UK market is IKEA's leading market in omni-channel followed by US, France and Germany. According to IKEA, the effect of e-commerce on business growth depends on the saturation and market penetration IKEA has in that market. In markets where there are many stores well distributed throughout the country and sales are high, IKEA believe that omni-channel will only lead to a sales share shift. This sales share shift means a move from store sales to more e-commerce sales. In markets where the stores do not have good coverage IKEA can bring in new customers. Customers who did not have the opportunity to buy products with the old structure. According to IKEA, the share of online sales and store sales in the system is based on how it looks today. The developments on the markets are not yet fully visible in the history and because of this the forecasts are more difficult to make accurate. This leads to the model not being as representative as it should be.

Omni-channel effect on demand

IKEA is not fully aware of how omni-channel will affect the different parts of their business. There is a possibility that different products will sell more online than they have in the stores. IKEA believe that perhaps furniture will benefit more from online sales than the smaller products due to their higher value and the difficulty for customers to bring them home. Products which do not have high enough value will be difficult for IKEA to make a gross margin on in online sales. A possibility for IKEA is to sell these products as add-ons or put a lower limit on the value a customer can buy for. According to IKEA, they need to investigate what product areas benefit mostly from e-commerce.

IKEA also highlight the difficulties with online campaigns. In e-commerce, there is a possibility to create a campaign with for example free shipping costs. IKEA are unsure which products that will be affected by this type of promotion online since there is no data of these types of campaigns. A strategy to handle these uncertainties according to IKEA, is that the demand planners should follow the ABC-classification of the forecasts. Following them will mean that products which contribute the most to IKEA's business will be prioritised and safeguarded.

IKEA also believes that the online demand might not have the same characteristic seasonal pattern as store sales. The customer could be buying something else and choose to add on a product because it appealed to the customer. These changes in demand characteristics means that the sales curves for products could look different in omni-channel. However, IKEA has not identified any particular sales patterns for online sales yet.

Forecasting for fulfilment

IKEA believes that in the future the stores will not look like or be used the way they are today. There will be a shift from store to other distribution points or pickup points. Previously, a sales forecast would merely state the amount of a certain product IKEA expected to sell in total. According to IKEA, the forecasts of today require a higher level of detail. IKEA believes that the changed network will require forecasting on handling and fulfilment types. For example: 3000 pieces through the store, 1500 through the CDC and 500 through pickup points. This means that the goods flow can be planned for and directed to the right fulfilment, beforehand. IKEA is currently discussing the question on where and what levels to forecast on. For example, if they should separate online orders and cash & carry on the country level to enable more detailed planning. IKEA has been unable to decide on new forecasting levels due to the complexity of the question and limited data. The demand planners already have about 700 000 forecasts each to keep track of. According to IKEA, creating forecasts centrally on lower levels would mean more forecasts for the demand planners.

The different maturity levels of the e-commerce markets also create challenges for IKEA. Different markets have different maturity in their network. A risk they have recognised with splitting up the demand too much for certain countries is that the forecasted sales volumes would be too low. Having different structures for different markets would be too complex for the system and the demand planners.

6 Analysis

This analysis chapter will compare the three external retail companies along with IKEA to the theoretical framework as well as study the challenges of omni-channel retailing on demand planning for the companies.

Since demand planning for new products is included in the general demand planning process at all of the external companies, this is not covered separately in this chapter.

6.1 RELEX Solutions

6.1.1 Demand planning

Data gathering

Småros (2018) presents the most common technique described by theory for inputs into demand planning for new products. However, Småros (2018) also states that it is not only the sales data that is important. Companies also need to take into consideration how a new product will sell during its life cycle. The sales curve for the new product might look different than the one for the reference product.

Demand forecasting

Småros (2018) pointed out the difficulty to forecast for new products, which is also stated in theory. She also describes that different types of new products have different effects on customer demand, as described by Kahn (2006). Therefore, forecasting is more accurate if the type of new product is taken into account when creating the forecast. Småros (2018) described that some forecasting techniques are suited for some types of new products. For example, the technique of using a reference product that Småros (2018) explained is according to Mas-Machuca et al. (2014) often used for line extension products.

Småros (2018) identifies along with theory that how small forecasting buckets a company can have depends on the sales volume of the product. She also states that the planning horizon should not be too long since the effects of unknown future changes make them unreliable. The theory also describes the unreliability of longer forecast time horizons.

Success factors

Just as Moon et al. (1998) states Småros (2018) believes it is important for the companies to be aware of the importance of demand forecasting for the company's business. There are some cases where forecasting is more important for companies, for example when the supply chain has long lead times. Long lead times also amplify the inaccuracies of the forecasts and therefore forecast accuracy is important for the company. However, increasing the flexibility of the supply chain could help the company mitigate the risks of inaccurate forecasts. Supply chain flexibility could be increased by, for example, shortening lead times from suppliers (Småros (2018)).

6.1.2 Demand planning in omni-channel retailing

The main challenges, according to Småros (2018), with demand planning for omni-channel retailers is the difficulties of forecasting the small volumes of the online sales channel. As previously stated in theory, forecasting small volumes create large errors from the effect of random deviation. However, Småros (2018) still recommends that companies separate their forecasts for online sales and store sales. The reason for this is that online demand has different characteristics than store demand, see e.g. Tarn et al. (2003). Reactions to campaigns in stores and online are also different according to Småros (2018) and therefore the forecasts should be separated. To be able to make forecasts on smaller volumes, there is a need for an advanced forecasting system along with a system to collect POS-data from the different sales channels (Småros (2018)).

Småros (2018) states that retailers need to anticipate the forecasting needs of the future. As online sales grow, they will have larger effect on the supply chain. Then retailers might need to forecast on fulfilment types in order to plan their supply chain better.

Table 10 & 11 presents a summary of the analysis of RELEX.

Table 10. Summary of RELEX analysis for demand planning

Demand Planning	
Data Gathering	Historical sales data, commercial activities & campaigns New products - sales data from reference product, sales curve.
Demand Forecast	Forecasting technique - Forecasting system depending on business needs. New products: forecast differently depending on type. Time periods - Forecast time periods depending on business. Fresh products daily buckets. Lower volumes need longer buckets (weekly or monthly).
Success factors	Importance of demand planning depends on flexibility of supply chain and company's responsibility in the supply chain.

Table 11. Summary of RELEX analysis of omni-channel effect for demand planning

Omni-channel effect for demand planning
Separate forecast for online & store demand
Forecasting on fulfilment types depend on sales volume
Advanced forecasting system needed to forecast on smaller volumes
Online demand volatile for price sensitive products
Good system to capture POS-data
What are the forecasting needs in the future?

6.2 Company X

6.2.1 Demand planning

Data gathering

Historical sales data and commercial activities generate the forecasts in line with what is described in theory. The commercial activities and campaigns for the different sales channels are communicated to the forecasts. The communication of these activities ensures, as described in theory, a more accurate demand forecast which supports better planning. Since the clothing business is dependent on weather, company X have included this aspect into their input data. This extra data into the forecasts implicates they have the opportunity to capture if a season finishes later or starts earlier.

Demand forecast

Company X's forecasting technique is quantitative based on historical sales data which is preferred according to theory. The company does however not have an advanced forecasting system which could have aided them in identifying seasonality and trends. Some of that must now be done manually by the demand planners. The company handles new products by using sales data of a similar product as most companies do according to theory.

Success factors

The logistics department at company X are aware of the use of an effective demand planning process to keep control of logistics costs. They know that the forecasts can support correctly allocating products and therefore keeping product availability high and lead times low see e.g. Moon et al. (1998)).

6.2.2 New product introduction

The company is working somewhat with classification of new products. However, they do not classify them after level of newness. According to theory, classifying the products more could help the company to understand and mitigate the demand risks of different products.

The company's launch characteristics are highly connected to the company's business. Since it is a fashion company, customers expect new products frequently. Products are also very seasonal and depend on weather. Testing products in some of the markets before launching everywhere helps the company understand the customers demand of the product.

6.2.3 Omni-channel

Sophistication

Currently, online sales are only a small percentage of the total sales of the company. The company is however putting a lot of focus into becoming an omni-channel retailer. They have multiple touchpoints with their customers such as store, website and social media. These touchpoints indicate omni-channel management according to Table 4. The company is aware of the importance of being where the customer is. The plans to sell online in markets where

they do not have stores indicate that the company wants to maximise the benefits of the online sales channel.

