Improving product availability

A Case Study at IKEA Kitchen and Dining

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Preface

In hindsight, it all feels like a time-lapse, having stayed at a picturesque motel in the middle of nowhere in order not to miss our first morning appointment; having numerous times commuted back and forth from one metropole to the other, passing through the dreamlike, flat landscape and seeing it gradually evolve from white to yellow, the sun melting away the snow and magically turning the surrounding fields into golden acres of rapeseed; having experienced our fair share of the traditionally malfunctioning railway system, at times waiting for hours to come back home, talking to all kinds of nice strangers waiting for time to pass. For the last sixth months, we have been given the fine opportunity to be able to get to know a group of industrious people, be a part of, and affect their undertaking. More than 30 hours of interviews, even more cups of coffee, and some cinnamon buns to go, have led us to this report, with which we can proudly conclude our formal education. We would like to thank all that have been involved in making this journey a pleasant one, with special thanks going out to our supervisors, Jan Olhager and Maria Johansson, who both made it possible to begin with. We wish you, the reader, an equally pleasant journey.

Drilon and Gabriel

Abstract

A global and still expanding leader in the home furnishing industry, IKEA, with its head office for development of the product range in Swedish Älmhult, wants to reach out to as many customers as possible. Cost efficiency has always been a driver, but in recent years an initiative on product availability has been launched, aiming to increase customer satisfaction. Kitchen and Dining is a Business Area with special conditions. This report strives to find the root causes, trade-offs, and remedies to insufficient availability, with an end-to-end Kitchen and Dining supply chain perspective. A case study approach was used to describe and understand the connection between many of the relevant functions and roles in the supply chain. The performance of two stores in different markets were looked at more closely. Through triangulation between interviews, workshops, and a questionnaire, there were found six causes that both are perceived to have a high impact on availability loss and that are most feasible to change. All six were discussed with a group of experienced IKEA employees with the goal to suggest potential improvements. Highlight was also put on one of the stores that during a period showed exceptionally low availability performance, bringing forward the issues that were shared by its representatives. Findings were discussed, reconnecting to literature, and it was concluded that the context of IKEA is distinctly different from that found in the relevant literature, that many issues could be addressed by improving communication, and that the mind-set of maximising availability can conflict with the overall strategy of the company.

Keywords: Product availability, In-store availability, Stock-outs, Out of stock, Root causes, Retail supply chain, Supply chain management, IKEA, Home furnishing

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1 Introduction

The following introductory chapter will present the background that has led to the purpose and research questions of this report, starting with a short theoretical background, briefly bringing up some general information of the studied company, and ending with the underlying company initiatives that are directly linked to the topic of the research.

1.1 Background

1.1.1 Theoretical background

With increasing global competition and the advent of e-commerce, customer expectations are perhaps higher than ever. Retailers may be risking revenue if products are not readily available for their customers. Product availability is therefore a central issue for retailers, and consequently an interesting topic for academia.

For several decades, researchers have studied customer behaviour as a result of stock-outs (Aastrup and Kotzab, 2010). It is known that customers are likely to switch stores when they cannot find the products that they want. Worst case scenario, the switch may be permanent, affecting the whole retail supply chain negatively (Corsten and Gruen, 2003). Coming to grips with customer behaviour is imperative to get an idea of necessary actions and potential advantages, but there is also a need to understand the root causes of stock-outs (Ehrenthal and Stölzle, 2013).

Although there has been quite some research looking at root causes, “shelves are still empty” (Aastrup and Kotzab, 2010), which means that there remains an opportunity to further develop knowledge. It is important to understand not only what causes stock-outs, but also how companies should treat product availability from an economical perspective. This report will, using the IKEA Kitchen and Dining supply chain as a case, bring forward three research questions connected to this.

1.1.2 Inter IKEA Group

As of 2016, IKEA is operating in 48 countries with 389 stores worldwide, employing 183,000 workers. More than 915 million store visits resulted in 36.4 billion Euros in retail sales. Since first of September 2016, the Inter IKEA Group, an umbrella term, consist of three core businesses: Franchise, Range & Supply and Industry.

The franchise core business is operated by Inter IKEA Systems BEVY., owning the IKEA Concept and acts as a global IKEA franchisor. The Concept refers to the IKEA range, retail system and trademarks. As a franchisor, Inter IKEA Systems B.V. is responsible for the successful implementation of the Concept in all markets, existing and new.

10-12 % of the total IKEA range (almost 10,000 articles) is produced by IKEA Industries Holding B.V. They maintain production capacity of strategically important articles in a total of 43 factories. The rest of the range is provided by IKEAs near 1,000 suppliers strong network all over the world.

The development of product, design and home furnishing solutions is performed by IKEA of Sweden AB. Every year 2,000 products are introduced, some replacing old and some entirely new to the range. The foundation, related to the IKEA Concept, as stated, is to offer a range with good design and functions at “prices low enough so that as many people as possible can afford them”. On a global level, IKEA of Sweden AB is also responsible for supplying the range. Further down the supply process IKEA Supply AG operates at regional level with purchasing offices supporting and developing external suppliers. Furthermore, IKEA Supply AG is the main seller of goods to retail, and owner of the distribution centres and inventory at hand. To conclude, the Range & Supply business is operated mainly by IKEA of Sweden AB, IKEA Supply AG and other related companies further downstream.

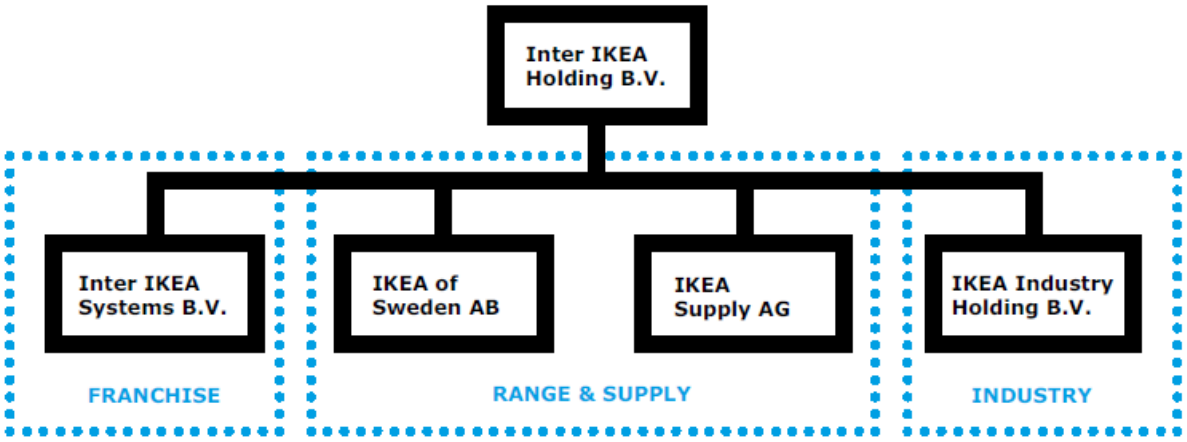


Figure 1. Inter IKEA Group (Inter IKEA Group Financial Summary FY16).

1.1.3 Expansion plans

The IKEA brand is set out to penetrate new markets while increasing presence in the ones it is already operating in. To facilitate the expansion plans, company structure has been revised. In September 2016, the dominating retail store owner INGKA Group separated from the brand owner Inter IKEA Systems B.V. Inter IKEA Systems B.V. is now acting as a franchisor to all retail stores, which previously was not the case; however, retail store owners in some regions, mostly the Middle East, already operated in this set-up before the revision.

The plans to expand and introduce IKEA retail to new markets puts pressure on the supply chain. The ambition is to expand heavily, opening 38 stores until August 2018, most noticeably introducing the first IKEA retail store in India, namely Hyderabad. China emerging as the largest growing market for IKEA shows potential for further growth in the region and IKEA will sooner or later pave the way for further store openings. Although already a large presence in Asia, general figures indicate differences in availability performance when compared to more established markets such as in Europe.

1.1.4 Centralising supply chain planning

A case study carried out by Jonsson et al. (2013) explores the centralisation of supply chain planning at IKEA initiated in 2002. The regions and stores formerly had extensive control over the planning and placing of replenishment orders. The supply chain was

inefficient with planners doing extensive manual work due to several systems being used in parallel at different units. Standardised working methods were missing and planning units were working towards different goals in different ways. This led to an imbalance in demand coverage with stores overestimating demand to secure availability while others were left with none. Undeniably, there was room for improvement. The purpose of the project was to implement a new concept introducing an integrated, global planning process, retaking control over the supply chain, increasing efficiency and yielding lower costs.

As of the study publication date (2013), improvements in operational performance were found. A common supply chain plan is at place working towards global objectives. Plans communicated are more reliable resulting in more efficient production and transportation. Stock levels have decreased while obsolete inventory is down. Nevertheless, some issues remain. Supply plan accuracy was still low in 2011 due to low forecast accuracy on new products, manual interventions to plans, and further compliance issues.

1.1.5 Availability initiatives at IKEA of Sweden

Around 2004, in parallel with the centralisation of the supply chain planning process, Ikea of Sweden started, originating from the Kitchen and Dining Business Area, an improvement initiative related to product availability.

As part of the availability initiative was introduced the concept of "S-Zero Hero", a term used to describe the particular competence and mind-set required to work with ensuring, on a supply chain perspective, that the most important range, from a strategic perspective, was always available. S-Zero referred to the "zero tolerance" towards stock-outs for that specific range. One could become a certified S-Zero Hero, much like a "Six Sigma Black Belt". To emphasize the importance of the S-Zero range, a set of availability rules were established, stating who, what, and how to work with the range, and who is responsible for making certain that the rules are followed.

Later, in 2010, having worked with the S-Zero concept sufficiently enough to extract key learnings, the company made extensive alterations, modifying also the concept itself. 14 rules became, and to this day remain, 17 rules (see Appendix A). The S-Zero range was

no longer used as a term, it was changed to S1; however, the idea of always striving to perfect availability did not change.

Internal reports in 2013 stated that availability in the total IKEA had increased, and that the improvement initiative was showing good results, not the least in the mind-set of employees.

1.1.6 Customer perceived availability

Continuing the availability improvement initiatives, a clarification on what defines product availability at IKEA is about to be implemented in the coming year. Product availability from a customer perspective is stated to be much more than just physical availability and should incorporate all IKEA products, service and information. Relating to the physical availability in the store, a new measurement called In Store Availability (ISA), or SL (Service Level) New, has been introduced. The old availability measurement, which is going to be replaced, is designed according to the following: if there is a piece of any given item in the store, there is availability. Since for many items several pieces are normally demanded, this was deemed to not reflect the customer perception adequately. Having one piece of a wine glass when an average customer purchases six, does in no way reflect that full availability is achieved. Therefore, the new measurement is designed to require the average sales per receipt in the store to be fulfilled. Range measured and time of measurement are also adjusted as to make ISA more rigorous in terms of perceived availability. In addition to ISA, On Shelf Availability, measuring on the specific sales location, but otherwise following the same logic as ISA, has also been introduced. At the time of writing, up until fall 2017, both the old and the new availability measurements are used in parallel.

1.1.7 Kitchen and Dining Business Plan

For both Kitchen and Dining, a continuous objective of the coming years is to increase sales. This is stated in the business plan and naturally so as IKEA is a profitable company. A recurring factor in succeeding to increase sales is said to be able to convert the visitors of IKEA, whether via e-commerce, by physically visiting a store or visiting of any other channel in which IKEA operates, to actual customers. For example, in 2015, the IKEA Kitchen website had near 105 million visitors, but numbers of sold kitchens

was unsatisfactory in comparison. The sheer difference in numbers insinuates an untapped potential for IKEA which they strive coming to grips with by improving in several areas, one of which, perhaps most relevant for this paper, is availability.

1.2 Purpose and Research Questions

With the new availability measurement about to be fully implemented, requirements on maintaining the same, or even increasing, performance, will also be tougher, especially considering expansion and sales increase plans. At Kitchen and Dining, where availability is seen as especially crucial, interest lies in getting to know hurdles and potentials with regards to the upcoming changes, hoping to both take introspective learning and spread it to the rest of the company; this reflects the purpose of this report, where the ambition is also to contribute to literature.

Purpose: Finding why product availability is low and what the challenges are to increase it.

The research questions (RQ) are therefore the following:

RQ1: What are the root causes of insufficient in-store availability?
RQ2: What are the trade-offs of increased in-store availability?
RQ3: What can be done in the supply chain to mitigate store out-of-stocks?

1.3 Delimitations

An end-to-end perspective is applied in this paper. The processes and roles involved throughout the supply chain related to securing store availability are under consideration. Two stores are especially targeted for observation, however, since focus is on the supply processes, replenishment operations in the stores are disregarded.

Furthermore, the company sponsor of the project is associated with a specific product range. This is further limited to articles of highest priority according to the company's inherent classification.

2 Literature Review

This section will provide insight to some of the most relevant literature when it comes to product availability in retailing. The goal is not to create an exhaustive in-depth review as much as it is to support and act as a fundament which can be used, tested and refined with the findings of this report. A semi-systematic review method was used, which meant starting with a set of keywords such as "retail", "supply chain", "product availability", "stock-out", "service level", "performance", and then, after having established a basis of seemingly useful articles, using forward and backward tracking to accumulate a preliminary reference list. The database used was Scopus, and only English journal papers and books were looked at.

2.1 Product availability in retail supply chains

In retail supply chains, product availability is regarded as an important indicator of quality (Salam et al., 2016). According to Aastrup and Kotzab (2010), two research streams regarding retail product availability have been living virtually in parallel during the last 40 years. One stream (I) has revolved around the customer behaviour connected to product availability; the other (II) has treated the supply side drivers/issues of product availability.

Knowing what implications exist when availability is not aligned with customer expectations is key, as suggested by literature. Low quality in terms of availability may translate into loss of sales and customers (Salam et al., 2016; Ehrenthal and Stölzle, 2013). According to Corsten and Gruen (2003) loss of sales in retail stores due to lacking product availability is averaging four percent on a worldwide level.

The findings of research stream I have led to the general conclusions that, when customers do not find the product that they seek, their behaviour follows the SDL (Substitute, Delay, Leave) pattern. In their review, Aastrup and Kotzab (2010), present a synthesis of the large body of work that throughout the years has discussed this behaviour, and they show that there are many different variables that affect how customers react and what they decide to do; (1) product-related, (2) store-related, and (3)

situation-specific variables all come into play here, implying whether a customer substitutes a product/store, delays the purchase, or leaves without a purchase.

Corsten and Gruen (2003) translate the different behaviours into supply chain risks according to: (1) Retailer shopper loss risk – customer switching store permanently due to lack of product availability; (2) Retailer sales loss risk – depending on the behaviour of the customer a sales loss could manifest in cancelling the purchase, purchasing the item at another store or switching to a lower priced item; (3) Manufacturer shopper loss risk – consumer switching to competitor brand permanently; (4) Manufacturer sales loss risk – substituting the current purchase to another brand or cancelling the purchase. Corsten and Gruen (2003) state that realizing that the four areas are interdependent is key to understanding the effects. Avoiding sales loss at retailer level reduces the shopper loss risk, supplier risk and also further inefficiencies upstream in the supply chain. Regarding the latter, Corsten and Gruen (2003) suggest that rush orders to fulfil demand are subject to the bullwhip effect, implying large swings in supply chain inventory and corresponding costs. The authors also suggest that inaccurate demand information cause information inefficiencies. If demand history does not reflect the real pattern due to issues in product availability the proper quantity to meet demand might not be purchased. Furthermore, if the purchasing responsible is aware of the availability issues, one might compensate for it and order an excessive amount not considering previous loss of customers.

Insight from research stream I makes second research stream II justifiable, since without realizing, from a customer perspective, the potential issues that arise with low availability, studying the underlying mechanisms that drive availability, or that cause low availability, is arguably of little value. This view is advocated by Aastrup and Kotzab (2010), who state that the two streams can be integrated to better understand how the conditions for customer response can be translated into the costs associated with low or high product availability, a topic which will be further dealt with in subsequent sections.

2.2 In-store and on-shelf availability

Before continuing, however, it is necessary to establish a correct taxonomy. Most commonly, product availability is defined as the probability of a product being available

in saleable condition when a customer comes to seek it on a store shelf (Moussaoui et al., 2016). In much of the relevant literature (Aastrup and Kotzab, 2009, 2010; Corsten and Gruen, 2003; Moussaoui et al., 2016; Salam et al., 2016; Ehrenthal and Stölzle, 2013), an out-of-stock (OOS) situation is seen as the complement of a product being available on the shelf, or on-shelf availability (OSA). If a product is not available on the shelf where a customer would naturally pick it, it is however not necessarily missing from the store.

Grubor et al., (2016) state that there are two aspects of stock-outs: the temporal aspect and the spatial aspect. The temporal aspect refers to whether a stock-out is permanent or temporary. The spatial aspect on the other hand, refers to whether a product is physically missing from the store or if it is merely missing from the designated point-of-sale (the shelf). A product physically missing from the store represents a store stock-out; a product missing from the shelf is a shelf stock-out. The corresponding complements are thus in-store availability (ISA) and on-shelf availability (OSA), respectively.

The distinction in the spatial aspect as presented by Grubor et al., (2016) is not merely trivial, but of high relevance to this paper, since it is fundamentally connected to the case and the research questions.

2.3 Root causes of stock-outs

Now to the big question: Why do stock-outs occur? The answers to that, although quite substantially recurring in literature, are not completely unison.

Looking at the whole supply chain, root causes of stock-outs are often grouped together in two broad categories, such that it is shown where in the process of supply issues are occurring. Aastrup and Kotzab (2009) refer to this as out-of-store and in-store causes; Ehrenthal and Stölzle (2013) use pre-store as a replacement for out-of-store. Thus, in terms of root causes, the retail store is decoupled from the rest of the supply chain.

Corsten and Gruen (2003), continuing the work of Gruen et al. (2002), state that the causes of OOS-situations can be assigned to three main practices: ordering, replenishment and planning. The issues in these practices are further divided according to where the errors occur, similar to the authors above. Regarding ordering, causes at

retailer level are for example: inadequate order quantity, late order, demand forecasting errors. Insufficient ordering at warehouse level when retailers offer large promotions would also result in supply not meeting demand. Failure in replenishment is related to store practices such as backroom errors, insufficient shelf capacity or signal errors to retail management. Replenishment issues at warehouse level also occur when not keeping inventory able to supply retailers.

Corsten and Gruen (2003) also suggest issues upstream at retail headquarter, supplier or wholesaler level; e.g. causes associated to planning practices are not only forecasting issues, but also discontinued items not communicated to retailers, manufacturer not able to meet demand or other issues related to suppliers not keeping enough inventory.

Important to notice is that Corsten and Gruen (2003) mention that the causes observed are estimated or sometimes calculated and therefore not exactly measured. Keeping this in mind one comes to the realisation that the assigned causes are not necessarily the true root causes but symptoms and merely the most likely place in where responsibility should be placed.

Adding to the field is the work of Ehrenthal and Stölzle (2013), who as mentioned detail the stock-out causes at store and pre-store level. A differentiation is made between ordering done directly from a supplier or via distribution centre. Regarding automated store ordering versus manual adjustments, the authors note the occurring issues independent of which type of ordering system is applied, stating that the distinction is important due to different approaches needed in order to solve the issue at hand effectively.

Moussaoui et al. (2016), on the other hand, use a different categorization: they find that the causes of OOS/drivers of OSA can be grouped into five types, namely operational, behavioural, managerial, coordination, and systemic. In this case, no explicit distinction is made on whether the issue at hand is related to in-store or any other activities in the supply chain, as the issues may be overlapping or occurring at any of them. All types contain more or less what has been mentioned by Corsten and Gruen (2003) and Ehrenthal and Stölzle (2013), but also additional substance from other authors' work,

among others that of Aastrup and Kotzab (2009) and Fernie and Grant (2008). Systemic factors are special: they cannot be divided according to place of occurrence, since they consider the supply chain from a holistic and strategic perspective; network design and product variety are examples of possible root causes of systemic nature. Moussaoui et al. (2016) emphasize that aligning incentives in the supply chain may be the key to mitigate many of the non-systemic issues, while systemic issues will require more exhaustive and long-term efforts. The view that incentive alignments are of high importance is echoed in the work of Narayanan and Raman (2004) who by studying 50 supply chains found that companies often did not act to maximise network performance. Incentive issues can be related to three major reasons: not being able to observe partner firm actions related to company products, leaving an information gap in creating incentives; lack of trust, causing companies to hide information fearing for cuts in vendor margins; and poorly designed incentives at the cost of network profit. The misaligned incentives found could in supply chain terms be translated to excess inventory, stock-outs, incorrect forecast, poor sales efforts, and poor customer service.

Empirical findings of many large studies seem to indicate that some causes are more likely to be encountered than others in the industry. Aastrup and Kotzab (2009) who investigated the Danish retail market, taking into consideration both independent and centrally organised retail supply chains, conclude that the overwhelming majority -- 98 percent -- of all stock-outs have their root in the retail store, more specifically in replenishment and ordering practices. Corsten and Gruen (2003) find that, on a worldwide average, a majority of the root causes of stock-outs lie in the store, but their figures are milder: 72 percent. Fernie and Grant (2008), who refer to data provided by Tesco, also state that most problems are related to in-store operations. Similarly, a study made by the Coca Cola Research Council (1996) on the North American market, shows, especially when items are warehouse-supplied, that the largest portion of OOS responsibility remains in the store. One may conclude that, although the figures differ slightly between studies, the in-store operations are where to put focus, in order to address the root causes of stock-outs. Important to realize here is that in these papers, what is referred to as stock-outs, is in fact shelf OOS, the complement to OSA, as previously defined. If, for instance, the root causes of store OOS/drivers of ISA were to be studied, the findings would not necessarily appear the same, as some issues inevitably

arise before or are related to other aspects of the supply chain than the store (Moussaoui et al., 2016). Using store OOS as a metric is understandable, since it more connected to customer satisfaction, which ought to have a strategic importance (Gunasekaran et al., 2003). However, getting to the bottom-line of the root causes, on an end-to-end supply chain perspective, could motivate looking deeper into ISA, either isolated or jointly analysed with OSA. Not only is it plausible that upstream failures to a greater extent could affect OSA; in-store operations could also affect the ISA metric, which, if below target, will inevitably have a negative impact on OSA.

Indeed, there is some evidence showing that bad store operations are not always a major, or very obvious, root cause. Vasconcellos and Sampaio (2009) surprisingly found in their study of the Brazilian retail market, that store managers mostly attributed the causes of stock-outs to supplier deficiencies, while in-store operations were considered as less likely causes. Although this might lead to questioning the potential bias of store managers towards their area of responsibility, it is nonetheless a suggestion that in reality, the picture is rather complex, and that it is not obvious where root causes generally exist. As the latter authors (2009) do not fail to mention, caution should be had when trying to apply research results from a different context than the reality in which one operates. Ehrenthal and Stölzle (2013), whose findings are also preceded by empirical research, further emphasise this: causes of stock-outs are tightly related to the specific type of retailer, store size, and type of product category and item; the same authors (2013) also understand that many issues that exist in the store, actually can be improved by coordinating and providing timely fulfilment from upstream.

It can be argued that there is an element of risk for shortages throughout whole supply chain. Chopra and Sodhi (2004) elaborate on supply chain disruptions and their impact through anecdotal reflections. The authors state that the “universe of risk” in which the company operates and what events and conditions drive risk, must be established in the organisation before one can proceed to build a mitigation strategy. Risks are concluded by stress-testing the supply chain in which different scenarios are simulated to reveal the inabilities in coping with the risks. Depending on the particular setting, a general risk-mitigation strategy is adapted by “tailoring”, meaning that for each mitigation approach, Chopra and Sodhi (2004) present “tailored” strategies. In the strive to reduce risk,

however, managers keep building reserves in inventory, capacity etcetera, and therefore also increase costs. Three key relationships are discussed in the trade-offs of reducing risk and the following cost of building reserves. Moreover, the configuration of the supply chain may be a variable that affects the retail performance, as suggested by Cigolini et al. (2014).

Ultimately, the fact that most of the above empirical studies have looked at retailing of fast moving consumer goods, leads to the possibility of further testing and refining the existing theory regarding root causes of stock-outs in different contexts.

Table 1 shows a summary of the OOS root cause attribution as presented by the authors above. It is evident that literature agrees that root causes can mainly be attributed to in-store operations. However, it is notable that virtually all authors look at OSA, not accounting for ISA. There is some recognition of the contextual importance, which will be further considered in this report.

Table 1. Summary of root causes based on literature.

OOS Root Cause Attribution	Authors	Notes
In-store operations mainly (planning, ordering, replenishing)	Coca Cola Research Council (1996); Corsten et. al (2002); Corsten & Gruen (2003); Aastrup & Kotzab (2009, 2010); and Fernie & Grant (2008)	Authors acknowledge root causes in different areas, but main take-away is that store operations cause OOS.
Supplier deficiency	Vasconcellos and Sampaio (2009)	According to the study, store managers perceived that supplier deficiency was a more likely cause of OOS than store operations.
Context dependent (business type, country, store size, product type)	Vasconcellos & Sampaio (2009) and Ehrenthal & Stölzle (2013)	These authors emphasise the importance of contextual differences in relation to OOS causes.
Non-systemic (operational, behavioural, managerial, coordination) vs systemic	Moussaoui et al. (2016)	Authors do not distinguish causes based on place of occurrence.

2.4 Maximising or optimising availability

Many authors (Aastrup and Kotzab, 2010; Moussaoui et al., 2016; Salam et al., 2016; Grubor et al., 2016) have questioned the idea that there is a simple relation between high availability and customer satisfaction or sales levels, while neglecting the potential costs that are implied by increased availability.

Presuming that increased inventory levels will lead to decreased OOS-levels, thus increased probability that customers return to the store, one must also be aware that increased inventory levels may lead to additional handling and waste disposal, and potential confusion in the operational environment (Grubor et al., 2016). The latter (2016) quite expectedly found when analysing a Serbian retailer that increased inventory levels were not significantly correlated to higher OSA, but merely to higher ISA. At the same time, shelf OOS was found to be significantly higher than store OOS. In other words, more inventory in the store, did not necessarily yield a more advantageous situation from the customer point of view. This of course can be reapplied to the understanding that in-store operations are a major root cause of OOS, e.g. due to difficulties with backroom operations and insufficient shelf space, but on a higher level it suggests that pushing inventory to the store could actually have negative impact on sales levels (Grubor et al., 2016).

Aastrup and Kotzab (2010) state that there has been an implicit agenda in literature to always strive, independent of product type, to minimize stock-outs, which is largely because research stream I has solely dealt with the high costs of understocking (lost sales) as implied by customer responses (SDL). The authors (2010) say that this is paradoxical, since OOS in essence is a service level that must be traded off to other performance measures: the retailer's costs of understocking must be compared to the costs of overstocking (e.g. obsolescence) while considering demand patterns for the specific product as well. High costs of understocking are usually related to products which customers are likely to switch stores in order to obtain, i.e. to the "Leave" behaviour; customers choosing to "Delay" a purchase initially imply a low cost of understocking to that particular product, although a delay with the passage of time tends to lead to a lost sale; the lowest cost of understocking is posed by the products which customers can easily substitute within the store (Aastrup and Kotzab, 2010). Consequently, for a certain

product, a likely customer response will have different implications for management levers, or how to deal with and what to do of the root causes of stock-outs, resulting in different optimal OOS-levels for different products (Aastrup and Kotzab, 2010).

Moussaoui et al. (2016), referring to literature, also gather that for some products, maintaining a certain level of OOS might indeed improve net retail performance: controlled OOS levels could signal scarcity and create a perception of quality or popularity, which in turn might increase the competitiveness and long-term demand for a product; moreover, creating OOS for low-margin products could act as a promotional tool for high-margin products.

Salam et al., (2016) continue in this direction by stating that maximising inventory availability will lead to significant carrying costs, including that of slow-moving and low-performance products, while optimising it will reduce the associated costs, though it will be virtually impossible to satisfy every single customer. Which products to prioritise would then be a question related to the careful assessment of possible customer responses, as per the proposal of Aastrup and Kotzab (2010). However, according to Salam et al. (2016), whether the goal is to maximise or prioritise, in the case that such a discussion is relevant, ought to be a decision based on the organisation's strategy, a statement that can be reconnected to and confirm the delicacy of the systemic factors of Moussaoui et al. (2016). The connection can be further drawn to the well-cited suggestions of Fisher (1997) in that a functional supply chain, operating in a market with low demand unpredictability, is better suited to aim for cost reductions and optimised service levels than is a responsive supply chain, which could gain more benefits by trying to reduce, avoid or hedge uncertainty, for instance through maximising inventory levels.

3 Methodology

This chapter describes the research methodology, beginning with the choice of approach and the look of the overall process. In the final part, the different data collection platforms are presented and explained more thoroughly.

3.1 Research Approach

To satisfy the purpose and research questions, a case research approach was chosen for this study, the motivation following below.

3.1.1 Case Research

Fisher (2007) suggests that empirical research can be categorised according to two attributes: what is the goal of the research, and how does the interaction with the world look? The goal can be to describe the world or to present, based on empirical observations, a recommendation. Coupled with the structure of the interaction, a research type can be placed in one of the boxes in the 2x2 matrix, designed by Fisher (2007), visible in Figure 2.

		Goal of research: Prescriptive	Goal of research: Descriptive
Interaction with the world	Highly Structured: Data and Algorithms	Engineering: Software implementation, optimisation	Econometrics: Statistical analysis of large data sets
	Less Structured: Interviews and Observations	Principles/ Hypotheses	Case research: Interviews and observations

Figure 2. Taxonomy on empirical research, adapted from Fisher (2007).

“We should not underestimate the value of less structured empiricism. Something as simple as a conversation with a manager over lunch can be extremely useful in identifying problems and hypotheses for further investigation, especially if a series of these conversations over time all point in the same direction” - Fisher (2007, p. 373)

The above quote very appropriately explains the main reasoning behind the chosen methodology here. Fisher (2007) does not neglect the possibility that research can overlap the boxes in the matrix, for instance as a case research can aim to more than merely describe the environment in which it exists. A case research form is a good place to start, after which initial recommendations (the lower left box) can be used in the future to further develop the understanding of the studied phenomenon and prescribing more thoroughly the actions that ought to be taken. Moreover, it is also possible to combine the less structured case form with elements of statistical analysis, to support recommendations.

Adding to this is Stuart et al. (2002), who gather that case-based research is useful when the context is different than in extant theory, when cause and effect relationship is in doubt, and when the subject matter is complex, thus making room for developing understanding.

But there are different variations of the case research. As this study largely is about identifying and describing critical variables, as well as building the relationship between and understanding causality of these variables, a focused/multi-site case study is an adequate research structure, according to Handfield and Melnyk (1998). Embedded in the study is however also a potential element of theory validation and/or extension, connected to the fact that much, but not all, of literature perceives the retail store as the habitat for root causes of stock-outs. For theory validation, the latter authors (1998) recommend experiments or large-scale samples of the relevant population, whereas a contextual case study might be best suited for theory extension (Stuart et al., 2002).

Being practically difficult, if not impossible, to include experiments in this work, the attention was shifted towards the other case research forms. Here was carried out a combination, if one may, of the focused, contextual and the multi-site case study. The

context, which as mentioned previously, seldom seen in literature, is that of a home furnishing company with global and increasingly expanding presence. The focus has been on the particular business which is developing and selling kitchen and dining products. Lastly, in order to get a comparable picture, without over expanding the scope, two retail stores (sites) in different parts of the world, i.e., different markets, were chosen as particular sources of performance data and units of assessment.

3.1.2 Research Process

Like any research, the case methodology follows a certain general process, which as per Stuart et al. (2002) is made up of five stages.

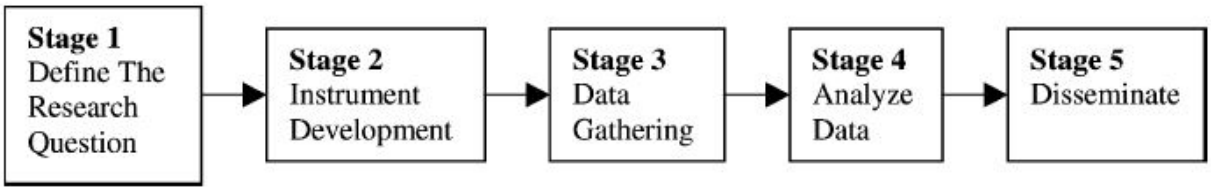


Figure 3. Five stage case research process, Stuart et al. (2002).

This very process has been guiding the present study. It can be loosely derived from, or compared to, the framework of Handfield and Melnyk (1998), who list the different stages of research in terms of Discovery, Description, Mapping, Relationship Building, Theory Validation, and Theory Extension/Refinement, where Data Gathering could be seen as overlapping.

Here, the research questions (or alternatively the discovery of the underlying problems) were defined in accordance with the company, although this may otherwise be deduced from literature. Instrument development, which refers to the establishment of preconditions for analysis, in this scenario has been about deciding how, from where, when, and to what extent to gather the necessary data; again, with the help of the company, who provided the necessary resources such as access to the company intranet, personal laptops, contact channels and meeting rooms. However, the literature review also plays a role in this development.

Data collection and analysis is based on both quantitative and qualitative platforms, weighing on the qualitative side. A distinction of the platforms can be made in terms of primary data – interviews, workshops, questionnaire – and secondary data – performance metrics and availability reports. The conclusions are not based on one of these, but are rather a result of triangulation between all the data combined with literature. As such, the methodology has been following a balanced approach, both inducing from empirical findings, and deducing from established theory. In the next section, the different data platforms will be described.

3.2 Data Collection

3.2.1 Performance Metrics

Having access to the company intranet provided the possibility of observing relevant, company specific, performance metrics on a both long and short term basis. There are two metrics of relevance that were accessible: ISA and On Time Delivery (OTD).

Although OSA was fully available for observation, it was, in accordance with the discussion in previous sections, decided that focus be put on ISA, specifically Kitchen and Dining S1 articles, since it is sufficient for the purpose of the research. It was decided not to invest time into looking at the existing/old measurement of availability, simply because the interest lies into showing how performance may come to look when ISA is fully implemented; if possible, to have a glimpse into a probable future. The choice of only looking at S1 articles is both based on the need for limitation and on the fact that it represents the company's top priorities.

OTD is a metric that follows up on the timeliness with which the organisation manages the product flow from supplier to the receiving end, be it a retail store or a distribution centre (DC). OTD is indeed a group of metrics. OTD Supply Chain (OTD SC) is monitoring the totality of the chain: does the product arrive at the end destination within the time frame that was decided upon? OTD SC is in turn divided into two sub-metrics: OTD Sender and OTD Logistics; the former measures if a product is dispatched at the planned time, whereas the latter measures if the actual transport and unloading lead-time (jointly called logistics time) matches what was originally calculated. In general, OTD is

an indirect indicator with regards to total performance, but potentially suggestive of issues with product availability.

All these metrics work as a supportive basis for the remaining data collection and general understanding, but are to some extent also subject to analysis. The main interest with regards to the latter has been to identify patterns or variations with respect to time as well as correlation between different metrics.

3.2.2 Interviews

As part of the qualitative data collection, interviews with a wide variety of IKEA employees, with different degrees of responsibilities, were carried out. The interviews were semi-structured, spanning between one and two hours, and at all times followed the same general outline. Some of the interviews were executed by physically meeting in one of the company's sites, although the majority, due to traveling constraints, were held via conference calls. In total were held 16 interview sessions, of which two had a duo of interviewees, meaning that totally of 18 people were interviewed. All interviews were content based; none were held about the employee's usual work space, because this was not an option.

The purpose of the interviews has been two-fold. Firstly, they have aimed to help in describing and mapping the different roles and responsibilities in the supply chain processes. Secondly, they have aimed to highlight, from the different perspectives of the interviewees, issues and potential remedies connected to product availability. As such, in order to obtain a maximally diverse picture, interest has lied in getting in contact with employees working closely both with the supplier-end and the retailer-end of the chain.

In the Appendix B can be found the interview form.

3.2.3 Availability reports

To further add insights to shortage causes, information regarding major ones were extracted from the bi-weekly availability reports issued by each regional RST. The availability reports were carefully reviewed, and shortages were continuously added to a list. If a shortage description was mentioned more than once, the number of occurrence

was tracked for each shortage. Only S1 articles related to the Kitchen and Dining HFBs were included in the count.

3.2.4 First Workshop

Apart from the interviews, a workshop session was held in order to consolidate the qualitative database. People, with which contact had been previously established, were invited to partake in this three-hour session. There were 12 participants in the session.

The aim of the workshop was to gather a cross-functional team and jointly identify issues and causes of in-store shortages. For this, was primarily used the "5 whys" mind-set, and an attempt was made to make a categorisation according to Ishikawa's cause-and-effect methods (1990). Five generic areas of causes were used as a starting point, namely Man, Method, Machine, Material, Measurement, and Milieu. Other types of general causes could alternatively have been achieved jointly through brainstorming, but in order to save time and energy for the bulk of the session, the above areas were deemed as sufficient. When it comes to the design of the session, Kaoru Ishikawa, in his work "Introduction to Quality Control" (1990, p. 231-231), has said the following:

"If possible, people from other processes should also be included, and brainstorming should be used to stimulate the flow of ideas. The person chairing the meeting should encourage people to talk, so that everyone's input can be gathered, and it is particularly important to create an atmosphere in which operators, foremen, and non-specialists feel able to talk freely. In this exercise, there should be no negative comments or discussion after a person has offered an opinion. It is more important to listen to what others have to say, than it is to express one's own ideas. Items judged unnecessary can always be rubbed out later. This is not the time to debate whether or not a particular cause affects the process, or whether or not it is important."

Consequently, the goal here was to have a team as diverse as possible, and it was constantly aimed to maintain an open-mindedness throughout the session.

The process of the session was such that, in the beginning, each participant was given up to half an hour to, on his/her own, identify every reasonable problem that is directly, or

on a superficial level, connected to in-store shortages. The participants were given the opportunity to write everything down on a paper. When everyone had completed this task, the brainstorming began. Firstly, all identified problems were listed on a whiteboard so that everyone could see them. Then, it was strived for all problems to be put into the different areas that were mentioned above. When this was done, focus was put on each area at a time, for instance starting with all problems that are listed under "Man", applying the "5 whys" mind-set to go deeper and deeper, until a probable root cause was found for each problem, all while trying to maintain open-mindedness and a positive spirit.

The original goal was to finish this session with a clear take away, but some difficulties arose in terms of moderating and using the time efficiently, implicating that the result was not useful enough to stand on its own. However, it was agreed that, as part of the total data collection, the learnings are adequate as a supportive element.