Customer requirements

The company has noted the customer requirements, which are presented in theory, see e.g. Accenture (2015). The requirements of low prices, flexibility and fast deliveries all put a big strain on the company's logistics operations.

Network structure

The company is trying to meet the customers' new expectations by offering more and more fulfilment types. An example of a fulfilment type tailored after the modern shopper's need is the possibility to buy in store and get it home delivered. The company is not offering store pickup at the moment, which is something that Hübner et al. (2016) refers to as integral for omni-channel retailing.

The company has identified the importance of efficient warehouse operations to deliver to customers within the promised delivery times. Hübner et al. (2015) also supports the importance of optimised logistics operations. The demand plan serves as an aid in planning the flow of the warehouse. As well as a basis for planning the staffing for picking and shipping of both online and store orders.

6.2.4 Demand planning in omni-channel retailing

The omni-channel environment has affected company X's business with increased uncertainties and more demand variation, as explained in theory. According to theory, it is easy for customers to compare competitors and campaigns/deals online. Reactions to campaigns online is something the company does not have enough data on which result in inaccurate demand forecasts. The company has noticed that the online sales have higher peaks for campaigns and this will have a larger effect on the business as online sales increase. Customers marketing products online is also something which causes unplanned spikes in the sales which is hard for the company to foresee.

The forecasting level is another impact of omni-channel identified on the demand planning at company X. Company X has their demand forecast separated for online and store sales. Having the different channels' forecasts separate means that the complexities and uncertainties of the e-commerce demand explained in theory will not affect the forecasts of the stores. The online forecast is not broken down further, for example into fulfilment types. Today the online sales stand for ten percent of the total sales but this is constantly growing. The low sales volumes online mean forecasting for fulfilment types would result in high forecast inaccuracy according to theory. Random variations have larger effects in low volumes and therefore create large deviations in the forecast. When online sales take a bigger share of total sales the company will have more reason to forecast on fulfilment types. Forecasting on fulfilment types would give the company a basis for optimal allocation of products to meet the customers where they are. Optimal allocation would lead to improved product availability and reduced lead times to customer. To create forecasts on fulfilment type historical sales input needs to be added the detail of fulfilment type. Therefore, a system capable of this is needed.

Table 12 & 13 presents a summary of the analysis of company X.

Table 12. Summary of company X analysis

Demand planning	
Data gathering	Historical sales data, commercial activities & campaigns, weather.
Demand Forecast	Forecasting technique - Quantitative with ERP-system & BI-tool. Aggregation level - Separate forecast for online & store sales.
Success factors	Demand planning to allocate products correctly.
New product introduction	
Classification of new products	Repeat & Running.
Launch characteristics	Frequent launches. Launches in all markets at the same time, sometimes tests in few markets first.
Omni-channel	
Sophistication	10% sales. Online sales channel in all markets.
Customer requirements	Demands on low prices, flexibility & fast delivery.
Network structure	Stores, postal service pickup, home delivery from store. Planning for more fulfilment types. Integrated warehouse for store and online orders.

Table 13. Summary of company X analysis of omni-channel effect for demand planning

Omni-channel effect for demand planning
Increased demand variations & uncertainties.
Not enough data on online campaigns.
Separate forecasts for online & store instead of fulfilment type.

6.3 Company Y

6.3.1 Demand planning

Since company Y does not have a structured process for demand planning they are missing out on important aspects for creating the demand forecast. According to Chen (2007), the demand plan is the base for other planning activities, which means having it structured would be beneficial for other parts of the company as well.

Data gathering

Since company Y constantly introduces new products, historical sales data is typically missing. Instead, the sales data from a similar product is used as a reference as theory explains can be done for forecasting new products. By considering cannibalisation as well, the company is mitigating the risk of inaccuracies in the forecasts of other products.

Demand forecast

The company relies on the experience of employees to a large extent when creating the forecasts. This qualitative type of forecasting is very common among companies, see e.g. Moon, et al. (1998). Company Y is using quantitative methods as well though, with programs such as excel. Therefore, the company is using both qualitative and quantitative tools, as recommended by Moon, et al. (1998) in order to achieve an effective forecast.

By aggregating their forecasts on their whole assortment, the risk for the bullwhip effect at company Y decreases. The demand unit for company Y is category of products. For example, a category can be shirts, which includes many different kinds of fits and colours. The demand group is what the company call planning markets. Those can be either clusters of countries or individual ones. Additionally, the company use separate forecasts for the online channel and the offline channel.

By breaking down the original forecasts into weekly buckets, the forecasts become more reliable, see e.g. Ylinen et al. (u.d.). The company also has many fast-moving products due to their business type, meaning it is easier to identify systematic sales patterns for a shorter time period.

Success factors

Company Y is moving towards a pull system since they have had a tendency of over forecasting. By delaying their orders to wait for how the markets reacts to a product, they mitigate the risk of large backlogs. Thus, they have realized how planning for the demand can reduce costs for the company. The company is continuously working on improvements in the area.

The company is working cross-functionally regarding the forecasts, which is beneficial according to Vlckova & Patak (2011). The example of discussions between sales and logistics suggest a collaboration is taking place, which is the highest form of cross-functionality according to Moon, et al. (1998). However, the company does not have an independent function for forecasting. Without an independent function for it, there is an increased risk of a biased forecast, see e.g. Moon, et al. (1998).

The company uses internal measurements of the forecasts. Due to the unstable nature of online commercial activities, reaching the goals they set is difficult to achieve.

Given that the employees seem to understand the downstream ramifications of the forecasts, the company knows the importance of forecasting the demand.

6.3.2 New product introduction

The company is not classifying their products and might therefore miss identifying differences in risk for different products. The company is launching new articles very frequently due to the nature of their business. The company is also looking to broaden their assortment online, which is desirable by customers in omni-channel retailing.

6.3.3 Omni-channel retailing

Sophistication

The company has had an online channel for 20 years and it now stands for 12-15% of their total sales. Currently, they have online sales in 37 markets. Thus, the company has a lot of experience with online sales.

Customer requirements

The company has recognised the customer behaviour of searching in many different channels online before a purchase. By doing so, the customer is more knowledgeable today than before. Customers today also appreciate a large assortment to choose from. Hence, the company has made their whole assortment available online. According to the company, making a large assortment available is also cheaper online than for the stores. The company focuses on achieving short delivery times and high service levels, which theory states is important in omni-channel retailing.

Network structure

The company believes their distribution network has changed following the new customer requirements in omni-channel retailing. For instance, more nodes have been required to achieve shorter lead times to customer. They offer several different fulfilment offers that theory states are important in omni-channel retailing.

Given their large number of stores, the changing role of the store in omni-channel retailing is of significant importance for company Y.

However, the company is not organised as an omni-channel retailer. They are keeping their online channel and the stores separate in order to maximise the offer per channel. Their business system is also running on separate IT platforms. Although, those platforms are currently being integrated to simplify matters.

6.3.4 Demand planning in omni-channel retailing

The company believe their stores will play a central role in the future, which makes sense given their large number of stores. The role of the stores for omni-channel retailers is a hot

topic in literature, see e.g. Rigby (2011) or Hübner, et al. (2016a). Company Y believes this will influence the demand planning as well. It is mainly about having clarity in where the actual demand takes place. For instance, if using the inventory of the stores for the online orders, then this needs to be clearly informed throughout the organization. This is something the company is also recognising as a potential issue when online and offline channels are interchangeably used.

Forecasting for online campaigns is a problem for company Y's demand forecasting. E-commerce is according to the company very deal-driven and this can create large demand peaks. These demand peaks have been hard to capture and has led to back logs for the company.

The dynamic that demand is volatile online due to customers irregular shopping behaviour is not something the company believe they can change. Instead, they are focusing on figuring out a way to adapt.

Table 14 & 15 presents a summary of the analysis of company Y.

Table 14. Summary of company Y analysis

Demand planning	
Data gathering	Historical sales, mainly using reference product.
Demand Forecast	Forecasting technique - Qualitative & quantitative tools. Weekly buckets. Considering cannibalisation. Aggregation level - Separated forecasts for online & store sales. Demand unit: whole assortment, product category. Demand group: planning market
Success factors	Over-forecasting costly. Cross-functional but not independent Measurements difficult in online-environment. Employees understand effects of forecasting.
New product introduction	
Classification of new products	No classification.
Launch characteristics	Frequent launches. Broadening assortment online.
Omni-channel	
Sophistication	Online channel for 20 years. 12-15% of total sales online. Online sales in 37 markets.
Customer requirements	Knowledgeable, large assortment, delivery times, service level.
Network structure	More nodes, many fulfilment offers, seamless touchpoints, many stores.

Table 15. Summary of company Y analysis of omni-channel effect for demand planning

Omni-channel effect for demand planning
Uncertain future.
Role of stores important.
Inventory allocation for click-and-collect.
Problems with forecasting online campaigns.

6.4 IKEA

6.4.1 Demand planning

IKEA are aware of the importance to their business of anticipating customer demand as pointed out in the theory. They are also aware of how it can affect their supply chain and how it can help them plan for the supply chain as well. Due to this awareness, IKEA has a separate process for demand planning. The demand planning process at IKEA resembles the one described by Szozda & Werbinska-Wojciechowska (2013), with the addition of a step for categorising articles according to their forecast uncertainty.

Data gathering

Since the quality of parts of the sales planning input is uncertain for IKEA, there is a need for them to look into how commercial planning is handled. A more structured approach to make sure the level of detail of the sales plan is consistent would make it less uncertain. The fact that demand planners question the sales plan occasionally, suggest that a greater focus in this area would increase demand planners' belief in their forecasts and increase their morale. Subsequently, the quality of the forecast could be improved.

The visibility of the POS data is also not more precise than the division of customer order and cash and carry. Having more precision regarding demand patterns would give demand planning more information to base their decisions on. For example, collecting information of the sales division of fulfilment option would give the planning processes a possibility to accommodate their supply chain accordingly.

Since IKEA's forecasting system captures seasonality's and other systematic patterns without manual input, the system can be considered good according to theory. Their forecasting system also captures the impact of planned commercial events to further highlight that fact. However, some promotional activities are not planned due to IKEA's entrepreneurial structure, which creates further problems regarding accurate input data. According to Ylinen, et al., u.d., an implementation of such activities in the planning processes needs to be fixed before it is relevant to try addressing the forecast accuracy itself. Otherwise, resources might be prioritised in a sub-optimised fashion.

Type of forecasting technique

The forecasting technique at IKEA is similar to that of most companies according to theory in the sense that they rely heavily on the experience of their employees in terms of long-term planning. However, the theory recommends using both quantitative and qualitative tools, which IKEA also are doing. Their long-term planning is more qualitative while their demand planning on a two-year horizon is fully quantitative. Moon et al. (1998) state, that when the forecasting process is solely built on numerical analysis then important qualitative factors such as macroeconomics and market trends may be missed. IKEA are capturing these through their inputs from sales planning and business navigation.

Aggregation level

IKEA's forecasts are made at region level and subsequently broken down to lower levels. This is done both to avoid bullwhip effect and to ensure that the demand planners do not have too many forecasts to keep track of. IKEA's forecasts have three demand groups; region level, country level and selling unit level (store, customer order). The lowest level, selling unit level is handled solely by the system and here there are about seven million forecasts. According to Holmström (1998), finding the right aggregation level is very difficult but important. IKEA is struggling with this and it has sparked a great deal of discussion within the organisation. IKEA has chosen to only have one demand unit and that is at SKU-level. This is so that demand planners should more easily be able to go into the system and adapt the forecasts. However, not aggregating the demand unit means a great deal of forecasts to keep track of. At the lowest level that the demand planners work on there are about 700 000 forecasts.

Time periods

IKEA's two-year forecast horizon means that they aggregate on a time perspective as well, which is especially beneficial for their slower moving articles to avoid uncertainties. However, they do recognise that their quite long forecast horizons are not as reliable nor as accurate in the later stages, which both Chen & Wolfe (2011) and Ylinen, et al., (u.d.) also pointed out. The weekly updates of the forecasts mean that the accuracy is increased since the system is fed with new sales data every week.

The role for achieving business success

IKEA has recognised the benefits of good forecasts as mentioned by Ylinen, et al., (u.d.) with improving product availability as their main agenda. This is due to their aim of being available "for the many people". Since they have a tendency of over-forecasting, their safety stocks are unnecessarily large and present an increased cost for the company. The reason for over-forecasting might be optimism and over-confidence in their own products, which could be especially true when launching new products as mentioned by Kahn (2006). IKEA has also pointed out that they recognise issues with long lead times, which Ylinen, et al. (u.d.) mentioned as a factor that also impacts business results. Therefore, it might be something to address as well. In accordance with Chen (2007), IKEA know that demand planning is their first step in the planning processes which will affect the other ones. IKEA has gone further in

their understanding of the importance of the forecasts for business results by classifying them after ABC. The classification ensures that resources are spent in the best way for achieving business results. Demand planners are not putting in effort on forecasts for products which do not generate that much revenue for IKEA.

Cross-functionality

Within their HFBs as well as within a certain new product development process, IKEA has realised the benefits of cross-functionality for demand planning, as stated by Vlckova & Patak (2011). Due to the complexity of the organisational structure, further cross-functionality is difficult to achieve on a regular basis. Regarding new products, cross-functionality happens consistently through the POD-teams, which involves different functions in the company. Regarding commercial activities, there is a lack of communication at IKEA between the retailing unit and IoS. According to Vlckova & Patak (2011), lack of communication increases the risk of a demand mismatch since the demand planner cannot take the activity into consideration when making the forecast. One type of unplanned activity can be that a store manager decides to move a product into a more exposed area, which will increase demand. The subsequent effect is an increased risk of availability issues and missed sales.

A lot of the cross-functionality at IKEA seems to happen through communication, which is the lowest level according to Moon, et al., 1998. However, in for example the POD teams, meetings are also taking place to discuss the forecast. Those meetings can be considered collaboration, which is the highest level of cross-functionality. This is due to the fact that the planning process is an independent function and not part of, for instance, the marketing discipline. IKEA allows the possibility for different functions to receive equal consideration of their input into the forecast and reaching a consensus. The forecast collaboration network also contributes to collaboration for demand planning since this network has representatives from all stakeholders which have input or are affected by the forecasts.

Measurement

IKEA are measuring their forecasts with forecast accuracy and forecast bias, but do not have a clear plan of how to use it in an improving manner, which is a common problem according to Moon, et al. (1998). It seems to mainly be used for assessing how each demand planner is performing in general. Why the forecast accuracy goals are set to 80% and 70% on different levels is also unclear, which is common among companies according to theory. However, there is an understanding among demand planners that good forecast accuracy will result in good availability and reduced costs. Due to this understanding, the demand planners within the different HFBs together strive to make better forecasts. The forecast accuracy today is mostly looked at on region level for the entire demand planner's range. This means that the inaccuracy of the forecasts for new products affect the demand planner's total accuracy, which is discussed further in section 7.3.4.

Level of system knowledge

Due to the scale of the company, it is difficult for demand planners to know what happens throughout the supply chain, although they seem to have a general idea of the impact of the outcome of their demand forecasts. Understanding the outcome of their forecasts is important according to theory as motivation for the employees. The demand planners at IKEA do not receive any real reward or punishment depending on their forecast accuracy which is something Moon et al. (1998) describes as common among companies. Service level is something that traditionally has been very important for IKEA and because of this demand planners have a tendency to over-forecast to make sure that products do not sell-out and become unavailable to customers. However, over-forecasting can lead to large problems for the company such as for example not having enough storage capacity in the warehouses.

6.4.2 New product introduction

Classification of new products

IKEA are not classifying their new products in the product development process. Not classifying them means that they are missing out on identifying the risks early in the product development project since according to Kahn (2006), different types of new products have different effects on customer demand. Different types of new products might require different strategies of introduction for IKEA. For example, adding a chair in a new colour to an existing range (line extension) requires less effort for market analysis and other aspects compared to a product which is completely new for IKEA. Even though classification is not being done in product development it is done to some extent in demand planning for new products.