3.2.5 Questionnaire and second Workshop

Although primarily a case study, this research has also incorporated elements of the survey. Based on both the interviews and the above workshop, a semantic scale questionnaire (Appendix C) was sent out to a cross-functional sample of employees, from sales to purchasing, in order to systematically find out more about the nature of the identified causes. The causes that were included in the questionnaire were such that they were mentioned many times, both in the interviews and in the first workshop. It was sought to know whether they are perceived as sporadic, periodic, or chronic, and how they are seen in relative terms of degree of impact (how much they affect availability) and degree of feasibility (what would it take to fix). An option of "not being able to answer" was also included, in order to minimize unnecessary influence in cases when the knowledge of the respondent was limited. The questionnaire was sent out to 70 people, of which 46 offered complete answers.

The result of the questionnaire was used to highlight the causes on which to put special focus, in terms of proposing suggestions for improvement. Answers related to impact and feasibility were all subject to statistical tests, that is ANOVA-tests and t-tests.

Finally, another workshop (organised by the company itself), containing a wide range of people working globally and regionally in the supply-end of the organisation, was used as a means of both validating the implications of the questionnaire, and discussing and generating suggestions. The idea was to extract the causes which were both of high impact and of high feasibility to change, and put emphasis on these with regards to suggestions for improvement.

3.2.6 Store Visit

Of the two stores that were assessed more closely, it was possible to physically visit only one, namely a store in the south of Sweden (SWE). The other, located in the United Arab Emirates (UAE), was not possible to visit, but it was deemed sufficient to have interviewed two representatives from there.

The goal of the visit was not to emphasise or solve a particular issue in that store, but rather to further deepen the understanding of the end-to-end processes and to comprehend the role of the store operations in relation to ensuring availability and/or causing shortages.

IKEA stores open the doors to customers at 10:00 every working day[1]; five hours before that, all in-store logistics operations, including unloading of goods, replenishment, and so forth, are dealt with. The visit, guided by an employee, took place during these preparatory hours, offering a good possibility to gain necessary insight. In conjunction with the observations, relevant questions were also asked to the guide.

3.3 Credibility

A large part of the data collection was based on interviews from people that are working within the case company. To minimise the effect of functional bias was therefore taken a cross-functional samples of interviewees. Triangulation between the qualitative/quantitative data and literature was done to minimise company bias. Moreover, the depth of the quantitative data put some limitations on the accuracy of the analysis. Looking at long-term ISA, for instance, it was only possible to see whether or

[1] The restaurant usually opens its door at 09:30.

not availability was reached; the actual number of items in stock at the store could not be retrieved. For the OTD metrics, delivery precision of specific orders was not retrievable, only of accumulated volumes or quantities during a specific period. Lastly, the availability reports were not compiled according to standardised ways (more on this in chapter 5 and 6).

3.4 Unit of Analysis

To summarise, the unit of analysis is the supply chain of IKEA Kitchen and Dining, which will be described more thoroughly in the next chapter. Although two stores were used as sources of performance data, the goal was to maintain a holistic, end-to-end perspective, finding root causes, suggesting improvements and revealing trade-offs with applicability to the whole chain.

4 Case Description

This chapter describes the case unit which will later be analysed. Firstly is presented IKEA's supply chain strategy and the definition of home furnishing businesses and business area, then the different functions and relevant roles throughout the supply chain are described. Although every single actor involved is not included, this is a fair representation of the greater picture, especially related to ensuring product availability.

4.1 Supply Chain Strategy & Business Areas

IKEA's goal is to work process-oriented and holistically in every part of the supply chain. This idea is manifested in the IKEA end-to-end model, which can be seen as one of the cornerstones of the company's strategy, the others being Design Requirements (related to product development and customer value) and People and Passion (culture and management).

The IKEA end-to-end model is in its most fundamental form a map of the company's relationship with its suppliers on one end and customers at the other – a picture of how IKEA can both ensure low prices and high volumes. It is a clear strategic statement that "LEAN" principles guide the overall operations.

The company wants to create a unique competitive advantage by being vertically integrated upstream, having close cooperation with its suppliers, so that goods can be purchased to low costs, and that products can reflect what IKEA believes are right for its customers, "the many people".

Seeing it as a map of the supply chain, different functions are active in different parts of the model. Generally, the closer to the ends, the more local is the presence of each function (or organisation): there are those that deal with individual suppliers and those that deal with individual end-customers. Furthermore, there is a distinction in terms of range responsibilities, depending on which end of the supply chain one is working. On the supplier-end, responsibilities are based on categories, an internal term which is used to divide the range mostly based on material type and/or production method (a more suitable supplier jargon). On the consumer-end, responsibilities are based on the actual

product assortment (the finished products which customers buy). There is a decoupling point in the centre, where category transforms into assortment, something that will be explained further in subsequent sections.

IKEA's product range is divided into several hubs, based on the types of products that are offered to the end customers. These hubs are called Home Furnishing Businesses (HFBs). In the stores this is reflected as per the distinctive spatial arrangement of the different products. For instance, kitchen exhibitions are in one location, bathrooms in another, and so on.

Kitchen and Dining are both two individual HFBs, but in this, as in several other cases, HFBs are centrally co-organised to form so called Business Areas (BAs). The reason for this is to make use of existing synergies. Each BA has its own central, organisational structure, with a BA manager that has the overall responsibility, looking over units such as Commercial, Supply Chain, Range, and Business Navigation, among others; of course, each of these units can in turn be further broken down, but all will not be treated here. A BA, organisationally, can be seen as containing the parties that are involved in developing and planning to produce and sell the HFB specific range on a global and mid- to long-term perspective. However, the term BA does not only implicate the central collaboration between HFBs, but also appears in the names of job titles at the Regional Supply Teams, as will be explained in short.

Thus, in the following will be shown which are the main actors involved and what they do in the supply chain, while maintaining a connection to product availability. It is important to note that the legal structure of IKEA, as partially presented in the introduction, does not always clearly reflect the organisational structure of the company. Although the company internally has its ways of denominating the different actors, here, to minimize potential confusion, will be used a nomenclature that not necessarily matches to a full degree that of the company. The purpose is to offer both insight to the individual functions and roles, as well as a comprehensible overview of the system as a whole.

4.2 Supply

4.2.1 Purchasing and Logistics

Closest to the suppliers is the Purchasing and Logistics (PL) function, which is divided into nine regional areas (PL Areas; PLAs) in which there are several offices that work closely with suppliers operating in that same area. But it is also divided according to the aforementioned categories. In other words, there are people responsible for developing operations connected to a certain category within the geographical boundaries defined by the PLA.

PL works with the existing supplier base; a more strategic position on this is held by the Category Organisation, a separate central (IoS) function that strives to find suitable suppliers and integrate them to IKEA's supply chain, while aligning the parties to the underlying business objectives. The unit in PL which is most involved with securing product availability, is the Business Development team, where in a typical office (within a PLA), a Business Development Manager is managing one or several Business Developers, Production Engineers, and Supply Planners. While the general purpose of the team is to purchase goods to a minimum cost and ensure optimal logistics in the related processes, it ought to make sure that it is all done without jeopardising availability downstream in the supply chain.

A Supply Planner, with responsibility within a certain category, normally follows up on the performance of a given set of suppliers (one or several). The main monitoring lies in the OTD Sender metric, which is a key performance indicator (KPI) for the Supply Planner. However, if there is any production issue that may or indeed does result in an order cancellation, it is the Supply Planner that stands for the immediate contact with the supplier and should then evaluate the possibilities of actions to be taken. Moreover, the Supply Planner controls and supports decisions related to the supplier's logistics costs, provides input on continuous performance improvement, and stimulates a proactive behaviour for all transactions.

While none of these roles have a direct connection to product availability, as in not actively monitoring the performance metric, they are enabling a properly working supply

chain, thus enabling availability. The Production Engineers deal with quality standards compliance, and whereas Supply Planners have a highly operational/executional focus, the Business Developers aim, on a more long-term basis, to build a professional relationship with a shared business model and transparent communication, while staying within the realms of IKEA's values.

4.2.2 Regional Supply Team

To ensure availability on a regional level, supply teams are located in four regions of IKEA's global market. The Regional Supply Team (RST) is somewhat of a prolonged arm of the supply groups at IKEA of Sweden (IoS), acting as a bridge between PLA and Retail.

The RST mainly consists of the two roles Business Area (BA) Specialist and Supply Development Receiving (SDR) Specialist. A BA specialist's task is to monitor availability and communicate it to Retail in order to secure high operational availability. This involves continuous follow-up on sales, incoming orders and deviations regarding articles within the assigned HFBs. A BA specialist, responsible for single or overlapping HFBs, is to handle overstock within the region by contributing to Retail Commercial (see following sections) with sales steering. Furthermore, smooth range changes is to be secured regarding news/outgoing articles according to plans. The SDR Specialists, on the other hand, supported by several functions, focus on retail replenishment and seeks the optimal solution while ensuring a stable and high availability. When optimal solution is decided, it is the BA Specialist's task to ensure that it is changed according to the recommendation.

In general, BA Specialists have a more direct responsibility of availability in contrast to the SDR Specialists which, also notably, are organised in categories. The former act on deviations and have the responsibility to secure it on an operational level. SDR creates the conditions for availability by optimising delivery set-up solutions with a cost focus. Regarding KPIs, SDR naturally focuses on OTD SC and Direct Delivery (DD) Share with background to IKEA's stated low cost strategy, a part of which is increasing the amount of DD to retailers. An important KPI for a BA Specialist however, would be the service level in line with the role responsibilities and tasks.

4.2.2.1 Availability reports

Every second week, availability performance summaries from each region are presented to functional managers mainly from retail logistics and sales. The RSTs are producing summaries with the purpose of showing current or potential availability issues in their respective region. The cause for the availability issues is described and a solve date suggested. Also, articles in which the region currently is experiencing overstock are described and, if appropriate, suggested to sales steer towards.

Major shortages in the report context are defined as articles having the highest impact on HFB service level. Since the SL New metric still is in a pilot phase and not fully implemented in the RST, the availability figures are presented as old SL.

4.3 Central Planning at IoS Kitchen & Dining

In Älmhult, Sweden, lies the head office of global planning and development of the range and supply, namely IoS. The office is divided according to BA's, in accordance with what was previously mentioned.

A general framework of IKEA's central planning process was presented by Jonsson et. al (2013), as visible in Figure 4. This is still, to this day, a valid representation.

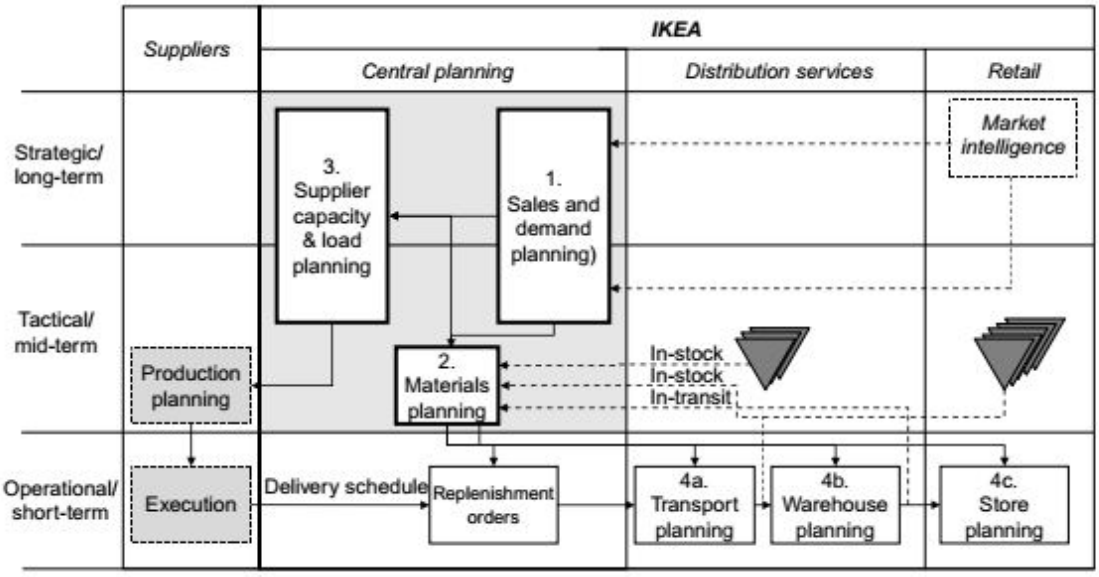


Figure 4. IKEA Central Planning Processes (Jonsson et al., 2013).

4.3.1 Planning Demand and Need

In each BA, under the Supply Chain unit, are stationed a group of Demand and Need Planners, who each specialise and are responsible for a certain part of the BA's range. It is the work of these people that drives the securing of product availability throughout the global supply network. As figure 4 depicts, the planning process emanates from the sales and demand planning.

On a tactical basis, the Demand Planner makes a global demand forecast, with input from tactical sales plans (in collaboration with the Commercial unit, among others) on the country level, and with input from historical sales data and range plans. The tactical forecasting is updated weekly and extends roughly 20 months into the future. This forecast works as an input to the Need Planners, who are supposed to translate the demand figures into a global need plan, in other words make sure that there is a balance between the demand and the production capability of the relevant suppliers, so that availability, to a minimum cost, will be secured. As such, a KPI for Demand Planners is forecast accuracy, while for Need Planners service level (i.e. availability), among other metrics, is much more relevant.

Demand Planners do not make operational forecasts; this is done by each store on a daily basis, and the supply/demand allocation to stores within countries is dealt with by the

retail country itself. Accordingly, Need Planners do generally not have direct contact with individual suppliers, since this is a task for the purchasing organisation, who work more operationally, although the two make use of the input from each other to make adequate decisions. In order to maintain proper capacity, parties must agree on the need and define the capacity with input from forecasts, sales plans, and so forth. Purchasing, more specifically Supply Planners, thereafter converts the calculated yearly capacity need into weekly plans as to take expected sales fluctuations into consideration, seasonality as an example. Methods differ in managing suppliers depending on whether responsibility of managing inventory at the receiving end is taken by suppliers, or not. A supplier that is deemed capable of this is called a Vendor Managed Replenishment (VMR) Supplier.

While Demand Planners' range responsibility is in terms of assortment (forecasts on SKU level), Need Planners are working according to categories, hence the close connection to purchasing. This implies that, when dealing with system articles, the Need and Demand Planners need to collaborate more than usual, since articles can overlap the respective areas of responsibility. It is here, between these two roles, that the aforementioned decoupling point lies, and this is also why parts of the central organisation can be said to belong to Supply, while others to Retail. In fact, Need Planners work closely not only with PLAs, but equally much with RST. They contribute to the SDR Specialists in designing optimal replenishment solutions, and they collaborate with BA Specialists to control stock and service levels at DCs and stores. The difference is, again, that Need Planners focus on the tactical planning.

4.3.2 Planning the Range Frame

There are four periods per year when new products are launched to the different markets, but as some products enter, old ones may exit, in order to stay within the predetermined range frame. The range frame is decided centrally by IoS, with input from Retail around the world, and is divided into the mandatory/core and optional range. Every store must hold a minimum amount of articles of both types, of which the majority is mandatory. All stores in a country hold the exact same mandatory range, with differences only in volumes, which are subject to store capacity. The complete range is allocated among each HFB, the share based on business conditions, set as a part of IKEAs three-year business plan; decisions in this regard are communicated annually to country Retail for the

following two years. It is the task of each BA to make sure that the range frame is maintained throughout the year, with only slight deviations accepted.

During a news period, Demand Planners usually put a lot more effort into the forecasting, as the period is associated with a less stable demand knowledge, compared to the running range. Depending on the novelty of the product launch, the Demand Planners must move between using historical demand data (for only slight modifications to already existing products) or having a closer dialogue with country Retail (for products that have not previously been offered).

Kitchen and Dining is the largest BA in terms of range size, of which Kitchen represents the major part; moreover, products are usually large and/or heavy, meaning that there are certain pre-conditions from a logistical point of view. The nature of the BA represents a particular challenge when it comes to availability. As a kitchen includes a large amount of individual articles often bought as a complete system, it involves a complex process of supplying. Moreover, customers invest a lot of time and emotion deciding on a new complete kitchen. If one article were to miss, it might have very meaningful consequences, as the customer could be left for quite some time with an incomplete – and even unusable – kitchen. The customer proposition of IoS (called the customer promise) is to always prioritise the customer's requirements, offering any product from the range that the customers want, when they want it – and this might be more of an obstacle in Kitchen and Dining than any other business in the company.

The range, in addition to categories and assortment, is also classified into four continuously measured service level groups. S1 articles, which were quickly mentioned in the introduction and which are the only ones observed here, are those that must be available at least 99% of the days during any period of observation; such are the requirements for the strategically most important range. Key system articles for Kitchen and Dining all belong in this group. Then there are S2, S3, and S4 articles, which have, in the given order, decreasing availability targets. Recollect that ISA, different from the old way of measuring, looks at availability in terms of how likely an average sales receipt can be served. Figure 5 illustrates the logic of this. A product is only available, if at the end of

the business day, there are “X” products in the store (or on the shelves for OSA), where “X” is the average amount from all sales receipts of that very product.

A complete kitchen consists of, on average, 40 unique articles. Assuming no availability interdependence between system articles (which might be used more as an internal motivator than the absolute truth), an item service level of 99% would yield a complete kitchen service level of 67%. Considering the tougher requirements of ISA, the challenges for this BA are quite staggering.

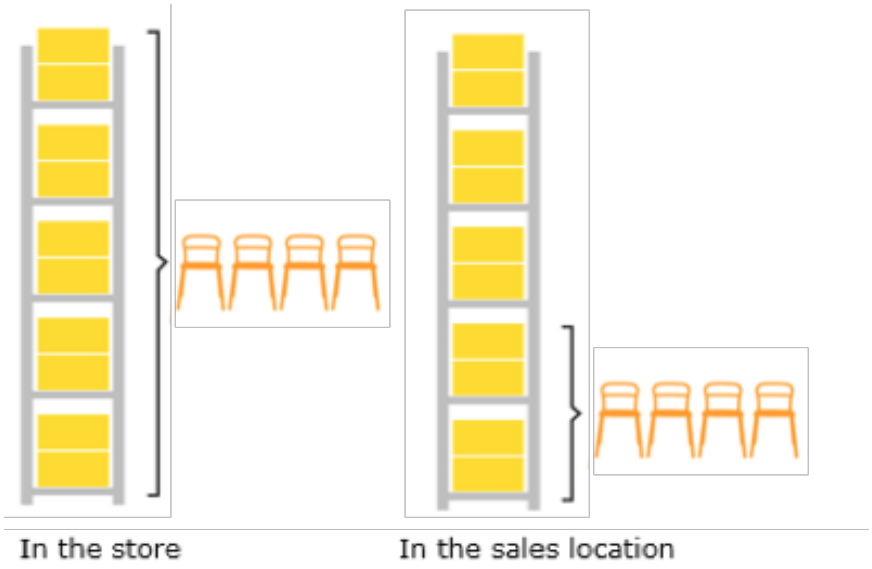


Figure 5. ISA and OSA Logic (courtesy of IKEA, 2017).

4.4 Retail

At IKEA, Retail is comprised of two main functions, namely Retail Logistics and Commercial. They exist on both the global, country, and individual store level. Depending on the region and franchisee, there are minor differences to be found, for instance Sweden in contrast to the United Arab Emirates, but the overall structure is always the same. Figure 6 shows the two functions and their respective organisational structure. As can be seen there, the internal structures are mirrored on the different levels.

4.4.1 Retail Logistics

In Retail Logistics, there are two branches: In-store logistics (ISL) and Retail Supply Integration (RSI), both with their own setup of specialists on all levels. Each of these branches have a level-transcending connection (so called matrix responsibilities); while there is a relatively robust chain of command on each level, every branch also needs to respond to the corresponding matrix[2]. For instance, while the Goods Flow (GF) unit in the store responds directly to the Store Logistics Manager (SLM), it also acts as a prolonged arm for the Country ISL; the latter in turn is an extension of the Global ISL unit. Accordingly, the Sales and Supply Support (SSS) unit in the store is an extension of the Country RSI, which in turn connects to the Global RSI.