Alignment of SC and NPD Process

The POD-teams in product development are cross-functional and have a supply chain responsible. This ensures that supply chain issues are on the agenda from the start throughout the product development project. During the product development project decisions are taken on which sales channels and which selling units should sell the product. The customer's supply chain solution preferences for a specific product is however not considered. IKEA does not investigate the markets service needs for the product during product development as Hilletoft & Eriksson (2011) argue is necessary. There is focus on inventory and forecasting during the product development process through cooperation with external stakeholders. Inventory is secured by cooperation from the Supply Chain responsible with a need planner. Forecasts are created by collaboration between sales responsible and a demand planner. The involvement of supply chain in product development from the start makes it a joint mission for the team and focus is on leveraging the supply chain which will help drive revenue growth and market impact, according to the alignment model by Van Hoek and Chapman (2006).

There have however been some problems with the hand-over with the project between the product development process and the PBSS-process. Problems with hand-overs between the processes increases the time to market for the project and may result in a delayed launch-date of the new product or insufficient stock at the sales start date. There is also a risk when need planners and demand planners are not included in the project that they miss out on valuable information.

Launch characteristics

IKEA's launch dates four times a year are based on the statistics that on average a customer visits IKEA stores four times a year. However, this strategy is made after the traditional way of shopping in stores and might need to be reconsidered in an omni-channel context. Customers are in touch with the IKEA offer more often than four times a year through in the current retail environment. IKEA is also working a lot with tactical launch decisions regarding what channel to launch the product on, for instance by deciding to launch all products online by 2019.

Failure risk factors

IKEA seem to be aware of the risks of new products and have identified that they depend on the level of newness of the product. The demand risk is higher the newer the product is, since they are less aware of how the market will perceive the product. They identified that from the supply side the collaboration together with new suppliers is important, making sure that they have the capacity and competency to produce the new products. To mitigate this risk IKEA manufactures small test series before launching full-scale production. IKEA also highlight that the supply risk is increased if the supplier has never worked with IKEA before. Delays in the product development process is a risk that is dependent on internal execution factors and IKEA are also aware of these risks. IKEA has also identified a supply risk regarding unplanned promotional activities that might happen in the store, which affect the product availability.

The risks with new products brought up during the interviews are mostly related to the logistics-side. This was because the focus of the thesis is on the logistics perspective of new product introductions. Erhun, et al., 2007 identified demand risks for new products such as the threat from competitors and the timing of the product launch relative to other products. Since IKEA's lead times are very long, these risks could potentially influence the company. With long lead times it is harder to react to for example change in customer behaviour, which perhaps competitors with shorter lead times are able to do. With long lead times, the timing might seem right when the project starts although it could be different circumstances when the project is finished, and the product is launched. Therefore, the long lead times at IKEA could cause potential risks regarding the demand and subsequently affect the business success of the new product.

6.4.3 Demand planning for new products

The forecasting process for new products

Just as Kahn (2006) and Mas-Machuca et al. (2014) described, forecasting for new products at IKEA takes place during the new product development project. This means demand planners help with making the initial sales forecasts for the products which are being developed. The forecast then evolves with the product development. If, for example, the product is changed or some strategy around it, the forecast needs to be adapted. IKEA has not formulated a specific process for demand planning for new products as recommended by Kahn (2006). However, they are aware of the complexity of forecasting for new products as

well as the importance of doing it. This awareness has led to them formulating strategies for dealing with the high levels of uncertainty of the forecasts.

Input data

As pointed out in the theory the difficulty with demand planning for new products is the lack of historical sales data as input. This is handled at IKEA the way Mahajan & Wind (1988) state that companies usually do it, which is making an assumption by linking the product to a similar existing product. This may however cause inaccuracy because there is no certainty that the customers demand will look the same for the new product. IKEA has quite a large range of products and only a small percentage of new products can be considered completely new. Usually the new products are extensions in ranges for example a new colour or just a small change and in these cases the historical sales data pattern for an existing product might fit quite well. Cannibalisation effects on existing products are hard for the demand planners to predict and are largely just an assumption based on the individual demand planner's experience. All of these assumptions made for the input data of a new product are what contributes to the low forecast accuracy for new products.

Forecasting techniques for new products

Since forecasts are made by linking a new product to an existing similar product the forecasts can be made quantitatively through time series technique. According to Kahn (2006), time series technique is one of the most common techniques for line extension products. This fits well with IKEA many new products are line extensions. The theory findings that low-technology businesses usually use quantitative techniques while high-technology businesses tend to use qualitative techniques further backs up IKEA's method. According to Lynn et al. (1999), successful products are usually forecasted with multiple forecasting techniques. This is however not something which is performed at IKEA.

Forecast uncertainty

By determining the new products' forecast uncertainty level IKEA becomes aware of the risks of forecasting for said product. This awareness means IKEA can be better at planning for the uncertainties of the products which is something that the theory describes as important when forecasting for new products. The theory also states that the uncertainties can be handled by giving a range of demand instead of a specific number from the forecast. Since IKEA is using the same forecasting system for both their running and new products this is not something they are doing. IKEA also mitigate the risks from the uncertainties by adapting their launch strategies after the level of forecast uncertainty. Launching products with high uncertainty in fewer markets initially means IKEA can develop sales history data which they then can use when planning for the other launches.

Selling the high uncertainty products in few stores first means IKEA can keep a higher safety stock at these nodes without binding to much capital. The risk of being stuck with unsellable stock if demand turns out to be low is therefore decreased. The lack of alignment of all the demand planner's working methods might be the reason behind the tool not being used

consistently. Hence IKEA are missing out on a tool to help in working with the uncertainties of new products.

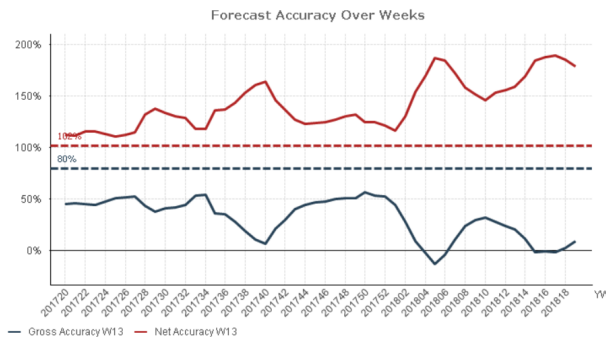


Figure 19. Forecast accuracy for new products

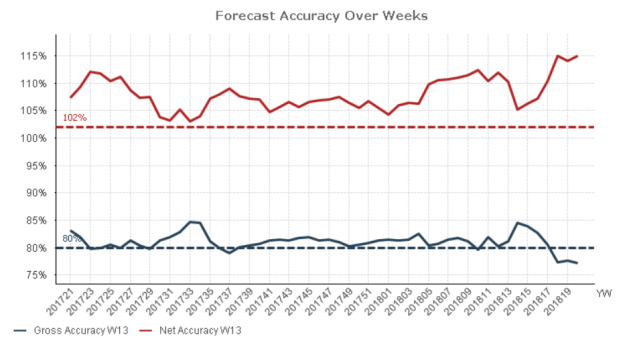


Figure 18. Forecast accuracy for running products

In Figures 18 & 19 forecast accuracy for running products and new products are compared for HFB 10 Lighting & Home Smart. As can be seen in the graphs the new products create a low forecast accuracy of under 50%, this complements Kahn’s (2002) statement that the average accuracy of new product forecasts can be as low as 52%, in this case even lower. Looking at the forecasting bias it is clear that the demand planners are over-forecasting by about 150% and sometimes even more. The forecast for running products has a better accuracy and reaches the IKEA goal of 80%. When looking at the forecast accuracy of all products for a HFB running, new and discontinued the forecast is lower and does not quite reach up to 80% see Figure 13. Perhaps it might be better to keep measurement of forecast accuracy of new products separate from running products as advised by theory since new product forecasting will always have low accuracy.

6.4.4 Omni-channel retailing

Sophistication

IKEA’s share of pure online sales is just seven percent which means it’s a relatively small portion of their total business. Therefore, the stores are continuing to be the main priority which might be hindering a genuine transformation to omni-channel retailing. However, theoretical omni-channel characteristics can be recognised at IKEA in several different ways. For instance, the IKEA multi-channel strategy of creating “one IKEA for me” can be interpreted as trying to give a seamless shopping experience to customer regardless of which of IKEA’s channels is being used. Additionally, the examples given of the Swedish market mean that a large part of IKEA’s customers are interchangeably using different channels both while searching for products and while purchasing. The boundaries between different channels at IKEA are becoming increasingly blurred. The way they try to avoid sorting their business into different channels further suggest they are recognising this new omni-channel trend and are attempting to adapt their organisation accordingly.