4.4.1.1 In-store logistics and Goods Flow

In-store logistics' primary focus is to make sure that the goods flow, from receiving to replenishment in the stores, is planned for and operated efficiently. This includes managing the sales spaces adequately. While the GF unit in the individual store has a more executional role, Country and Global ISL, support GF with competence, methods, and developmental tools on a long-term perspective.

4.4.1.2 RSI: Capacity and Flow Planning, and Sales and Supply Support

RSI on the other hand, acts as a kind of link between Retail Logistics and Sales, aiming to synchronise the commercial needs with the supply needs. The country level unit contains both Sales Support and Supply Support Specialists, and Capacity and Flow Planners (CFP). There is a slight peculiarity here with regards to matrix responsibilities. Although SSS in the store, Country RSI, and Global RSI belong to the same matrix, Country and Global CFP -- of which there is no correspondence on the store level -- also have their own matrix. As such, CFP has a special focus on assessing store capacity, i.e., when opening new stores, as well as contributing to optimising replenishment solutions to stores (thus often collaborating with SDR from RST).

[2] Matrix responsibilities exist throughout the whole company, but it is mentioned here for the sake of clarity.

The SSS unit in the stores has a pivotal role, being a contact point both for the Shopkeepers (see Commercial) and the GF unit, as it monitors and supports decisions for order parameters (sales start, sales space, order quantities, etcetera) and assists in the inventory management process, contributing to ensure a high stock accuracy. It is also actively contributing to maintain aligned operational forecasts. On the country level, the corresponding responsibilities of SSS is shared by the Supply Support and Sales Support Specialists. In cases when a Shopkeeper has encountered an issue that could jeopardise availability performance, at first, he/she contacts the SSS unit; if these together cannot understand or solve the issue, the Supply Support Specialists are in turn contacted; ultimately, the latter can also exchange information with a BA Specialist that could provide further input. Otherwise, if an issue is more related to forecasts or range plans, the chain of information sharing goes via the Sales Support Specialist, which has a more frequent exchange with Sales Leaders (see below) and the central Commercial unit.

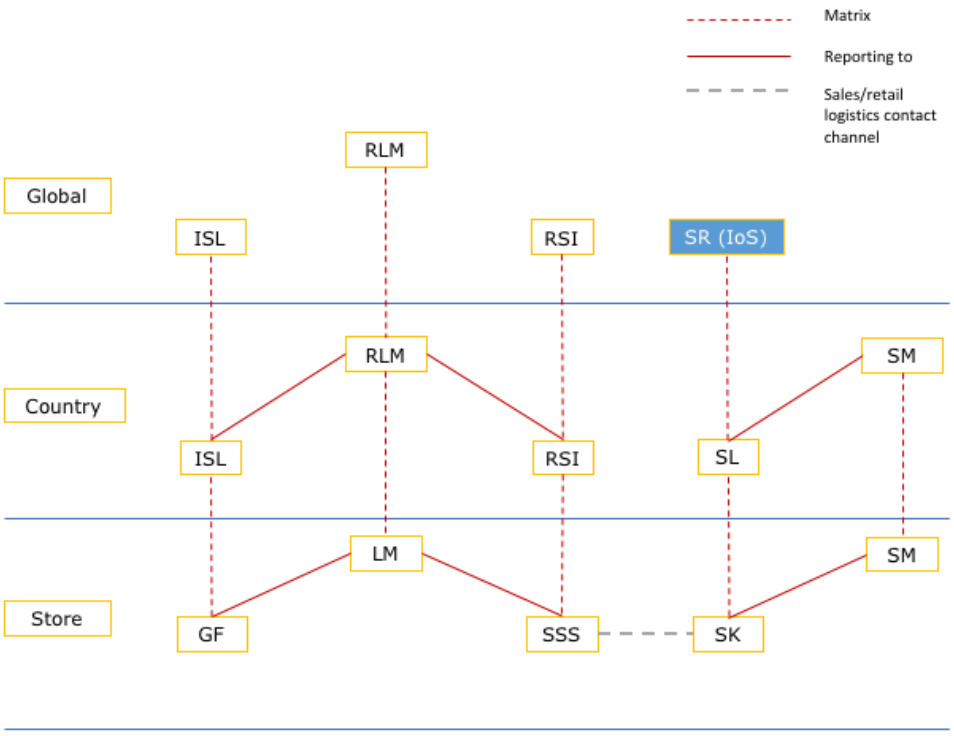


Figure 6. Retail Logistics and Commercial Interrelations.

4.4.1.3 Order parameters

In 2011, a fulfilment system was implemented at IKEA. Replenishment orders are generated through the system covering the entire flow from supplier to stores either via DC and/or direct delivery. The complex system is adjusted with a number of parameters and updated continuously to reflect the current conditions in which IKEA operates in. New supply chain set-ups, perhaps the opening of a store, or changes to forecasts require a review of parameters. Basically, any event or detected deviation drives a review. Depending on the context the responsibility and contributor in the process varies. Nevertheless, the concerned SSS Specialist operating in the store is essential in the proceedings as mentioned in 4.4.1.2. The communication channel between Retail Logistics and Commercial, as illustrated in figure 6, facilitates sales planning and is highly relevant in meeting the demand by securing availability. The Shopkeeper is to communicate changes in the sales plan, while the SSS should actively monitor the operational forecast and order parameters accordingly.

4.4.2 Commercial

On the country level, there is a Sales Manager (SM) that takes answers from several Sales Leaders (SL), which have HFB based responsibilities. The SLs are assigned, for their given range, to sell the right assortment, at the right price, and at the right way. Limited mostly to what products that are developed at IoS, one of the main goals is to always keep lower prices than the competition, implementing the national pricing process, deciding prices on individual articles within the range of responsibility. With knowledge in the national market and commercial trends, the SL contributes to forecasting so that turnover, profit, gross margin and volume commitments meet wanted figures; a KPI for the SL is for the sales goals to be met accurately. Towards the global level, the SL is matrix connected with the Sales Responsible (SR) in the Commercial unit at IoS, and towards the local level, with Shopkeepers (SK) in all stores around the country.

SKs, just like SLs, are responsible for one specific HFB range. Accordingly, they are managed by a store SM. The SK is assigned with the task of making sure that there is a competent sales team, with good understanding of the range, to maintain a presentable store and generate a pleasant shopping experience for the customers, and make sure that the country priorities for the HFB are implemented in the store. Keeping an eye on local

competition and taking necessary action, the SK gives input to the SL which can use the information for decision making. If there is overstock, or if there is a good opportunity to sell products that have competitive advantage, it is the SK that is meant to act responsively and sales steer towards these articles; an act which, if successful, could both increase profit and minimize the effect of existing shortages, as it can lower the exposure of the stock-out and give more time for replenishment.

4.4.2.1 Activities

IKEA stores, like many other retail companies, occasionally offer the customers a range of products to a reduced, lower price. Perhaps to attract customers, reach predetermined sales goals or get rid of store/DC overstock. Starting with the, by IoS communicated, "One IKEA Business Calendar", an overview is presented for the coming three years of prioritised range changes, news launches, activities including the preconditions and capabilities in implementing the plan. Combined with the "Country Commercial Calendar" the country's Commercial function can plan activities for the forthcoming period. Activities can thus be initiated centrally or on a country Retail level. To secure successful campaigns, activities that are expected to increase sales above the normal pattern, are to be communicated to the Demand Planner at the latest 6-months in advance (addressed in the availability rule 4).

It is the responsibility of the store Commercial Activity Leader to communicate and implement the operational commercial calendar related to the country and store.

4.5 Sweden and UAE Store

Although IKEA's working methods and processes are designed to be equally followed all over the world, there are several differences between the realities of the SWE and UAE store. Firstly, the Swedish market is a lot more established, and IKEA is more embedded in the society. With this follows a larger customer base, larger range, and more volumes and capital to handle. Larger markets also tend to be more campaign driven, whereas in smaller markets, such as UAE, campaigns happen much less frequently.

Secondly, consumers show slightly different behavioural tendencies. While in Sweden (and many other places) consumers indulge in the traditional IKEA way of buying, that

is, going to the store, picking the product which one wants to purchase, and often bringing it home without any additional service from the company (which in Sweden would cost extra money), even when the product is a kitchen set. In UAE, consumers reportedly prefer to a larger degree to have someone else bring the purchase of kitchens to their homes. This is such a fundamental tendency, that customers are offered free home deliveries within two business days from the newly launched Central Unit (CU), a Kitchen specific pilot driven exclusively by the franchisee company in UAE. As of 2017, instead of to the traditional IKEA store, all kitchen products except accessories, are sent to the CU. As consumers very rarely pick kitchens themselves, the introduction of the CU has shown to free up a lot of space from the ordinary store, which is of rather low capacity compared to, for instance, the Swedish counterpart. Dining products, however, are still sent to the traditional store, just as in previous years. The CU concept is not wholly unique: IKEA all around the globe makes use of so called Customer Distribution Centres (CDCs) with similar functions to that of the CU in UAE. CDCs carry products which customers, upon ordering, get delivered to their homes; the difference is that the ambition is for the CU to work as an additional store, where customers can visit and see exhibitions, supporting all the other stores in the region with a certain part of the range. All in all, the use of these additional facilities is part of IKEA's increasing investment in multi-channel retailing[3].

Lastly, due to cultural differences, there are also certain predispositions for the type of range offered in the two stores. Although the core range, decided centrally by IoS, shall be in every store, there is also the optional range which is subject to, among other things, market based deviations. Even for S1 articles, of which a large portion usually is mandatory, there are some differences.

[3] Multi-channel retailing is out of the scope for this report, but the use of CDCs/CUs has implications on in-store availability, in that forecasting and capacity needs to be balanced between the two.

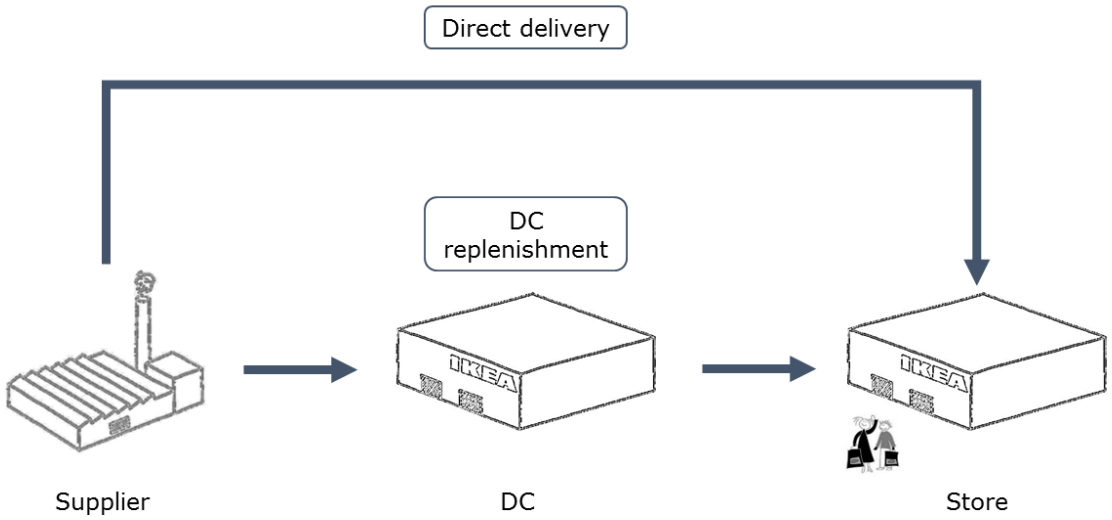


Figure 7. Store replenishment set-ups.

If products are not delivered directly from suppliers, which can be both global and local, the stores are supplied from a handful of DCs, which are of two types: low-flow and high-flow. The former stores and delivers SKUs (e.g. a pallet) with a low turnover rate, whereas the latter deals with those having a high turnover. The SWE store receives products from two high-flow DCs in Sweden, and one low-flow in Germany, while the UAE store gets deliveries from one low-flow in Italy (which in recent years replaced the German DC) and one newly introduced high-flow DC in UAE, in relatively close proximity to the store. Figure 7 illustrates the general delivery method.

4.6 Case Summary Illustrated

With this, as most of the relevant actors in the supply chain have been described, here is a summarising figure (8), whose aim is to show the interrelationships between all parts.

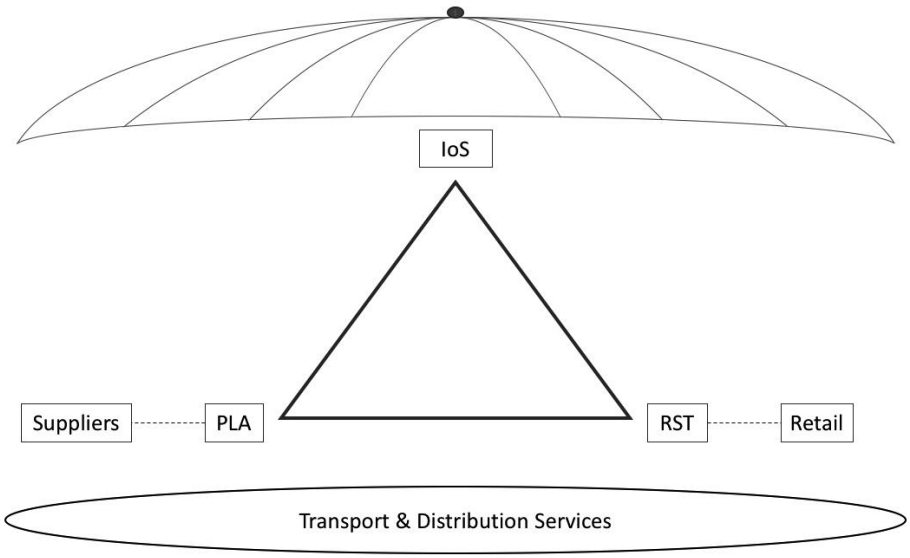


Figure 8. The overall model of the IKEA Supply Chain, where IoS works as a global "umbrella".

The umbrella represents the role of IoS, being connected to and having a global, end-to-end responsibility over all nodes which can affect product availability. Transport and Distribution Services are not treated here in-depth, as their role is almost only executional.

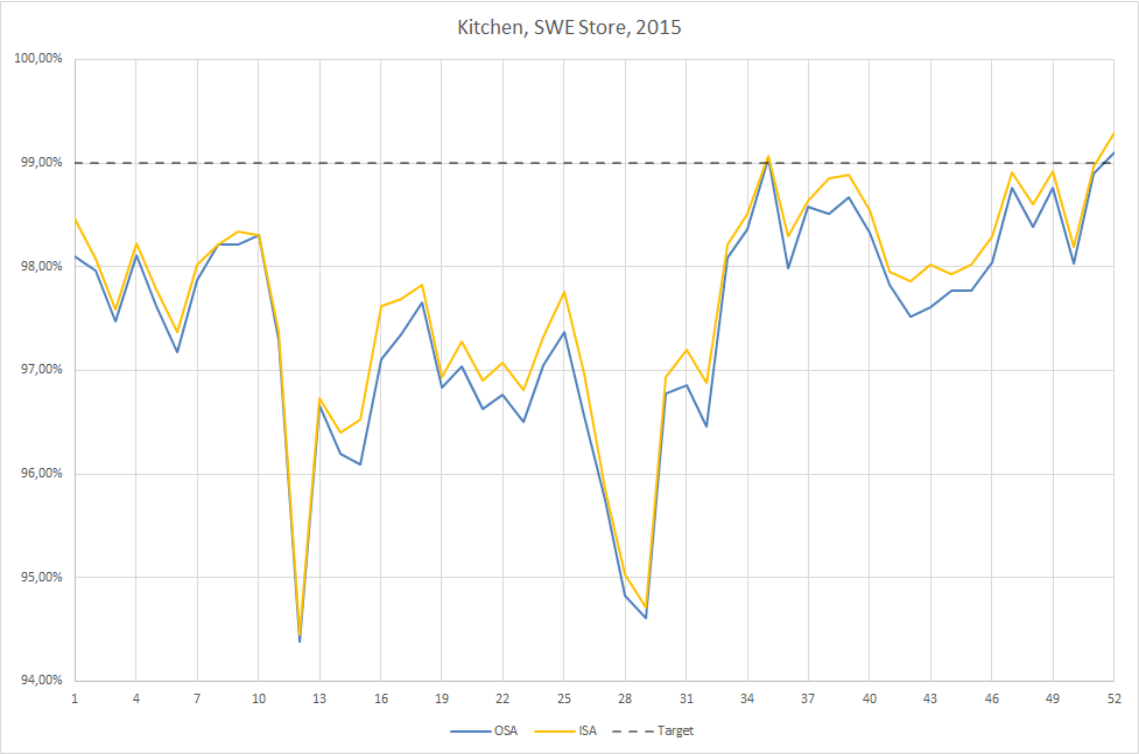
5 Case Analysis and Findings

In this section, the research questions will be addressed, based on the data that was collected during the research process. The section is divided into Shortage Causes, wherein RQ1 and RQ2 are treated, and Improvement Suggestions, where RQ3 is treated.

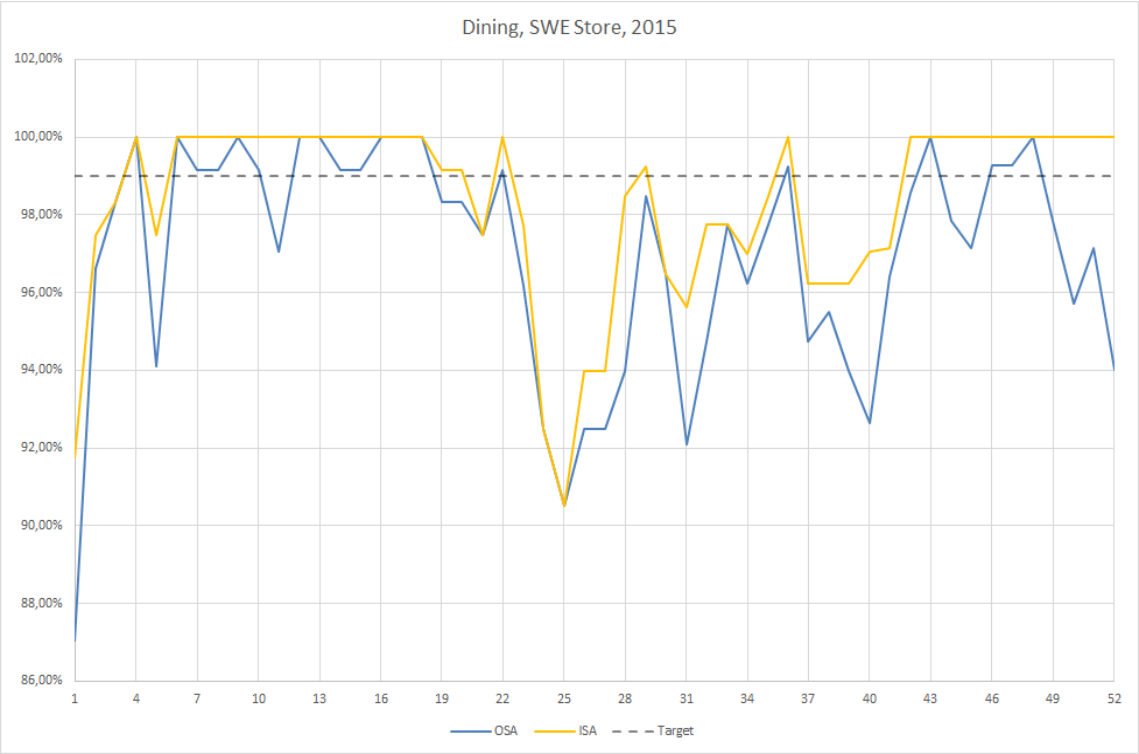
5.1 Shortage Causes

It is appropriate to start this section by showing the results of the quantitative data collection, in terms of availability performance at the two stores. Presented in the following graphs is the weekly variation of ISA (SL New) during the last two years, for both Kitchen and Dining. Out of curiosity, the OSA metric is included. The disposition of the subsequent section is as follows: two graphs for each HFB per store and year are shown at a time. To every pair of graphs, a short observational comment is added.