IKEA has also integrated new channels such as smartphones and social media into their portfolio of channels to broaden the number of channels using new technologies, which in line with the characteristics of omni-channel retailing. An example of new technologies is

their augmented reality project which aims to increase customer convenience. To summarise, there is an increased number of ways for customers to interact with IKEA.

Customer requirements

IKEA has recognised that customer requirements have changed following omni-channel. According to theory, customers are more knowledgeable with a variety of information available to them to see and share among each other. This is also the main change in customer behaviour that IKEA has found. The customers' requirements of being served anywhere and anytime suggests they do not think in channels, since that kind of service requires a mobility and seamlessness in terms of channels. Theory also states that personalisation is of importance today, which IKEA are recognising although it might not be the top priority in the furniture business. Since furniture is a category of products that experience a relatively low degree of innovation.

A challenge that can be recognised at IKEA is regarding the usage of the stores, since the stores are such a fundamental part of the IKEA concept and that customers are increasingly looking at store-shopping as a chore. According to theory, online-shopping is largely performed as a way of avoiding that chore, which might be challenging for IKEA. The IKEA stores also tend to be at relatively remote locations that can be considered inconvenient for people living in cities. Therefore, it is of importance that IKEA really consider the future role of the stores and use them to their advantage. For example, their stores present a good opportunity to offer personal service and a chance for the customers to touch the products themselves before purchasing, which is something that is appreciated in omni-channel retailing as well. However, due to their remote locations, theory suggests this gives more incentive for online shopping since customers typically live far away from the stores. Since a sizable portion of IKEA's product offers are bulky items, it gives further incentive for customers to order products online instead of having to transport bulky items home with them. IKEA has identified that some types of products might be more popular to buy online than in stores and this could change the total sales shares in the future. This could mean that IKEA might have to put more focus into other parts of their business when online sales shares continue growing.

Moreover, IKEA is not yet offering their whole assortment online, which customer trends suggest would be important for customers in order to have a wider selection of products. Therefore, the company is also not yet benefitting from the opportunity to increase shelf space by selling more products online as suggested by the theory. Since a lot of IKEA products are bulky this would help the stores with space issues and give the customers more product offers. However, the IKEA plus initiative is suggesting that this is something they have recognized is important and are going to change in the foreseeable future. IKEA has also recognised that customers have higher demands on lead times, precision and an increased availability of products, which is in line with emerging demands according to theory.

Network structure

IKEA has made changes in the distribution structure to accommodate for the new requirements regarding last mile fulfilment. IKEA has implemented to varying degrees in the different markets fulfilment concepts, that are central in omni-channel retailing, such as

pickup points and click-and-collect. Their wide range of fulfilment options suggest they have adapted to giving customers many options to select from, which theory suggest is an important aspect of meeting the customer in an omni-channel environment. Theory also suggests stores can be used as a dispatching location for deliveries, which IKEA has recognised as a possibility for the future. Since their stores are large and well located, this could shorten order lead times drastically.

Theory suggests IKEA has a relatively complex distribution structure since they need to coordinate their many different fulfilment options with the different dispatching locations. Given how the network keeps growing in terms of number of nodes, the complexity is not going to decrease, which speaks to the importance of having a structured and careful planning of logistics operations.

Risks

The unplanned sales activities that happen at IKEA are causing volatility to their demand, which is already difficult as it is to plan for in an omni-channel context according to theory. With an online channel, these sudden promotional activities are easier to implement. However, the demand uncertainty is also greater online than in stores as stated in theory. This means that the natural uncertainty of e-commerce is magnified if IKEA continue to launch commercial activities online without careful planning, leading to large backlogs or availability issues. The IT system IKEA is using in certain markets such as Sweden is also causing unnecessary risks since the availability status of products is only updated once a day. With a growing share of online sales, this may be an increasing problem.

In order to keep costs under control, the company needs to compensate by reducing the service level. This leaves a risk for them of not offering good enough terms such as delivery times, which theory states is an important feature. Reducing costs wherever possible in the logistics operations could be a good way to increase competitiveness in the service level. One way of reducing the costs could be for example to use the same warehouses for both online and offline sales. This would mean IKEA could leverage inventory pooling to reduce the inventory pooling and subsequently reduce costs. However, the complexity of warehousing operations would increase. IKEA has realised for example in the UK that warehousing is very costly which gives incentive for looking at solutions in that area.

The risks IKEA experience regarding an increased complexity for the central planning is correct according to theory, since planning centrally for different markets that have different structures is challenging. The reason for having different structures in different markets is because customer requirements and demands differ in different regions.

6.4.5 Demand planning in omni-channel retailing

Data gathering

As mentioned in 6.4.1, there are currently problems at IKEA with un-planned commercial activities. Launching commercial activities online would cause even further uncertainties if they are un-planned in that channel. Since the natural variance of online demand is greater. Therefore, it is important that IKEA has a structured approach to planning for, for instance, promotional activities online as well.

To forecast on fulfilment type, a higher degree of visibility would be needed for the POS-data. For optimal planning, it would be useful for IKEA to know the fulfilment type in the sales data. By having that information available, a more structured and detailed planning can take place.

With online sales there are a lot of more data to collect than just actual sales data. For example, data can be collected on what products a customer has looked at. Forecasting in the future could perhaps be on more than just sales data. Predictions of sales could be on for example, number of clicks on the website on a certain product.

Structure and consistency in the demand planning process

IKEA has a way of mitigating the risks with demand forecast inaccuracy of new products in their demand planning process. This part of the demand planning process would aid IKEA in meeting the increased demand uncertainties of the online sales channel. However, this tool is not used by all the demand planners at IKEA today.

Another area where IKEA has issues with unstructured internal processes are for communication of forecasts for linked articles. For example, if there is a change in the forecast of a product, then the demand planner has the responsibility to communicate that change to the demand planners of linked products. A structured process or tool to keep track of the linked products and to communicate the forecasts is missing today. If IKEA were to separate their forecasts on more levels, the demand planners would probably get more forecasts to be in charge of. Then they would need a structured way of communicating forecasts for linked products to free up time and minimise risks of miscommunication.

There is also an unstructured way of making long-term plans in the different HFB's at IKEA. Making the long-term plans in a more structured and similar way for HFBs would help increase the long-term plans accuracy. For omni-channel retailing it is more important that there is a consistency in how plans are made, given the increased complexity it entails.

Aggregation level

IKEA is currently discussing whether forecasting should be on fulfilment type in the future. IKEA has many different fulfilment options that need to be planned for efficiently. For example, which inventory click-and-collect orders should be taken from. Since click-and-collect orders are collected from the store's inventory but not included in the store's forecast. This could cause problems with too low stock at the stores when the online sales increase and more customers use click-and-collect. It is important that the distribution network has the right product allocations throughout, so that the goods flow can be directed appropriately. Forecasting on fulfilment type means that IKEA will have to split their forecasts into a fourth level. Currently, it would mean large uncertainties in the forecast accuracy. IKEA's sales volume of seven percent would mean a very low sales volume when split on fulfilment type. If IKEA split their forecasts according to fulfilment type, then it is important to do it correctly. If the inaccuracy is high it could lead to wrongfully allocated products. To re-allocate IKEAs bulky products would cost the company a lot. Since the different markets have different fulfilment options this also creates challenges. Splitting the forecast after fulfilment type differently for different markets would be difficult to achieve centrally. It is complex for both the system and the demand planners to handle.

The role for achieving business success

Certain factors of IKEA might have a big effect on their demand planning following a growing share of online sales. Their issues with long lead times is something that could be problematic since the online demand is unpredictable. With a growing share of online sales, short lead times are desirable to compensate for potential unexpected deviations in the demand curve. For IKEA, this is very difficult to achieve. Therefore, the lead times might be something to address that could have a bigger role in achieving business success for them than a slightly better forecast accuracy. However, their current over-forecasting might also cause problems for the business with a growing share of online sales. The reason for that is a larger uncertainty in demand can make the unnecessary safety stock cost increase even further.

Cross-functionality

The entrepreneurial idea of the retail units mean that unplanned activities occur occasionally. As long as that structure remains, problems in the supply chain will remain. A structured communication platform is of even more importance in omni-channel retailing given there are more channels to co-ordinate. For instance, commercial activities can be launched in the app, on social media or their website. A communication structure needs to be in place so that there is a transparency of where different activities are launched. Otherwise, there will be unexpected changes in the demand curves that the demand planners have to deal with. Even if the online activities are properly communicated well in advance, it is still a massive challenge to predict the online demand.

Level of system knowledge

When demand planners are working as they are today, only on country level aggregation, effects of online sales tend to be rejected. The rejection is due to the online demand not having a significant impact at the level the demand planner is working on. If the demand planners work with this mentality, then online demand characteristics risk not being included into the forecasts. For example, when the demand planner makes assumptions of the sales curve of a new product they usually only think how this will look after the traditional sales curves from store customers. Disregarding customer demand behaviour from online when online sales increase would cause forecast errors leading to problems with product availability. Therefore, all demand planners need to consider both store and online demand effects when making assumptions for new products.

Online demand characteristics

Online sales shares can look different to store sales. It is important to know what products sell better online in order to plan for promotions. If IKEA creates a general campaign online the demand planners need to know what products will be affected the most. This is something which is not represented in the sales history at the moment and therefore online campaigns are a challenge for IKEA. The Black Friday example shows that IKEA has experienced

problems with online campaigns in the past. It exemplifies how difficult it is to predict certain peaks online and how much the supply chain can be affected.

Since online demand can have different characteristics than offline demand in both quantity and frequency according to theory, this can lead to different sales curves for products. As mentioned above the demand planners need to take these changed demand patterns into account when creating the forecasts. Investigation needs to be done for if the sales curves vary for online sales.

Table 16 & 17 presents a summary of the IKEA analysis.

Table 16. Summary of IKEA analysis of demand planning, new product introduction & demand planning for new products

Demand planning	
Data gathering	Historical sales data, some commercial activities for stores not included
Demand Forecast	<p>Forecasting technique - Time-series algorithm, advanced forecasting system.</p> <p>Aggregation level - Demand unit: article number. Demand group: region, country & selling unit.</p> <p>Time periods - Forecasting horizon: 2 years. Good for slow moving articles. Weekly buckets.</p>
Success factors	<p>The role for achieving business success - Problems with over-forecasting, especially for new products, results in increased costs. Availability important for business idea. Classifying forecasts after importance.</p> <p>Cross-functionality - Cross-functional POD-teams. Lacking communication between retail & IoS (commercial).</p> <p>Measurement - Forecast accuracy & forecast bias. Not used for improvements.</p> <p>Level of system knowledge - No rewards or punishments, demand planners seems to understand the outcome of forecasts.</p>
New product introduction	
Classification of new products	No classification, done in demand planning though
Alignment of SC and NPD	Cross-functional from the start of the NPD process through POD-teams
Launch characteristics	Launch dates based on store-behaviour. launch everything online soon

Failure risk factors	Demand risk, supplier collaboration, unplanned commercial activities, delays in NPD, bad timing due to long lead times
Demand Planning for New Products	
Process characteristics	Forecasting happens during NPD and updated iteratively
Forecast inputs	Linking the product to a similar existing product, cannibalisation effects based on demand planner's experience
Forecasting technique	Time series technique, same as for existing products
Forecast uncertainty	Classification tool to help plan for uncertainty, but not used by all demand planners.
Omni-channel	
Sophistication	Online channel for 20 years. 12-15% of total sales online. Online sales in 37 markets.
Customer requirements	Knowledgeable, large assortment, delivery times, service level.
Network structure	More nodes, many fulfilment offers, seamless touchpoints, many stores.

Table 17. IKEA analysis on omni-channel effect for demand planning

Omni-channel effect for demand planning
Commercial activities in both channels need to be properly planned for and communicated.
POS-data visibility
Having a forecasting system capable of delivering desired POS-data.
Forecasting on more levels.
Taking online demand patterns into account for forecasts.
Uncertainties with online campaigns.

7 Cross-case analysis

The patterns from the different cases are compared to form a general analysis to answer the first research question of this thesis. The analysis is then applied to IKEA in order to answer the second research question.

All studied companies believe that omni-channel is a challenge to their business models. They have been forced to adapt to the new complexities on the market. Examples of such complexities are: higher customer demands on low delivery times, high level of service and low or no delivery cost. Additionally, there is an increased ease for customers to compare prices and buy from a competitor. Even though the companies have identified these challenges, they are unsure of how to handle them in all parts of their business. For example, demand planning is one area where the companies are not sure yet how the complexities of omni-channel both impact their business and should be handled.

7.1 Identified challenges

The following challenges were identified at the companies to answer RQ1.

RQ1 - What are the challenges for demand planning of new products in omni-channel retailing?

7.1.1 Online sales patterns for new products

An issue identified at IKEA was that demand planners when making assumptions for new products only considered store demand patterns. Småros (2018) identifies the sales curve as an important input into the demand forecasts for new products. For omni-channel retailers it is important to consider the sales patterns of customers in all sales channels. The theory along with Småros (2018) states that online demand can have different patterns than for store demand. The online sales can result in changed pattern of overall sales turnover, order frequency and quantity as well as increased seasonality and more volatile demand, see e.g. Canetta et al. (2013), Tarn et al. (2003) and Hübner et al. (2015). Only creating assumptions based on store demand patterns would therefore cause forecast inaccuracies for the new products.

7.1.2 Commercial activities online

All the companies have difficulties with planning for commercial activities online. Online demand is unpredictable, which is further intensified by commercial activities online. The effect can be described as adding uncertainty to uncertainty, causing challenges for the planning processes.

Common for the companies is also that they do not have enough historical data on online campaigns to create accurate forecasts. The historical data that is available does not correctly depict the current situation since the online sales have been growing drastically the recent years.

The online channel has the possibility of making rapid commercial activities to react quickly to changes in the competitive environment. Rapid commercial activities would not have the time to be included into the demand plan. Therefore, they could create large deviations in the demand forecasts and unavailability of products. The increased number of sales channels and

touchpoints with customers also mean that there are an increased number of stakeholders involved in marketing and brand communication. For the demand plans to be aligned with all of the stakeholders' activities and strategies there needs to be clear and structured communication.

Company X brings up that a large issue with online demand uncertainty is influencers on social media marketing the products without the company's knowledge. This is not something that the other companies brought up. It is however a possible issue for all omni-channel retailers. Since the only thing needed for a customer to make a purchase is a link to the sales channel.

7.1.3 Aggregation level

Finding the correct aggregation level of the forecasts for a business is challenging, see e.g. Holmström (1998). To allocate products better in the omni-channel supply chain, forecasting on fulfilment type is a frequently discussed topic. All the studied companies in this thesis have recognised the gains of planning for optimal allocation in the supply chain. However, with online sales still a small part of the companies' total sales shares, dividing the forecasts on fulfilment type creates large uncertainties. Forecasting for online sales by themselves is also a challenge for the companies due to the small volumes. Forecasting small volumes means that the forecasted demand is more affected by random deviations which create large forecast errors, see e.g. Ylinen et al. (u.d.). The forecast errors may cause availability issues or over-stock issues at the fulfilment type inventories. The errors may also cause products to be wrongfully allocated. Therefore, there is a trade-off between achieving better availability through forecasting on lower levels such as for example fulfilment type and avoiding uncertainties from small aggregation volumes. For these reasons none of the companies studied are forecasting on fulfilment type today. The level of importance of correctly allocating products depends on the company's business. For fashion retailers it does not have the same level of importance as for a furniture retailer. For the furniture retailer the costs of having bulky items at the wrong place in the distribution network can be high.

7.1.4 Forecasting system requirements

The requirements of the companies' forecasting and POS systems in the future are larger. The POS system needs to capture sales data from more streams in omni-channel. If the companies where to forecast on fulfilment type, then that data also needs to be captured by the POS system. Småros (2018) stated that to be able to forecast accurately on lower volumes an advanced forecasting software is needed. This is an issue for both company X and company Y who are either working manually in excel or using their ERP-system. IKEA however do have a more advanced system that benefits them when making demand forecasts for omni-channel.