5.1.1 ISA Weekly and Yearly Performance



Graph 1. Weekly ISA and OSA for Kitchen range in Swedish store, 2015.



Graph 2. Weekly ISA and OSA for Dining range in Swedish store, 2015.

Observations at Swedish store, 2015:

Moving into the new year, neither the Kitchen nor Dining reached target for ISA. Two large dips in availability were observed in week 12 and week 29 for the Kitchen HFB, where minimum figures, occurring in the middle of March, showed an ISA of 94.5% (graph 1). The Kitchen yearly average for 2015 was 97.7% and ended on a positive note, passing the S1 target. Regarding Dining (graph 2), the minimum was reached week 25, hitting an ISA bottom of 90.5 %. For several weeks of the year, though, the HFB passed target and experienced zero shortages (ISA=100 %) in the range. The Dining ISA average for 2015 was slightly below target, at 98.3%.

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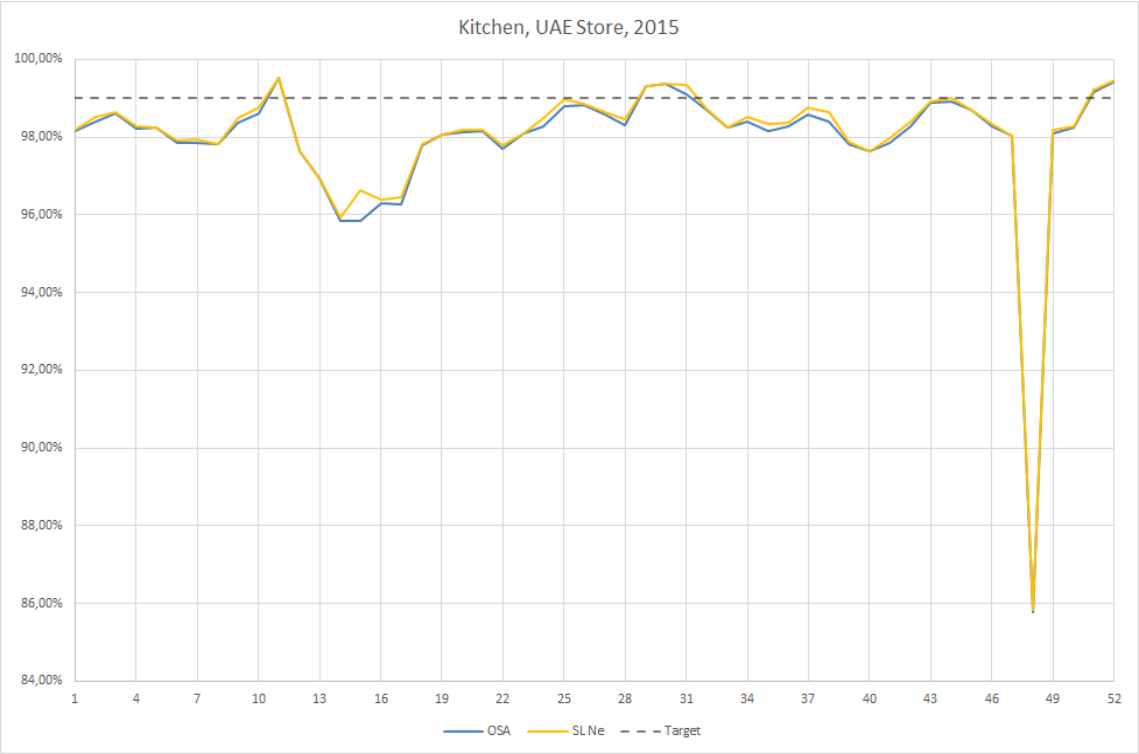
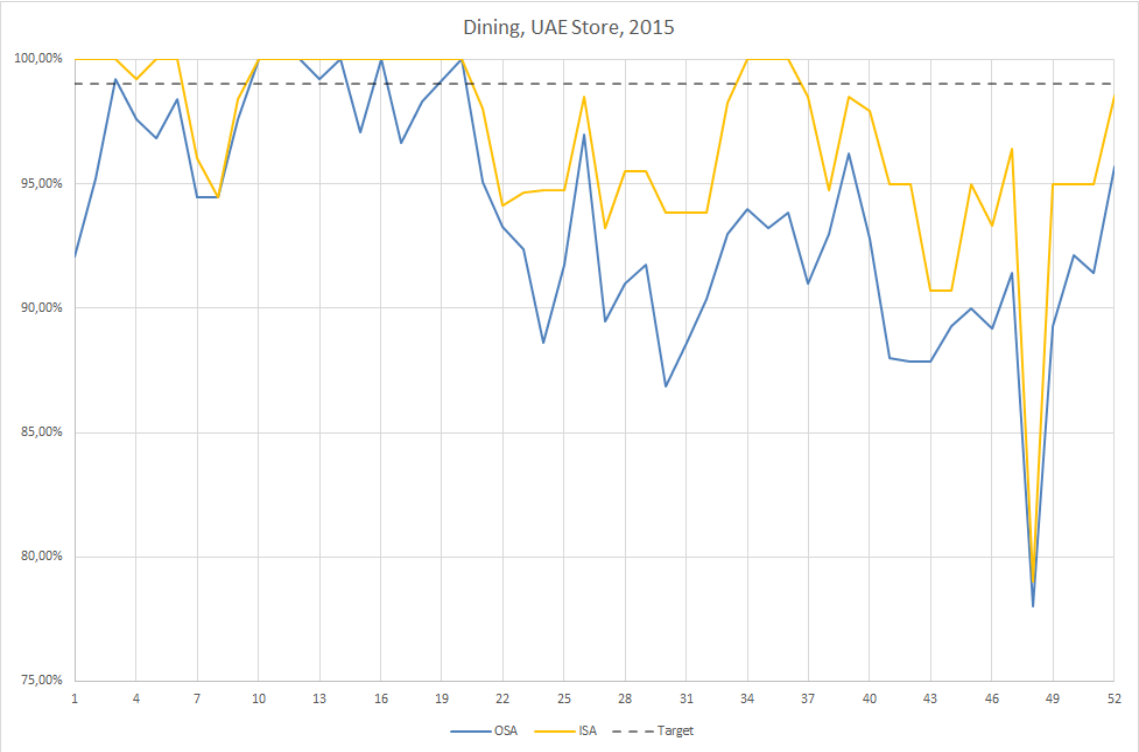


Graph 3. Weekly ISA and OSA for Kitchen range in UAE store, 2015.



Graph 4. Weekly ISA and OSA for Dining range in UAE store, 2015.

Observations at UAE store, 2015:

Kitchen passed the S1 target a few weeks of the year, peaking during week 11 at 99.5% (graph 3). The total average for the year was a positive 98% even though rock bottom was reached in the last quarter with an ISA of 85.8%. The same drop was observed in the Dining business, as well at 86%. For Dining (graph 4), the year started above target and reached 100 % for several weeks, however, dips were large and long-lasting, resulting in a yearly average of 95.9 %.

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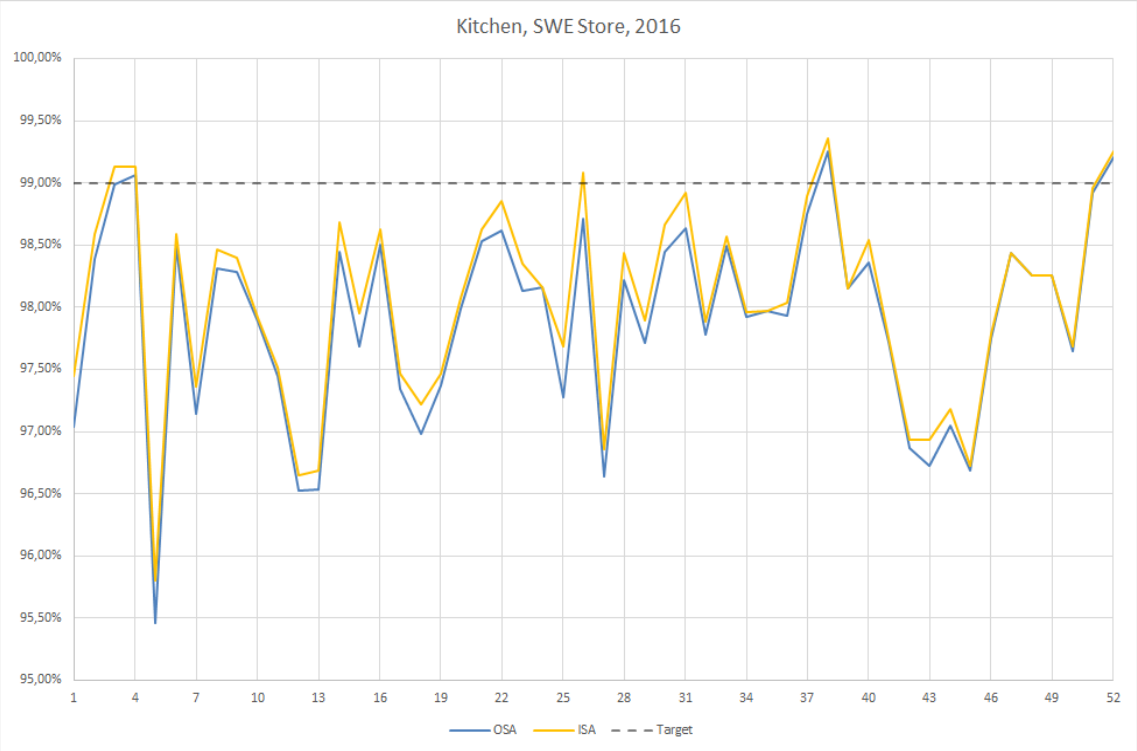
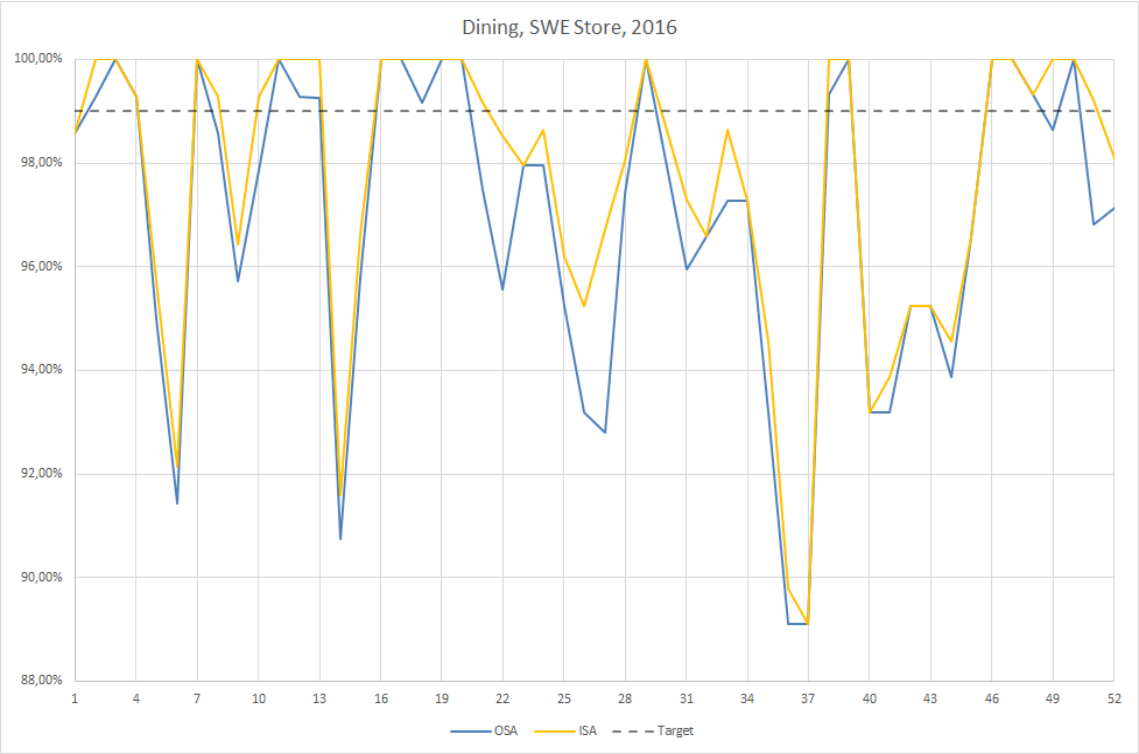


Graph 5. Weekly ISA and OSA for Kitchen range in Swedish store, 2016.



Graph 6. Weekly ISA and OSA for Dining range in Swedish store, 2016.

Observations at Swedish store, 2016:

Kitchen availability during the year improved, with ISA averaging at 98 % (graph 5). The bottom was reached early in the year hitting 95.8%, which also was an improvement compared to the previous year. Target was reached occasionally, peaking week 38 at 99.4%. Regarding the Dining HFB, a slight decrease in performance was observed (graph 6). The ISA average was 97.6%. Large dips were occurring in an almost periodical manner, causing shortages, and bottom was reached week 37 at 89.1%. Nevertheless, although sparsely, there were weeks with a 100% ISA.

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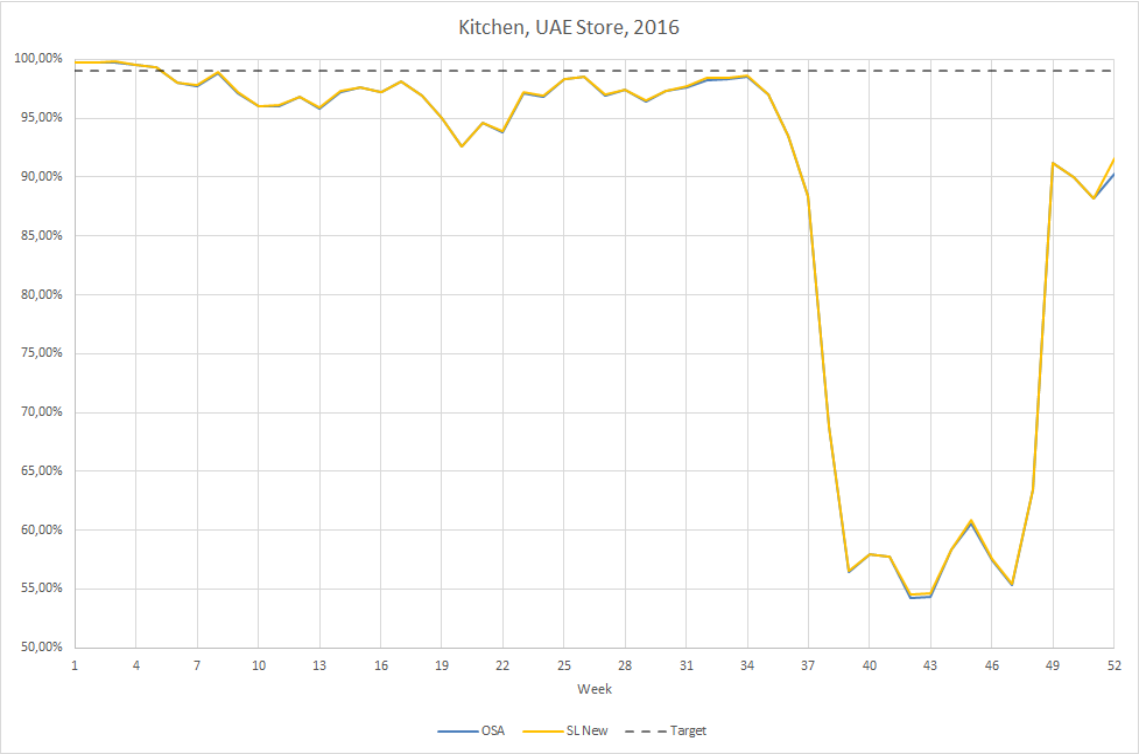
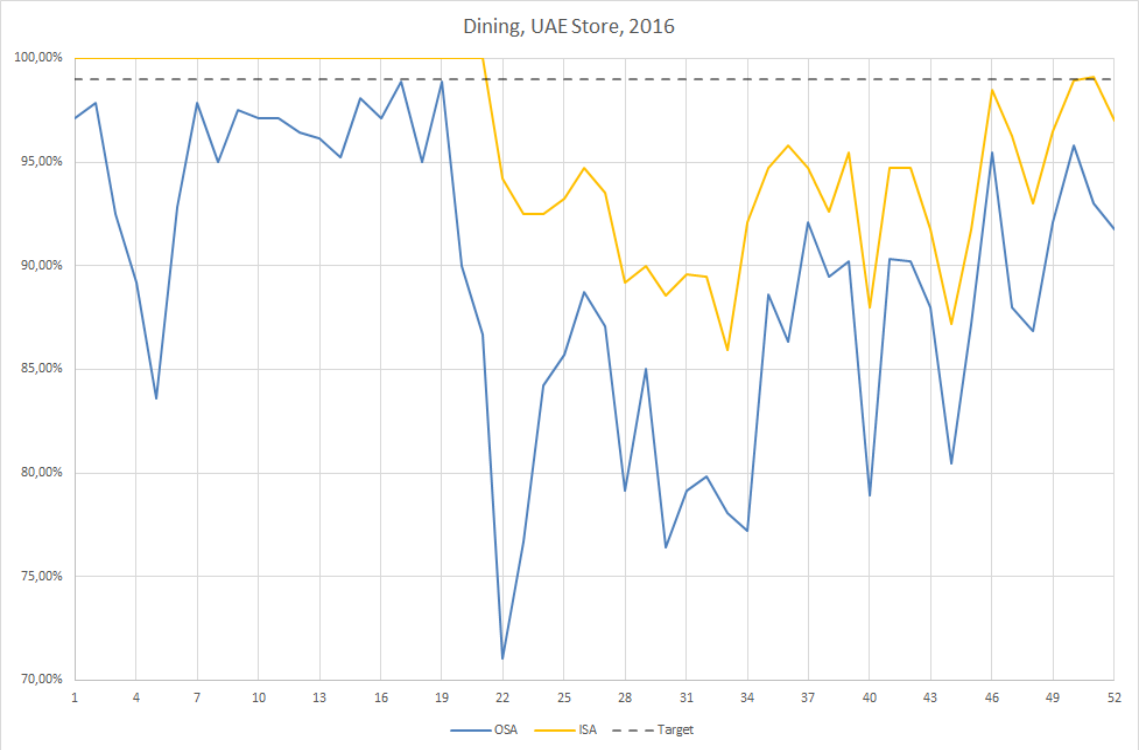


Graph 7. Weekly ISA and OSA for Kitchen range in UAE store, 2016.



Graph 8. Weekly ISA and OSA for Dining range in UAE store, 2016.

Observations UAE store, 2016:
Availability in UAE was a strange matter for the year of 2016. The Kitchen business started off the year very well, peaking in week 3 at a record 99.8 % for the observed period, bouncing back from the massive dip late in 2015, with a five week above target streak (graph 7). Sooner, availability dropped below target and continued in an expected fashion until early autumn when availability absolutely plummeted to 54.6%. Not until late 2016 would the availability recover to slightly above 90%, resulting in an 88.4% average. Dining on the other hand (graph 8), averaged the same 95.9% as the previous year. Having no shortages for the first 21 weeks of the year, availability started decreasing, reaching bottom in week 33 at 86%.