7.1.5 Usage of stores' inventory

Småros (2018) mentions the usage of the store's inventory for online orders as a challenge for companies. This is a central part of the omni-channel customer offer and called click-and-collect see e.g. Hübner et al. (2016a). Småros along with Company Y identified the usage of stores inventory for online orders as a challenge. This is also noticeable at IKEA, that has issues with the planning of stores inventory for online orders. Currently the online orders are taken from the store's inventory but not included in the stores forecast. If the click-and-

collect orders increase in the future this will create issues for their store inventory. Company Y has solved this problem by instead taking click-and-collect orders from a separate online inventory, and therefore not disrupting the store inventory. Småros (2018) however argues that click-and-collect orders should be added to the store's demand forecast to keep the forecast accurate.

7.1.6 Structure and consistency in the demand planning process

At IKEA issues with a lack of consistency in some parts of the demand planning process was identified. This challenge is specific for IKEA and therefore has not been identified at the reference companies. However, this challenge is highly important for IKEA since it affects how they adapt to omni-channel retailing. Therefore, it is included in the main challenges identified in this study. The areas in which IKEA are lacking structure and consistency in the demand planning process are: usage of the step define forecast uncertainty, communication of forecasts for linked products and long-term plans in the HFB's.

The main challenge for demand planning of new products in omni-channel is online sales patterns for new products and inconsistency in the usage of define forecast uncertainty. The rest of the identified challenges are for demand planning as a whole but also make demand planning for new products further complex.

The identified challenges and their impact on the different companies are presented in Table 18. 'Identified as challenge' means that the company itself has identified the challenge as important to them. 'Applicable' means that the challenge has been identified and is applicable for the company, although the company itself has not identified it.

Table 18. Identified challenges at the studied companies

Identified challenges	RELEX Solutions	Company X	Company Y	IKEA
Online sales patterns for new products	Identified as challenge	Applicable	Applicable	Applicable
Commercial activities online	Identified as challenge	Identified as challenge	Identified as challenge	Identified as challenge
Aggregation level	Identified as challenge	Applicable	Applicable	Identified as challenge
Forecast system requirements	Identified as challenge	Applicable	Applicable	Applicable
Usage of stores' inventory for online orders	Identified as challenge	-	Identified as challenge	Applicable
Structure and consistency in the demand planning process	-	-	-	Specific challenge for IKEA

7.2 Handling the impact of omni-channel on demand planning for new products

In order to answer research question two, the challenges identified from the last section will be applied to IKEA.

RQ2 How can IKEA handle these challenges?

7.2.1 Sales patterns online for new products

In the future the demand planners need to base their assumptions for forecasts on demand patterns for both online and store sales. Correct input data is essential for creating accurate forecasts see e.g. Vlckova & Patak (2011). IKEA currently has a separation of selling units and customer orders. The demand planners, who only see the total demand for country and region, do not handle this separation. To be able to have online demand patterns as input when forecasting for new products the demand planners need to be aware of how for example sales curves differ. Smáros (2018) recommends companies to forecast online sales and store sales separately to better see the differing demand patterns. The separation of online and store forecasts is also practiced by company X and company Y.

The recommendation for IKEA is to split the forecasts between online sales and store sales already at the country level. Changing this would however require a lot of work for IKEA. The system structure would have to be changed as well as an assessment of what should be done by the system and what the demand planners should handle. Simply letting the demand planners forecast for online and store demand at country level would give the demand planners a doubled workload. To make separating online and offline forecasts beneficial at a country level all countries must have enough online sales. Otherwise forecast errors would become too big and this would cause problems in the supply chain, see e.g. Chen (2007).

To be able to consider online demand patterns the demand planners need knowledge about online demand characteristics. This knowledge could perhaps be retrieved by analysing and comparing sales data for new products from offline and online channels. There is a risk that IKEA do not have this data or are not able to access it. In that case they should collaborate and learn from external experts in the area.

7.2.2 Commercial activities online

To handle the challenges with forecasting for online commercial activities, it is important for IKEA to consider what products in their range are most likely to be affected by a campaign online. There is currently an idea at IKEA that the bulkier items, which are hard for the customer to take home, will be affected the most. Consideration should also be taken regarding the effect on affiliated products, as well as which products are the most important ones for the business. IKEA's current ABC classification could be used to determine the products' business importance.

To plan for commercial activities properly it is important that communication of forecasting inputs works well, see e.g. Moon, et al. (1998). Since omni-channel retailing means communication with customers and sales in more channels it is increasingly important that there is a clear communication-structure. IKEA need to declare to all the stakeholders when at the latest the commercial activities need to be inputted into the forecast, and how detailed

they need to be. By doing so, a high degree of visibility of the information can be achieved, which is important for internal decision making according to Barratt & Oke (2007).

Separating online and offline forecasts at a higher level can also help IKEA plan for commercial activities online better. Aggregating online demand at country level is something which could help IKEA identify campaign patterns, see e.g. Småros (2018). They can then be broken down and applied to the lower level forecasts.

The recommendation for IKEA is to look over the structure for communicating commercial activities to make sure that all stakeholders are involved. When forecasting for an online commercial campaign the demand planners should prioritise the products which have the biggest business importance. That means they should follow the ABC-classification of the forecasts. The demand planners should also analyse the sales to see which of their products sell more online and use this knowledge for future online campaigns. Furthermore, online demand should also be separated and aggregated at a higher level to help identify campaign patterns more easily.

7.2.3 Aggregation level

Finding the correct aggregation level for IKEA is difficult. There has to be a balance between the amount of work for the demand planners, gains for the planning process on forecasting at that level and what accuracy is possible for the sales volume at that level. If forecasts were to be separated on fulfilment type this would cause an exponential increase from today's seven million forecasts. Therefore, an extra level of forecasts would need to be handled by the forecasting system solely.

IKEA are working with an advanced forecasting system which according to Småros (2018) potentially could handle forecasting on lower volumes. To investigate if IKEA could forecast on fulfilment modes in the future they should collaborate with their forecast software provider. Together they can identify what would be the lowest volume to forecast on without giving too much inaccuracy. Identification should also be made of what ramifications different forecast accuracies would mean when allocating products on fulfilment modes. By doing so IKEA can mitigate the risk of products being allocated wrongly when forecasting on fulfilment mode.

At present IKEA is not recommended to forecast on fulfilment type. However, it would still be relevant to investigate what volume is necessary for IKEA to deem forecasting on fulfilment type beneficial. To forecast on fulfilment type also requires POS data on fulfilment type, which needs to be provided by the system.

7.2.4 Forecasting system requirements

IKEA has a good system today, but it should be investigated if it is capable of further changes in demand forecasting. These changes could for instance be if the system is capable of splitting the forecasts on channel type or fulfilment type. Investigation needs to be made of how forecasting will look in the future and what type of system that would require. For example, demand planners might not be needed the way they are today and some of their work could potentially be replaced by artificial intelligence. IKEA need to be aware of the developments in forecasting to cover for future needs.

7.2.5 Usage of stores' inventory for online orders

How IKEA will use their stores inventory in the future will have an impact on IKEA's demand planning process. However, this thesis has not identified any optimal solution for the issue of how to use store's inventory for online orders. One option is to include the demand forecast for click-and-collect and pickup point in the store's forecast. This would give correct planning of the store's inventory but would mix up online demand with offline demand. Another option is to forecast click-and-collect and pickup point demand separately and take it from the CDC's inventory instead. This would, however, decrease the transportation efficiency for the company due to not being able to include the deliveries with the store's replenishment. The products would also not be available directly for customers after they order the product online. Instead, they would have to wait for the delivery from the CDC or CPU to the store before being able to collect it.

7.2.6 Structure and consistency in the demand planning process

Three areas where IKEA's demand planning process lacks consistency was identified; define forecast uncertainty, communication of forecasts for linked articles and creation of long-term plans within the HFB's.

The define forecast uncertainty step of the demand planning process should be enforced properly. The demand planners should be taught the importance and benefit of this step when creating a demand forecast for new products. To clearly see the importance of this step, follow ups could be done to see if this decreases the demand forecast uncertainty of a new product. If the demand planners see clearly that this step is beneficial then they will be more likely to use it.

For communication of forecasts for linked articles a tool should be developed to help the demand planner to keep track of which products in their range are linked with others. The optimal solution would be to have this included in the forecasting system. However, if this is not possible a separate tool needs to be created. This tool should also be able to communicate the forecast.

To gain consistency in the creation of long-term plans a single technique should be chosen for all HFBs. All HFBs should decide on this technique collaboratively. This collaboration will result in both a best practice technique but also making sure that all HFBs will implement it in their practices. The technique should be based on historical data to be more accurate.