* * * * *

Table 2 shows a summary of the yearly accumulated ISA values for both stores and HFBs in both years. The accumulated value is not the same, although often close to, the average. The averages are just arithmetic means of the weekly values shown in the graphs, presented only as a clarifying observation. To get the accumulated value, the amount of days that products were available in the store, are divided by the amount of days that they were supposed to be in the range offer; this is a calculation that the data application does on its own, and this is what the organisation follows up on.

Consequently, looking at ISA on a daily basis, one would only get a binary number, either a one or a zero, as the product at the end of the day is either available or not (it can here be repeated, that a product is available only if there is at least as much in stock as the average amount in the daily sales receipt). The accumulated value can thus only be shown for a period of two or more days; the variations in the graphs show the weekly accumulated values, whereas Table 2, as explained, shows the yearly.

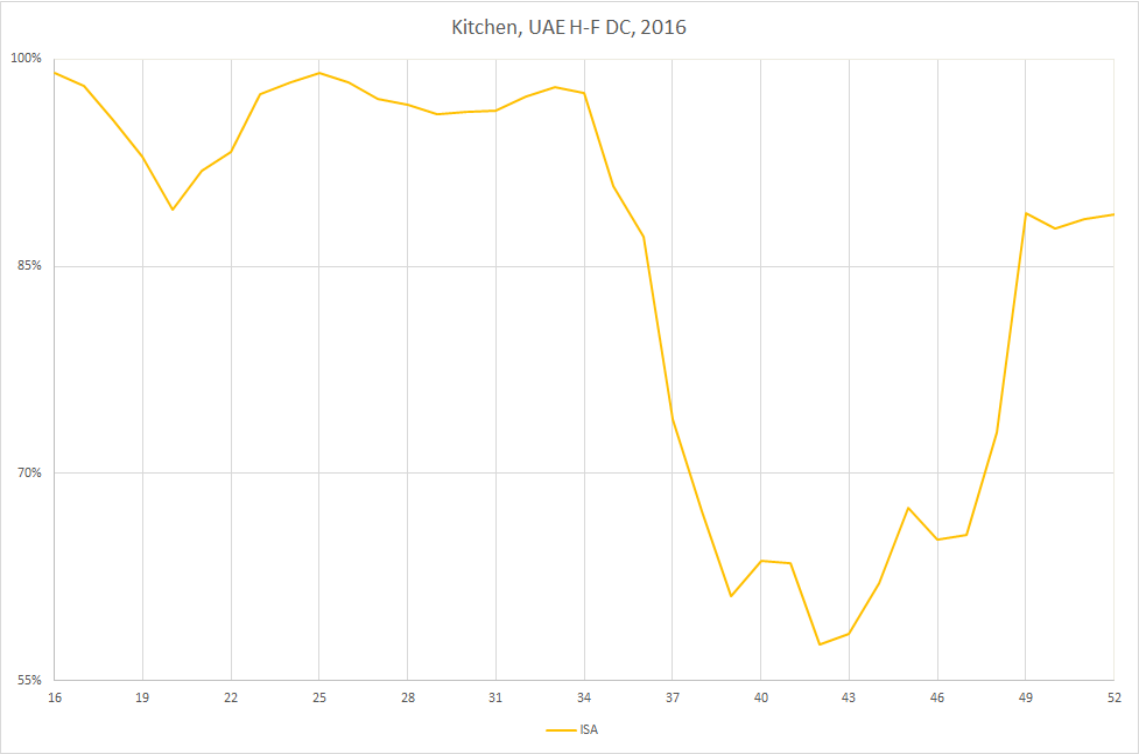
Table 2. The yearly accumulated ISA in both stores, for the Kitchen and Dining range.

	2015	2016	
SWE Store	97.68	98.02	**Kitchen**
	98.39	97.59	**Dining**
UAE Store	98.98	*89.48*	**Kitchen**
	96.86	95.78	**Dining**
	ISA%		

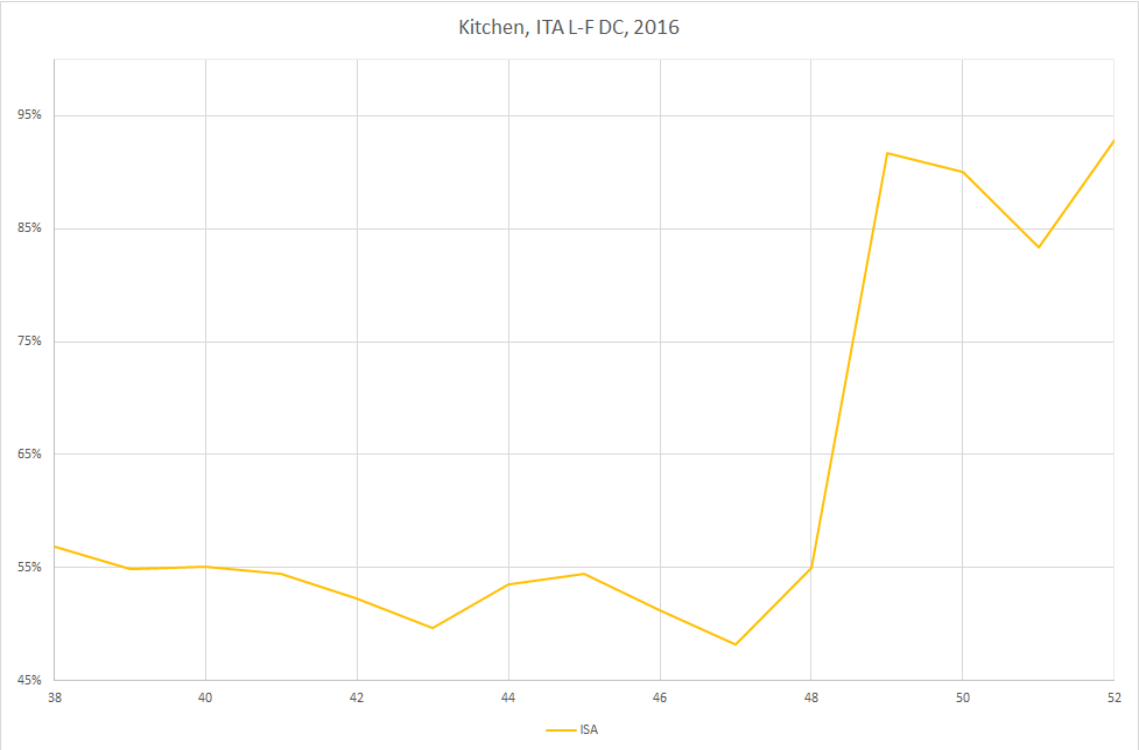
5.1.2 Problematic period in UAE

Out of all the numbers, it is of course one that is most alarming, namely the performance of Kitchen at the UAE store in 2016, and as such it deserves special attention. Remember that this is the S1 range, that of most strategic importance to the business. Having spent two hours talking with the country RSI Manager and the SSS Manager from the UAE store, some problems connectable to these symptoms were revealed. It was reported that the switch from the previous, to the newly launched low-flow and high-flow DCs had contributed to things getting a lot worse. This, a new supply setup in its own, had brought with it also a completely new setup of carriers and with that new lead-times, leading to an increasingly turbulent state, starting slowly in early 2016 and culminating towards the end. The heavy dip around week 36 for the Kitchen range almost coincided with the first delivery from the low-flow DC in Italy, from which lead-times tended to be very unstable, often as high as seven weeks, due to frequent container delays. Especially during the already sensitive new product launches, supply has, as per the reports, often been delayed, causing a high amount of shortages.

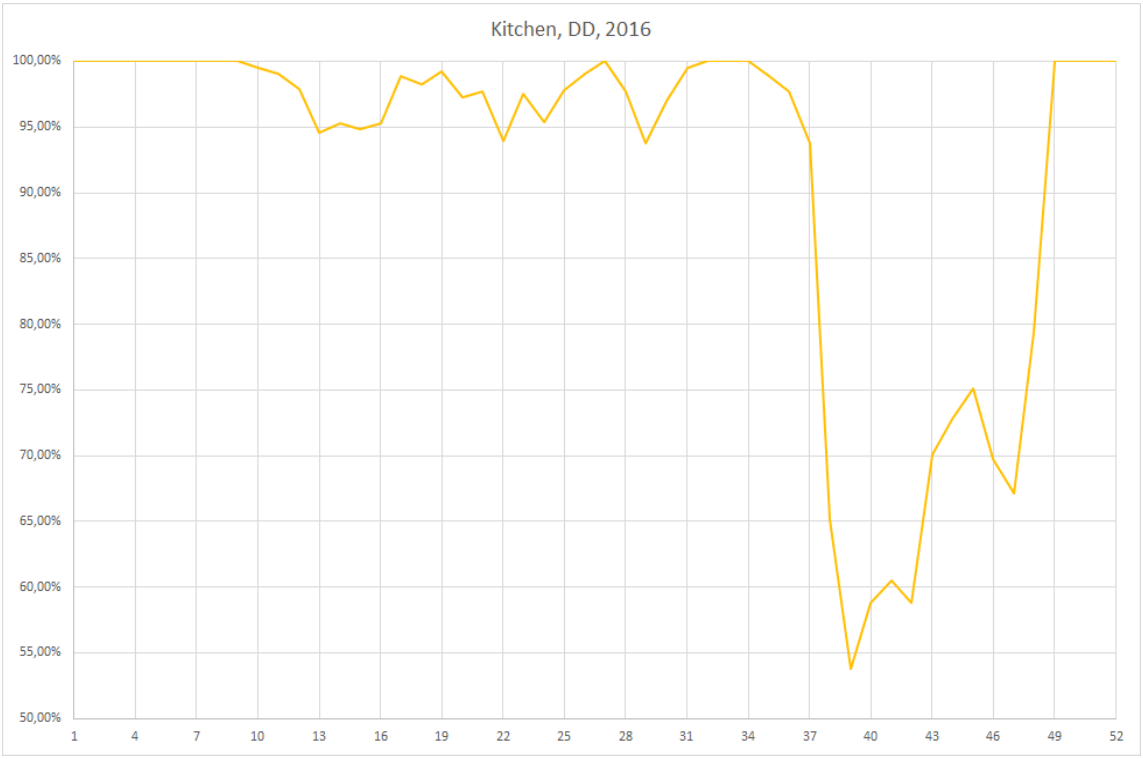
But it is not easy to say that the issues are only related to the above, as by looking at ISA for the part of the range that comes from both the high-flow and the low-flow DCs and that from direct supplier deliveries, it is obvious that availability for Kitchen was low during that period, independently of the delivery method (see Graphs 9 to 11). Furthermore, it cannot be excluded that the reallocation of kitchen systems to the CU, a process which slowly started during 2016, has had a role to play in the turbulent state.



Graph 9. ISA for the Kitchen range when received from High Flow DC in UAE.



Graph 10. ISA for the Kitchen range when received from Low Flow DC in Italy.



Graph 11. ISA for the Kitchen range when received from DD.

This suggests that the shortages are mutually caused by both lacking efficiency in the supply process and shortcomings in the retail organisation, which the representatives also honestly admitted. They perceived that the operational forecasting and sales space allocation, among other things, could be improved. For instance, if forecasts have underestimated demand, the negative effect will be rather high, because long lead-times (even if they were to be more predictable) will mean that a shortage will last longer as well.

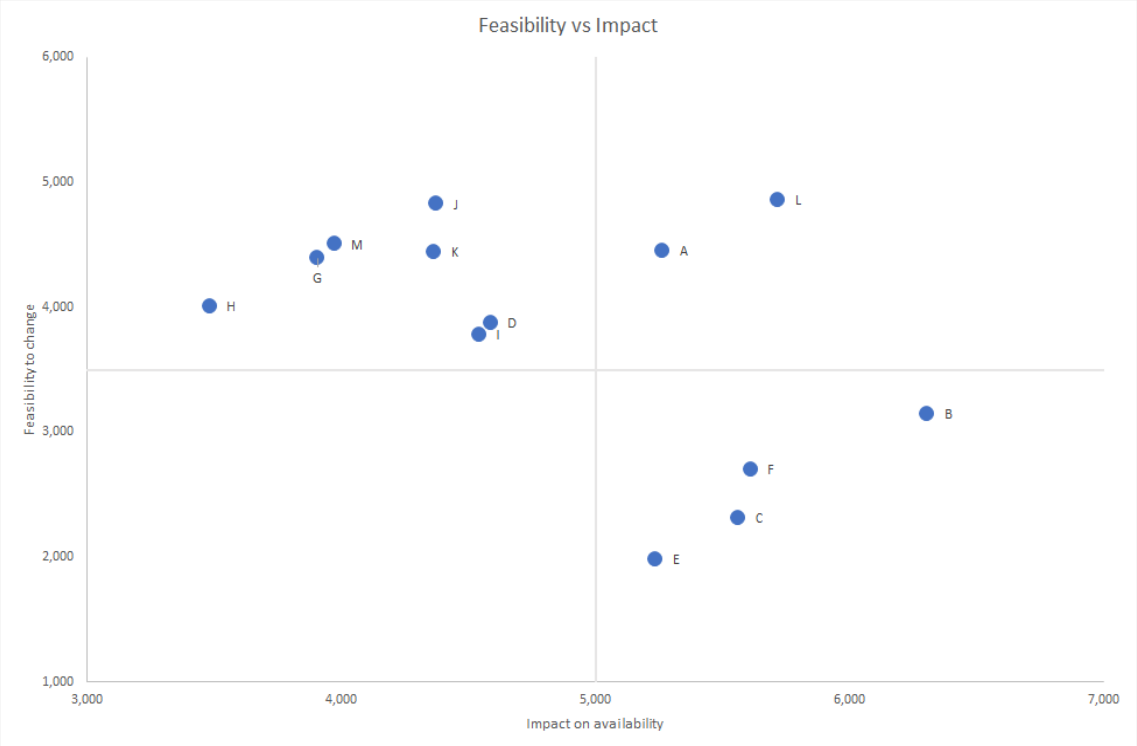
However, a rather indisputable problem is that RSI and the UAE store are generally much less equipped with useful IKEA tools, compared to Sweden or many other countries. There is no simple way for them to continuously follow up on availability, as the applications (which were used to gather data for this very report) are not available, neither is the software system for sales location management (SLM), which was implemented in the company a few years ago. They are rather dependent on the periodic availability reports that RST send out, which means that there is a need for a lot of

manual handling of documents and extensive labour with spreadsheets. In addition to this, the representatives often felt during this difficult period, that they did not get enough attention, neither from RST nor from IoS.

Thereby the issues and causes of shortages in the UAE store, highlighted due to the alarming figures, have been summarised. In the following will be shown the more general findings, such that they can be applied to all parts in the supply chain.

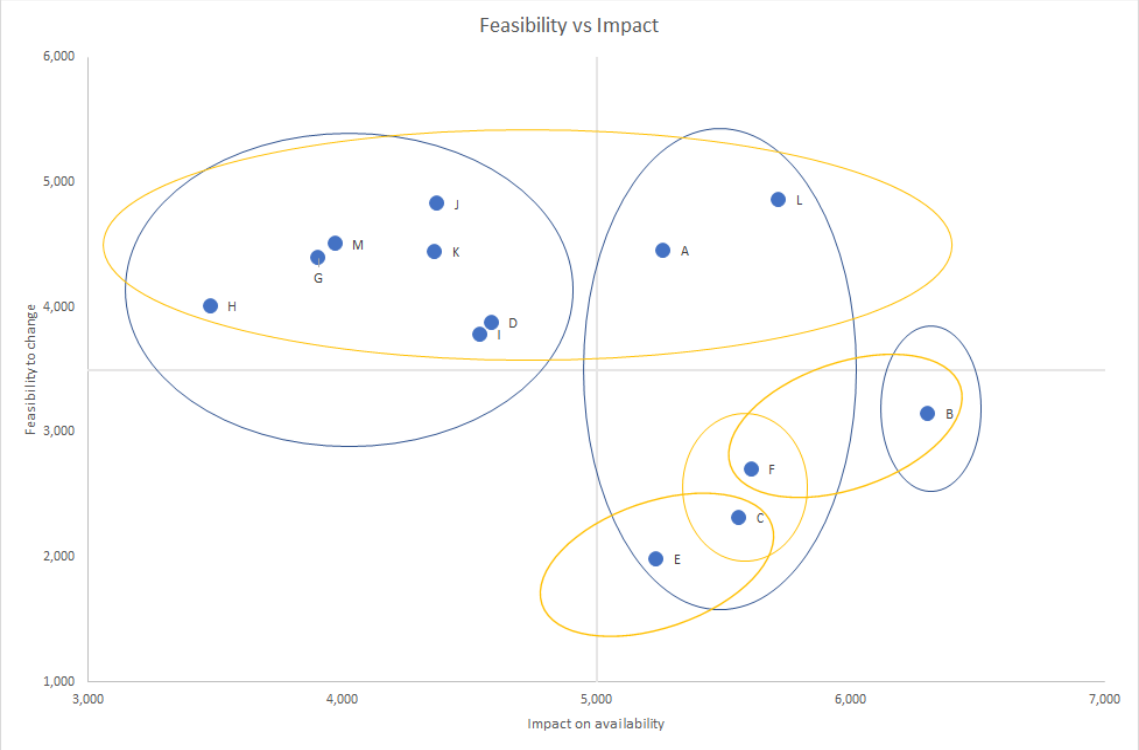
5.1.3 Questionnaire Findings

The result of the questionnaire is illustrated in Graph 12. 13 causes of shortages were ranked on the two dimensions by the respondents, and the graph shows the average numbers of all responses. Causes are denominated with letters to avoid extensive text in the graph, but those that will be looked at more closely will be articulated both here and further in the subsequent sections. The remaining cause descriptions can be found in the Appendix C.



Graph 12. Average answers from questionnaire.

As the impact-feasibility graph is a quantitative representation of perceived reality, it was of high interest to conduct a statistical analysis and find out whether the ranking of answers is truly shown by the averages or not. ANOVA tests and t-tests with unequal variances assumed, on a 95% confidence level, were done on Excel, and it was found that many averages indeed cannot be significantly distinguished from each other due to large variances. On the impact dimension, the points can be clustered into three groups (seen as blue in graph 13), implying three levels of impact on availability. On the feasibility dimension, however, clusterisation was not as straightforward. While the top half points are significantly different from the bottom half, points in the bottom right quadrant are to some extent overlapping each other (groups seen as yellow in Graph 13).