8 Conclusion and final remarks

The purpose of this master thesis is to investigate the impact omni-channel retailing has on the demand planning process for new products and to identify what this means for IKEA. In this chapter, the conclusions drawn are presented based on the research questions. Afterwards, the contributions, limitations and suggestions for future research are discussed.

8.1 RQ1: What are the challenges for demand planning of new products in omni-channel retailing?

This research question was answered by the identification of six challenges. Since there is a gap in theory regarding this area, this research question was mainly answered by analysing the collected data from external companies as well as the single case study.

- Online sales patterns for new products
- Commercial activities online
- Aggregation level
- Forecast system requirements
- Usage of stores' inventory for online orders
- Structure and consistency in the demand planning process

The difference in online sales patterns has an effect on the assumptions made for forecasts of new products. The sales curves may not look the same for online and store demand.

Another challenge is commercial activities in the online sales channel. The highly unpredictable demand patterns online coupled with a large sales growth creates big peaks for online campaigns. These peaks are difficult for companies to predict since their sales history does not correctly depict the as-is situation. Communication is also something that becomes more important when there are more stakeholders involved in planning for commercial activities.

Finding the appropriate aggregation level is difficult both according to theory and the companies themselves. The online sales of omni-channel retailers today are usually still quite low. Forecasting on too low volumes leads to large forecast errors.

To handle the future demand forecasting requirements the companies, need to know what systems are required. The type of system required depends on how the companies want to forecast. Forecasting for low sales volumes without getting too large forecast errors requires an advanced forecasting system.

Another challenge is planning for the usage of store's inventory for some online fulfilment types such as click-and-collect. If this is not forecasted for correctly when online sales increase, then it would lead to depleted stock in the store's inventory.

Issues with structure and consistency have been identified at IKEA for three areas in their demand planning process. These areas are: define forecast uncertainty, communicating forecasts for linked articles and long-term planning within the HFBs.

Of these challenges online sales pattern for new products and structure and consistency in the demand planning process are the only ones which affects demand planning for new products directly. However, the other challenges affect demand planning generally which is also applicable and further challenging for new products.

8.2 RQ2: How can IKEA handle these challenges?

To answer RQ2 the challenges identified in RQ1 were compared to how IKEA are working today along with what theory states. Consideration was also taken if any of the reference companies had possible solutions to the challenges. Some of the solutions for handling are areas which IKEA need to investigate further. This has to do with there being a lot of gaps in the demand planning for omni-channel retailing theory and uncertainties within companies of best practice. The proposed handling results are visible in Table 19.

Table 19. How IKEA can handle challenges with demand planning for new products in omni-channel retailing

Identified challenges	How to handle for IKEA
Online sales patterns for new products	Separate forecasts for online & store demand. Base assumptions for forecasts on sales pattern for both online and offline. Analyse sales data to determine how online & store demand patterns differ.
Commercial activities online	Look at online sales aggregated on country level to identify campaign patterns. Determine what products are most likely to be affected, what products are most important for business and what will be the effect on affiliated products. Structured communication needed. Stakeholders to know all relevant information.
Aggregation level	Not recommended to forecast on fulfilment type. However, investigate what volume and POS data is needed to do it in the future.
Forecast system requirements	Investigate what forecasting will be in the future and what system that would require. Maybe changing role of demand planners.
Usage of stores' inventory for online orders	No optimal solution. Include in store forecast or have separated.
Structure and consistency in the demand planning process	Enforce the step of define forecast uncertainty and educate the demand planners of its importance. Create a tool for communicating forecasts for linked products. Have a common technique for creating long-term plans for all HFBs.

8.3 Contributions

8.3.1 Theoretical contribution

This thesis contributes to research by studying how omni-channel affects the demand planning process for new products. Since this area has not been investigated before, the thesis provides some insights into how omni-channel has impacted three retail companies. The thesis also provides insight into how the companies have developed their demand planning processes to meet these challenges. The thesis presents some recommendations on how omni-channel effects on demand planning for new products can be handled at IKEA. Since this was an exploratory case study, the theoretical contribution is mainly the identification of areas for further investigation and studies, discussed further in section 8.5.

8.3.2 Practical contribution

The thesis contributes to IKEA with knowledge about theoretical connections for demand planning processes for new products. As well as with theoretical application for omni-channel, which is a new and difficult area for IKEA. The thesis also gives IKEA insights in how other companies are handling the challenges with omni-channel on their demand planning process for new products. As described above the thesis provides IKEA with some recommendations and areas for further studies.

For the thesis students the study contributes with learnings on demand planning for new products both from a business perspective as well as from academic research. The students also gained insights into omni-channel and how this affects retail companies.

8.4 Limitations

This thesis was an exploratory study with limited theory in the area. The inadequate academic research creates a limitation on this thesis to provide enough material to form a general and applicable conclusion. The limited time of a master thesis project also puts restrictions on the study. More time could have led to the possibility of obtaining insights from more external companies or deeper insights into the studied external companies. Access to companies which have well developed processes for demand planning for new products in an omni-channel environment was also a restriction. The companies which were studied were not fully aware of how to handle the challenges with omni-channel. Instead, they gave more insights into RQ1.

Demand forecasting is a large and advanced field. Forecasting quickly focuses on advanced statistical calculations such as time series algorithms. Calculations which are often handled by advanced computing software. The thesis students have not had the ability to go into depth into these calculations. Instead, focus has been put on the process for demand planning and how this is handled for new products.

8.5 Future research

A couple of suggested future research areas were identified following this thesis. More data should be constructed in the research area demand planning for new products for omni-channel retailers. To do so, more in-depth analyses need to be made on retail companies are working within this area. It is especially interesting for companies, which are performing well within the area in order to form a best practice. More studies also need to be made of how online sales affect demand patterns for retailers. However, it is difficult for literature to keep up with the rapidly changing nature of omni-channel retailing. As Småros (2018) stated, what forecasting will look like in a not too distant future is very uncertain. One interesting area is how new technologies, such as artificial intelligence (AI), will affect the demand planning process. Are demand planners needed in the future or can AI handle that work? Therefore, we believe the impact AI can have on demand planning in omni-channel retailing is an area of significant interest.

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Appendix

Interview Guide

Part 1: New Product Introduction

How often are new products introduced?

How do you classify your new products (different types of new products)?

Is product development handled in-house?

How many new products/SKUs do you introduce every year?

Do you see any risks with introducing new products?

- Demand risk?

Are products introduced in all channels/markets at the same time? Are all products sold in all markets/channels?

Part 2: Omni/multi-channel retailing

How long have you had an online sales channel?

How has the online channel affected the distribution network?

- More nodes?

How big share of the sales volume are from online sales?

In what ways do you interact with the customers? Different customer touchpoints? Can they be used interchangeably?

Which fulfilment offers do you have?

- Store pickup?
- Home deliveries?

What is the main effect multi-channel has had on your business?

What are the biggest challenges for you to meet today's customer requirements?

Part 3: Demand planning

What is your purpose with demand planning?

Describe in short your process for demand planning

What roles have input/are included in the demand planning process?

What data are you using to make forecasts on?

- How is the accuracy of this data assured?

What techniques are you using to make your forecasts and how are you using them?

- Qualitative
- Quantitative

What level of aggregation do you have on your forecasts?

- Product level
- Customer demand level

What time-period are you making your forecasts on?

What measurements do you use to assess forecasts?

Do you believe you have a good forecast accuracy?

Have you noticed any changes in demand and demand uncertainty after moving into omni-channel?

Do you believe the forecasting system is easy to understand for everyone working with it?

Are your forecasts separated for store vs online demand?

Are your forecasts separated for type of fulfilment mode?

- Pick-up in store
- Home delivery

Part 4: Demand Planning for New Products

Do you have a separate process for demand planning for new products?

How are you demand planning for new products?

- Technique
- What data do you have as input?
- What assumptions are you making?

Do you have any risk analysis for forecast accuracy? If the forecasts are un-correct

(Are you providing demand forecasts to new product development?)

Part 5: Omni/multi-channel & Demand planning

Are there any challenges with multi-channel for demand planning?

How are you working with these?

Can any changes in demand or demand uncertainty be distinguished after moving into omni-channel?

Is the demand planning process adapted to the increasing network which is a result of multi-channel?