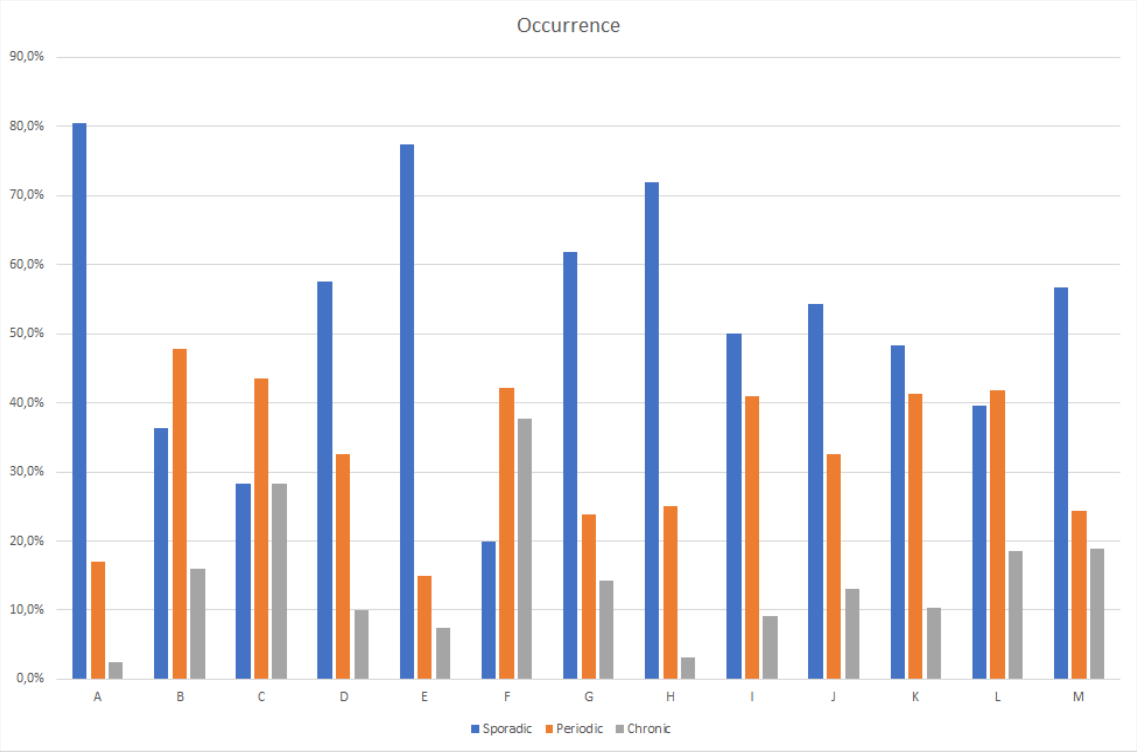


Graph 13. Average answers from questionnaire clustered according to significant differences.

What can be observed clearly is that the average points of causes A and L are accurately placed in the top right area, as they belong to the highest feasibility group and second highest impact group. Accordingly, Cause B is accurately placed as the highest point with regards to impact, since it (and no other) belongs to the highest impact group; it is also

reasonably positioned on the vertical dimension, as it belongs to the second highest feasibility group.

Of these three, Cause A was overwhelmingly perceived as sporadic (Graph 14) in its occurrence; B and L, however, were subject to much more variability, although both were mostly seen as periodic. All the three were brought to the second workshop, but since the patterns in the bottom right quadrant of averages was not very obvious, Cause F, C, and E were also included in the session.



Graph 14. Occurrence differences of causes.

Here, Cause E was seen as sporadic by the large majority, C as weighing on periodic, and F quite skewed towards both periodic and chronic.

Table 3 gathers all six causes which will be of more focus.

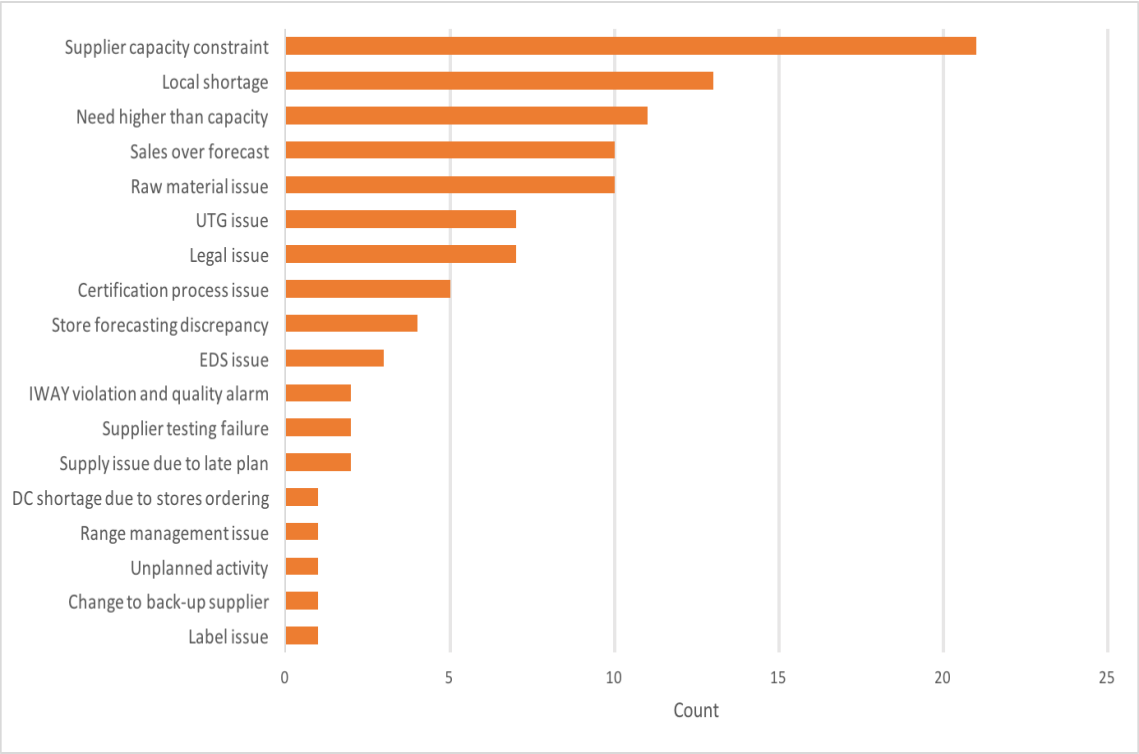
Table 3. Summary of primary-focus causes.

Cause	Description
A	Supplier failing to communicate quality issues
B	Insufficient production capacity
C	Unexpected demand fluctuations during planned activity (campaign)
E	Unexpected changes of regulations at receiving country
F	Uncertainty in forecasting News
L	Poorly set order parameters in store

5.1.4 Availability reports

In the availability reports issued by the RSTs mentioned in section 4.2.2.1, causes to major shortages are described. The extracted shortage causes and occurrences, as in the number of availability reports in which the cause is evident, are presented in graph 15.

Important to note is that the duration of several shortages span over more than one week, meaning that they are recurring in more than one report. The same is true for non-region-specific issues which not only causes major shortages in a single region. Articles and their respective shortage cause are therefore accounted for more than once. Nevertheless, this adds a dimension of impact, be it the magnitude in terms of global/local impact or solely the duration of the shortage.



Graph 15. Distribution of shortage causes from availability summary reports.

Data is extracted from reports from all four regions, spanning from week 2 to 20 as of 2017, although with some irregularity since some reports are missing due to limited access.

Somewhat shortened, the shortage causes are presented nearly identically as they were described in the availability reports. Differences are found in how causes are formulated in the regions. “Local shortage”, which can be discussed whether an actual cause of a shortage or solely the impact, is evident solely in the availability reports from Asia Pacific for example.

“Supplier capacity issue” is the most recurring shortage cause in the availability reports. Observed in reports from all regions and lasting over several weeks due to it often having a global effect and/or taking a long time to solve. One can also motivate the relation with “Need higher than capacity” since both are related to the supplier output. The Chinese New Year is also described during the choice of period and relates to supplier capacity.

The peak in sales in the Chinese market combined with lacking labour at domestic suppliers causes order cancellations and supplier capacity constraints.

Furthermore, outgoing and discontinued IKEA range described as UTG (from Swedish: Utgående; English: outgoing) and EDS (End Date Sales) are found to cause issues downstream. In some reports a backup supplier is arranged for, to do last-buy before EDS, trying to solve capacity constraints. This and set-up changes related to outgoing articles in which for example the replenishment solution is changed from DD to DC, causes shortages.

"IWAY[4] violation and quality alarm", "Raw material issue", and "Supplier testing failure" likewise cause long-term shortages and can be observed over several availability reports.

Forecasting issues are described as "Store forecasting discrepancies" and "Sales over forecast". If the latter is related to the tactical or operational forecast is not possible to distinguish from the report alone.

"Certification process issue" of an oven from the report is found to only affect the Russian market. Consequently, this manifests as a local shortage much like the, as described in several Asia Pacific reports, "Legal issue" of a gas hob offered in the Chinese market.

Combining the specific findings from UAE, the questionnaire, and the availability reports, research question 1 has been addressed.

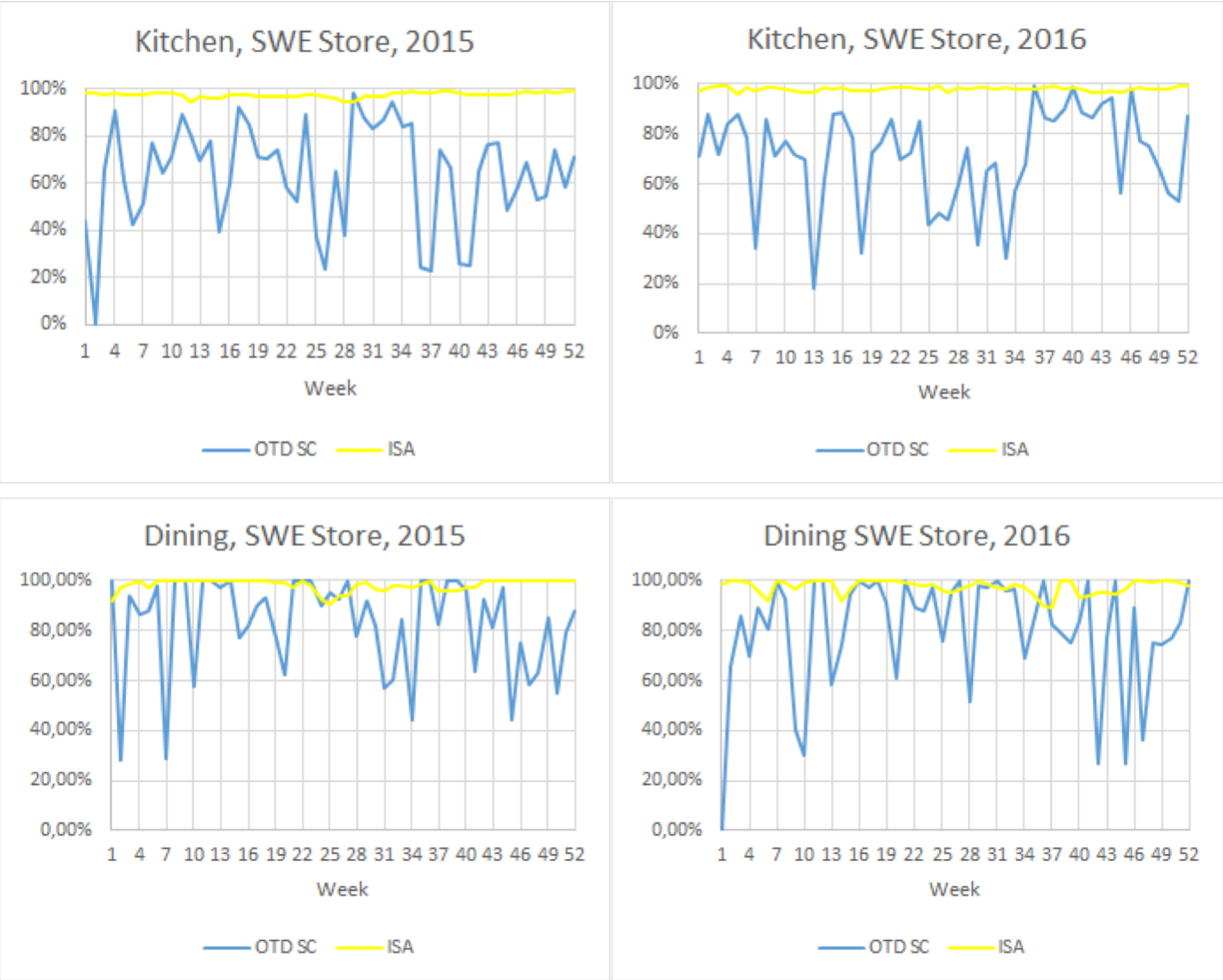
5.1.5 OTD SC, ISA, and Trade-offs

Having in mind the findings from the UAE perspective, it was sought to find whether and how the delivery performance in the supply chain is related to the availability performance in the stores. Therefore, was performed a correlation analysis between OTD

[4] IWAY is basically a Corporate Social Responsibility framework that all actors must conform to.

SC and ISA, in both the Sweden and UAE store, looking at the Kitchen and Dining HFB respectively. OTD SC, measured in the percentage of products (in volume) being received at the store within the planned time frame, put against ISA, on a weekly basis, during a full year.

The analysis shows that correlation in either case is very weak (see graph 16-17 and table 4-5). Looking at the graph where the two metrics are superimposed, it is already there obvious. There are weeks where OTD SC is very high and ISA is lower than usual, and there are weeks where OTD SC is below target and ISA is close or above target. The result is not very unexpected, since availability cannot reasonably be given a high dependence on order delivery precision, especially in regions with long distances between supply chain nodes; this is where safety stocks enter the picture. Highlighting this is the fact that the target for OTD SC is merely 65%, compared to 99% on S1 level ISA. In addition, sales patterns may vary, meaning that delivery performance can be allowed to be reasonably low, as long as sales also happen to be lower than expected during the same period.



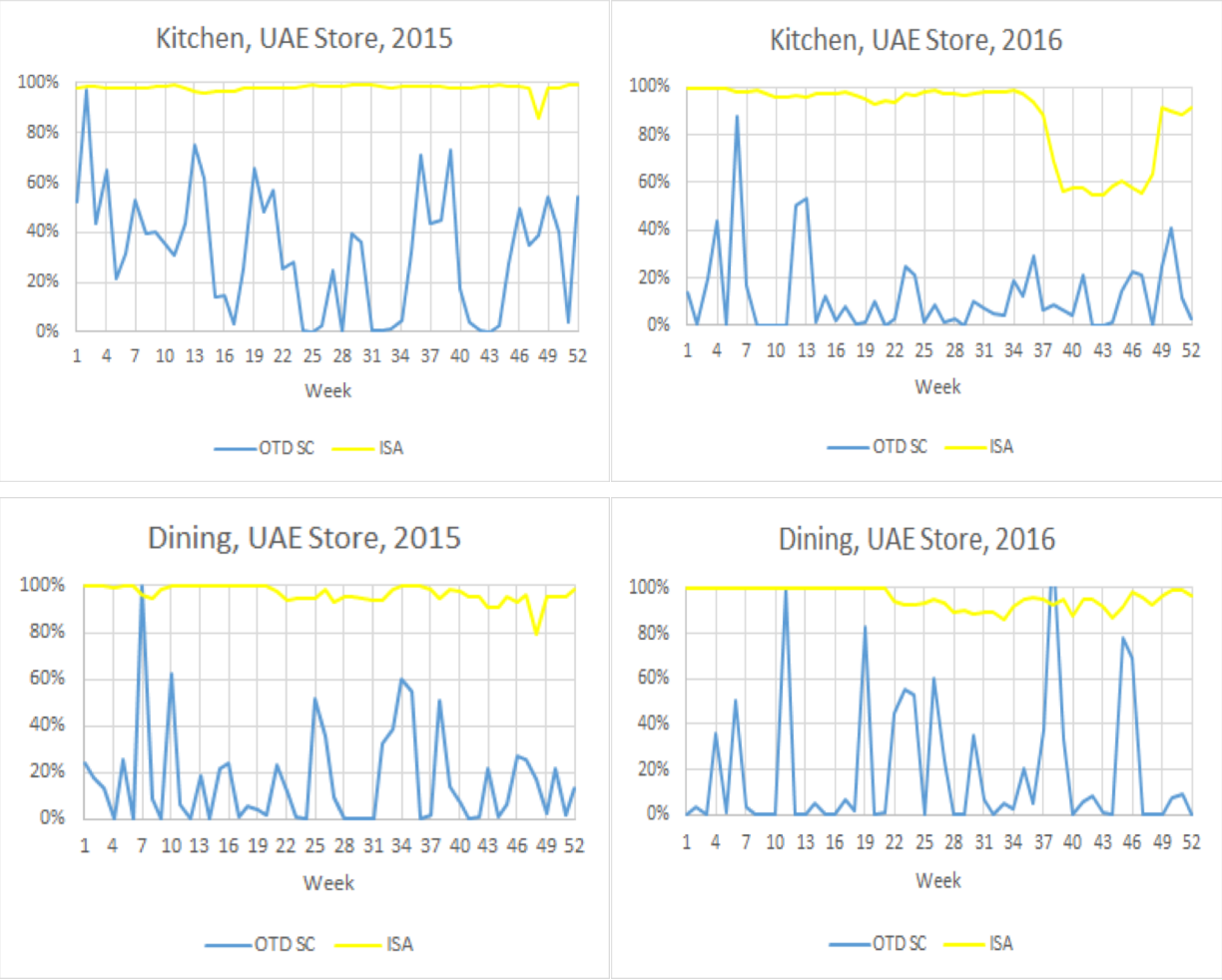
Graph 16. OTD SC and ISA for Kitchen & Dining, Swedish store.

Table 4. Pearson correlation constants for OTD SC and ISA at the Swedish Store. In all cases the correlation is very weak.

SWE Store	**2015**	**2016**
Kitchen	-0.1391	0.13666
Dining	-0.1292	-0.0362

Since delivery performance in general does not seem to directly affect the degree of availability in the stores, it seems that there is not much cause for concern. However, as there are many periods where ISA maintains its normal level although OTD SC is

exceptionally low, the implication is that availability might often be kept to an unnecessarily high cost. It is not within the scope of this report to investigate the root causes of insufficient delivery precision, but if the OTD SC metric pattern were to hypothetically remain the same, there is an implied trade-off to maintained or even increased in-store availability, namely high inventory costs. Research question 2 is thus addressed here.



Graph 17. OTD SC and ISA for Kitchen & Dining, UAE store.

Table 5. Pearson correlation constants for OTD SC and ISA at the UAE Store. In all cases the correlation is very weak.

UAE Store	**2015**	**2016**
Kitchen	-0.0977	0.10209
Dining	0.03393	-0.047

But although OTD SC is not correlated with ISA for a single store, there are visible patterns when looking at the accumulated performance from year to year (see table 6), especially comparing the two stores. For the Kitchen range, The Swedish store had a total OTD SC of 63% and total ISA of 97.7% in 2015; 70% and 98% respectively in 2016. On the other hand, the UAE store had a corresponding OTD SC of 31.23% and ISA of 98.98% in 2015; 13% and 89.48% respectively in 2016. These figures partially confirm the above conclusions of weak correlation, as in 2015 the UAE store had a much lower OTD SC but nonetheless slightly higher ISA than the Sweden store. In 2016, however, as OTD SC in total drastically fell, ISA also fell with roughly ten percentage points for Kitchen in the UAE store, suggesting that there after all is a relation between the two metrics. This ought to imply that, on a regional basis, if performance of the whole logistical setup is below par, it will likely show symptoms in the store as well. The suggestion makes sense when connecting to the issues that were reported by the UAE store representatives.

Table 6. Yearly accumulated values of ISA compared to those of OTD SC, for each store and HFB, in both years.

	2015		**2016**		
SWE Store	63.11	97.68	70.36	98.02	**Kitchen**
	80.93	98.39	81.29	97.59	**Dining**
UAE Store	31.23	98.98	12.67	89.48	**Kitchen**
	15.58	96.86	15.47	95.78	**Dining**
	OTD SC%	***ISA%***	***OTD SC%***	***ISA%***	

5.2 Improvement Suggestions

The six causes brought from the questionnaire result were discussed with a group of IKEA employees during a one-and-a-half-hour session, generating some propositions as to what can be done differently to avoid the occurring issues. The 17 availability rules were used as a reference and were also evaluated. Here, each of these finding will be treated one cause at a time, including input that was taken from the interviews and discussions from the first workshop. The causes and their occurrence will also be briefly elaborated. A matrix summary of the six causes and the suggested improvements can be found in Appendix E.

5.2.1 Supplier failing to communicate quality issues

If a supplier delivers a batch containing quality issues, the negative impact is higher the further downstream in the supply chain that the issue is revealed; the worst-case scenario is that defect products reach the end-consumers, in which case availability is no longer relevant. To avoid that worst-case scenario, the company must issue a supply or sale stop, which also will affect business negatively, since it, depending on the magnitude of the quality issue, can lead to extensive periods of shortage, causing potential frustration for the consumers. Therefore, this cause is classified among those with highest impact.

But this is mostly a sporadic issue, happening almost only with immature suppliers, with which a relationship may not yet have been fully established. The risk is of course higher in cases of single sourcing, and for suppliers that deliver system articles, but on the other hand, these cases also imply a fundamental relationship between the suppliers and IKEA.

Suppliers may fail to communicate quality issues either because of lacking quality control, or because of reluctance to share information. The former can only be solved by developing the quality thinking, offering more education, and following up on occurrence, aspects that are already generally dealt with in some of the 17 availability rules (3, 8, and 11; see Appendix A). The latter is likely due to an unwillingness to reveal a problem that “may or may not” be found later in the chain, either because of fear to be deemed as insufficient or, frankly, because of opportunism. For suppliers to be willing to share information, that is, to be transparent, there must be trust, because trust drives transparency. A “soft factor” as this is, it is difficult to address in the availability rules,

except that the term “right quality” could be added into rule 11, to highlight the importance.

5.2.2 Insufficient production capacity

In the work of balancing sales and supply there is always a question of how much production capacity is needed. An optimistically planned capacity in combination with sales not meeting expectations leads to overcapacity with high costs, lower margins and unhappy suppliers not producing according to agreement. On the other hand, capacity not able to fulfil sales leads to availability issues, loss of sales and likely, disappointed customers.

As generated by the questionnaire, limited production capacity is perceived as the number one issue in terms of shortage impact. The availability reports also agree with the respondents as the most recurring shortage cause related to S1 articles. There are undoubtedly challenges of having balanced capacities. Sales fluctuate, new products are introduced frequently, adjustments are made to existing ones, etcetera. Basically, actions that put pressure on suppliers to act on changes on short notice. The task is to have responsive suppliers, securing an even order flow at the lowest possible cost making sure to utilize capacity. The question, however, remains of what defines insufficient production capacity at IKEA. Does IKEA have a general lack of capacity or an issue in evaluating, communicating and planning the utilization of capacities? A comment which was received in connection to the questionnaire, made sure to emphasise that the latter is true, and not the first.

Concerns regarding production capacity were raised during the second workshop. Participants implied that communication was key in the process of securing capacity. It was not always certain that suppliers fully understood the need. Misinterpretations often occur resulting in lack of machinery and long lasting shortages. An example was presented in which, during a tender for three new articles to be produced, a supplier offered the most competitive bid. The issue was that the supplier had used the maximum production capacity for calculating the price for each article. The supplier won the tender, but however, soon enough it was realised that the quantities could not be delivered. Furthermore, the reliability of suppliers was discussed. It was perceived by participants

that there were occasions when suppliers did not focus on the needs of IKEA while having other more profitable customers in case of limited capacity.

In Appendix A, rule 5 addresses the work of securing capacity. In the rule, it is stated that a risk analysis is to be performed annually. In some workshop attendees' experiences, however, this action is performed much more frequently for S1 articles with observed good results. A way of improving the process of securing capacity and reduce exceptions, was therefore determined to increase the frequency of risk analysis. As a last remark from the workshop, it could not be stressed enough from the participant how key communication both from Purchasing and IoS is in managing relations and securing performance from suppliers. This works both ways. It is essential that not only is communication facilitated but also driven by both parties.

5.2.3 Uncertainty in forecasting News

The four periods of new product launches in the stores are subject to increased uncertainty for the whole business. The newer a product is in its market, the more difficult to predict how the reaction to it will be in terms of sales. When it comes to the running range, especially products that have been around for years, forecasting is relatively easy as demand patterns have been established. Forecasting news, however, is a persistent issue and big cause of shortages, as capacity will often not be able to meet demand due to unforeseen sales fluctuations.

A Demand Planner reported during an interview a peculiar situation with one specific version of a kitchen product that had been forecast to sell roughly two million units worldwide. It turned out that this product was very popular, appealing to customers not necessarily only looking to buy kitchens, with sales skyrocketing to eleven million units worldwide – a roughly 550% percent surplus. While the company may have reacted adequately, sensing the trend early on, maximising supplier utilization, the suppliers could after some time not cope with the demand. As the need for capacity was extraordinarily high, the original production tools were no longer appropriate; new production tools had to be developed, a process that takes around six months to complete. This then lead to a long-lasting shortage, problematic because the popularity of the product did not diminish proportionately.

While having a completely accurate forecast is virtually impossible for news (a margin of error is always allowed, again tying in safety stocks), there are some potential ways of mitigating the risks. Firstly, it is wise to plan for activities not to coincide with news periods. As activities generally increase turnover and with that the risk of shortages, for instance due to a country lowering prices more than recommended, it can just add to the intensity of stock-out rates if a new product happens to be complementary to that on the campaign.

Secondly, since there is often an increased level of uncertainty coupled to news launches, a limited amount of articles can be ordered to the stores, pushing the new product to the market cautiously. If demand were to show an increasing trend, due to popularity, the company can then supply accordingly. Now this puts some requirements on the whole supply chain. For supply to be postponed liked this, there must be a buffer in one or several nodes. One way to do this is by postponing assembly of the news at the suppliers, keeping stock of individual components rather than finished products, and when demand eventually starts to increase, assembling these components and dispatching them. This way the supply chain can be more responsive to the demand variations, while avoiding stock-building of finished products. When goods are produced and packaged in IKEA, they are labelled with, among other things, destination data, making it costly to retroactively change their destination; components on the other hand are not labelled, and depending on where demand has increased, they can be assembled and sent more flexibly. If products have modular properties, postponing the assembly can have even greater implications, enabling not only the destination to be changed, but also the actual product itself, while it could in some cases simultaneously lower the risk of production delays as components are already waiting to be assembled.

The challenges with this are that there are possible trade-offs (reconnecting to RQ2) between decreased inventory costs and the cost of extra storage space at the supplier's' facilities, or even making sure that there is no barrier of willingness to implement such a structure, as it might add more complexity to the supplier's operations. Furthermore, this would put a higher stress on timely and accurate information sharing between all involved parts in the supply chain.

In relation to the 17 rules, it was determined that, as news forecasting touches upon basically all of these, nothing in particular could be added.

5.2.4 Unexpected demand fluctuations during planned activity

A successful activity is one that goes according to plan, according to the consensual understanding of the employees during the second workshop. Activities are planned for in advance, and they ought to be communicated as accurately as possible, in terms of the conditions under which they will apply. An unplanned activity is one that does not follow this framework, and will of course very likely be problematic.

However, there are planned activities in which things do not follow expectations, where the outcome is that customers buy much more than was planned for. The obvious dilemma can be formulated as "when are too much sales a bad thing?". A Sales Manager or a Shopkeeper, hypothetically, might be satisfied with an activity having generated a huge increase in sales for his/her store/range, and this might not be an alarming issue if the increase is within reasonable limits. Sales, however, could become too high when it stirs up the predetermined allocation of demand and capacity within a country, or in extreme situations even across countries, if it were to lead to severe capacity constraints. There have been cases in countries that are highly campaign driven, where an activity has sold up to 200% more than planned. Naturally, there might be a reluctance in many areas, not necessarily only within a store, to let go of a good opportunity to earn profit, but then sub-optimisation has been allowed, disfavouring other stores, potentially many customers, and as such also the total system.

It was found that there is no one single remedy to this, but possibly several. First and foremost, the availability rules emphasise the importance to follow the activity and sales planes framework (rule 4), of course an initial requirement for having healthy campaigns. Then it is crucial to take learnings from previous activities, especially looking at those where sales have been underestimated; carefully analysing the marketing channels and techniques and what consequences these had on commercial success. Another important factor is for there to be well-spread awareness of ongoing activities, and that any possible

change of plan is communicated by Retail to IoS or other parts in Supply, before or as early on in the activity as possible, preventing unnecessarily reactive behaviour.

5.2.5 Poorly set order parameters

As described in section 4.4.1.3, the fulfilment system is complex. Numerous order parameters exist, and in if not properly adjusted, have a more or less negative impact on availability. However, the availability summaries and workshops suggest that some parameters, if wrongly adjusted, have a larger impact than others. The operational forecast in the store stands out as one of them. Regarding news launching, much like the issues of Demand Planners, difficulties are apparent when forecasting, in terms of accuracy. Related to forecasts and observed in the availability reports, is that sales exceed store forecast during activity periods. Shortages in these cases might not be central ones at suppliers or DC, especially in the case of activities, yet due to faulty adjusted parameters, orders are late and availability suffers.

During the second workshop, a participant shared his experience having previously worked as a Shopkeeper. A discussion of safety stock and associated parameters arose for low selling S1 articles. Safety stock was, in his opinion as a Shopkeeper, to be kept as low as possible. He was not interested in tying up capital for articles not generating turnover. Sales were to be maximised and capital allocated towards top-sellers. Reasonable as that may be from a sales perspective, however, since S1 articles also consist of low selling system articles, rarely demanded but needed to fulfil a complete order, availability was put at risk. When challenged on this matter, the former Shopkeeper was convinced that a low turnover article could not be classified as S1. The quest for turnover had preoccupied his mind-set.

A contrasting experience is that which was shared by the RSI and SSS Managers at UAE, who in the in the midst of the lamentable delivery performance in their region, wished that a group of low flow articles, delivered from the low flow DC in Italy, should be moved to the high flow DC closer to the market. Just as in the case above, these articles, although moving slowly in terms of pallets, are key to complete kitchens. Considering the long lead-times, when a customer suddenly puts an extraordinary order, thus emptying stock, there will be a long period of shortages for those articles. This can again be

connected to the operational forecasting, which must be reasonably accurate for such a product move to be justifiable.

In order for the fulfilment system to function properly, stock accuracy is imperative, as expressed by the SSS Specialist in the Swedish store. The perception was that, if accuracy is continuously high, availability follows naturally, as the system consequently can make accurate decisions automatically.

5.2.6 Unexpected changes of regulations at receiving country

Product requirements are subject to governmental regulations and rules. In order to do business in a certain country, the range is to fully comply in this matter. Keeping the product sellable requires continuously monitoring requirements regarding certifications in the specific countries. Whether it concerns requirements regarding storing at the retailer/DC, the product itself, working procedures, or other aspects, they must conform to the laws of safety, health, environmental protection.

The global presence in which IKEA operates puts pressure on IKEA functions to be responsive to changes in market requirements. Considering the size of the IKEA range, this is not always the simplest of tasks. If compliance is not achieved, a sales stop in the concerned country or store may be initiated. An example of this is a current, and ongoing, sales stop of a gas hob in a few Chinese stores, affecting availability figures in the entire Asia Pacific region.

Admittedly, the issue is a hard one to cope with. During the workshops this has been inherently stated. Regulation changes can unexpectedly unfold in a relatively short time frame. IKEA lacks control in this regard, but can however mitigate the impact by working proactively. Important is to urgently initiate the process of aligning the affected issue to the new requirements in the damage control. Depending on the extent of the regulation changes and, if it affects a central or a local unit, it is up to the managing staff to take appropriate actions and communicate it to the related function. Nevertheless, the uncertainty is an apparent large factor. By monitoring requirements extensively, it allows for working proactively.

6 Discussion

This section will revisit and discuss the findings in relation to the three research questions. First out is the theme of causality (RQ1), then comes communication suggested as an overall remedy (RQ3), and ultimately is discussed the potential conflict of interest when setting up goals that trade off each other (RQ2).

6.1 Causality

It is perhaps necessary to discuss the validity of the findings of shortage causes. Have indeed true root causes been presented? As briefly mentioned in section 2.3, Corsten and Gruen (2003) stated that there often is a routine-like tendency to assume that the most recent cause of a shortage is the root cause, without considering underlying reasons on a longer term.

Here, all issues and causes were derived directly from the conversations held with a broad range of IKEA employees, based on their educated understanding of the processes and its actors, something that must be respectfully trusted to have sufficiently valid meaning, albeit functional and/or role specific biases always exist. As findings were compared to the periodical availability reports, that were independent from this work, quite a few similarities were found. However, some symptoms of the pitfall that Corsten and Gruen (2003) warn about, were also observed. “Local shortages” for instance, often recurring, is a rather weak term, virtually impossible to trace back to any specific activity. Similarly, “sales over forecast” or “need higher than capacity”, although they are more articulate, only scratch on the surface of what might in fact be a root cause. While the reports have an operational value, supporting short-term adaptations, they are not sufficient for a fundamental, widespread understanding of shortage causes, such that it can be used proactively. This, however, was strived for with the interviews, workshops, and the questionnaire.

The six causes that were subject to special focus can be juxtaposed to those which were often found in existing literature (see table 1). One of the takeaways from literature was that some of the major studies pointed towards the retail stores being the greatest source of shortage causes. Forecasting, ordering, replenishment, backroom operations, and shelf

space allocation were mentioned as important factors in that respect. Even for retailers that were in some way centrally organised, Aastrup and Kotzab (2009) concluded that upstream shortcomings were highly rare. Findings in this report do not support this to a full degree, as two of the causes with highest impact were found to be very much supplier related. However, it must be repeated that many of the existing studies look only at OSA. In the graphs presented earlier, both stores often showed a clear discrepancy between ISA and OSA, suggesting that there is a loss of customer perceived availability somewhere within the store. If one was to isolate the analysis only to OSA, it cannot come as a surprise that root causes are consequently attributed to the in-store operations. It is as saying "we do not have the product on the right shelf, and although it is somewhere in the store, the only issue is to find it and put it where it should be". But that may not be the only (or underlying) issue, and although OSA might on average reside on some percentage points lower than ISA, it is the latter that enables products to be on the right shelves. And if it is one metric that the upstream supply chain can affect, it is ISA.

In fact, it is difficult to make a direct comparison, since in much of literature, the organisational environment of the analysed unit is not made very clear. Many times, because cases are not focused to one company. For instance, how does the forecasting process look like; to what extent is the company subject to backroom operations; how is in-store replenishment performed; and so forth. In IKEA, there is no backroom in the sense which it is referred to by literature. The typical retailer (selling fast moving consumer goods, the often-used example in literature) may have an internal warehouse, from which products are replenished to the shop floor when needed. IKEA, on the other hand replenishes as much as possible directly from receiving, putting smaller articles out in the shopping aisles and larger items into the open warehouse, much of which is available for customers to pick from. The main "backroom" replenishment is from the bulk space of the racks, stacked high up, to the lower part of the racks from which customers pick their products. If a pallet were to remain unpacked in the bulk shelf, that is when there is a shelf OOS. In other words, ensuring OSA is a relatively simple task, whereas ensuring ISA involves much more steps and possible failures.

It can however be discussed that, although the causes here were quantified in terms of impact, they were only explored qualitatively to begin with. Those which were mentioned

frequently were brought forward for further analysis. In for instance the study of Corsten and Gruen (2002) and Aastrup and Kotzab (2009), findings from a large group of retailers were gathered into total figures, the majority in those cases giving similar answers. Either IKEA belongs to the minority, or the findings of the above are only generalizable to a limited extent.

In fact, the contextual differences from this study and much of literature, may be the main watershed, as IKEA not only has a substantially different business, but also works and organises distinctively different than most retailers selling fast moving consumer goods. This resonates with the propositions of Vasconcellos and Sampaio (2009) and Ehrenthal and Stölzle (2013) mentioned in section 2.3. Another thing upon which light has been put is that there are differences in markets, as is the case between the store in Sweden and UAE; this is also supported by Corsten and Gruen (2003), who show that figures do differ from country to country.

Ultimately, it must be said that there is also a degree of interrelationship between many, if not all, causes, and that it perhaps is not of that high value to aim for ranking and pinpointing what cause and where in the supply chain it mostly occurs.

6.2 Communication

Although it was mentioned as crucial in some sections, quite a few of the causes and remedies dealt with here do in fact revolve around one single factor, namely communication. Communication can in itself be both a driver of availability and a cause of shortages. On a high level, the company is on a constant journey of minimising uncertainty of information and maximising plan conformity. Uncertainty can be caused externally, for instance by unforeseen market trends or new authoritative regulations, in which case transparent and accurate communication within the supply chain is a driver of availability, as communication will help all parties do the right things in a timely manner. Uncertainty can also be caused internally, but then it is due to the fact that actions have been performed without or at the very least with lacking communication, for instance not sharing information on quality issues, or not sharing details regarding changes in a campaign. It can of course be a combination of the two as well, in which case communication is even more crucial. Fawcett et al. (2008), studying a wide array of

different companies and functions within those, doing both a large survey and several interviews, found that the two, primary supply chain "bridges" (enablers of effective supply chain collaboration) were perceived to be frequent communication and willingness to share information.

Willingness to share information may, however, require a more fundamental driver. Authors Moussaoui et. al (2016), Narayanan and Raman (2004), Lee (2004), and Corsten and Gruen (2003) all pointed out the relation between having incentive alignment in place and solving several supply chain issues that cause unsatisfactory performance. Recall that the first group of authors (2016) even went so far to state that most non-systemic problems related to availability can be addressed with an adequate incentive system. It can be argued that this statement applies to this case study as well. The first symptom of misalignment is that of the apparent disconnection between the OTD SC and ISA metric. One of the interviewees, a SDR Specialist, explained that the KPIs quite easily can distort reality, as for instance even if a carrier constantly comes with late deliveries, ISA may be hitting target, either via safety stocks or fast, small orders from other suppliers -- just as was shown in the above store examples. Another example, which was not possible to thoroughly test here due to insufficient data, also brought forward by the SDR Specialist, is an often-seen discrepancy between the different OTD metrics. Even though OTD Sender and OTD Log might be on or above target, OTD SC is not always doing the same. As OTD SC is supposed to represent the total delivery performance, it ought to be a concern if the parts are greater than the sum. The problem, although it may not be superficially apparent, is that different roles have different incentives based on the KPIs that they follow, which can mean that there can be a certain resistance to change the current state of things, be it in connection to unnecessarily high costs or insufficient availability.

6.3 Conflicting Interests

The final discussion subject will be in connection to section 2.4, that which provokes the question of whether availability ought to be maximised or not. It was mentioned in the case description that IKEA's strategic imperative is to strive for "lean" operations, which undoubtedly insinuates that cost efficiency is a priority, deeply embedded in the company's foundation. This is also reflected in how availability is treated. The four

different service level groups (S1 to S4) are created precisely with cost efficiency in mind, as it is known that all products in the range cannot be given the same priority in the stores. Some articles sell more, because they are more popular, and customers may even associate these products with the company's identity; therefore they deserve more shelf space, as inventory interest is compensated for by the profit, while the relationship to loyal customers is maintained. As a result, articles which are less important on a relative scale, are allowed to have a higher degree of shortages, and having invested less on the availability for those, the "Leave" behaviour of customers (Aastrup and Kotzab, 2010) has less potential consequences. Sales steering, or making use of stock-outs of some items to push out others to the market (Moussaoui et al., 2016), is also a well-established technique in the company. This shows maturity in terms of adaptation to the overall strategy.

In Fisher's (1998) terms, IKEA's products are typically functional, a view that is supported by Jonsson et al. (2013). Offering functional products, the company is, although a global leader in its industry, subject to tough regional or local competition, with many customers being motivated by price. Demand uncertainty is, although existing, not very high, especially for the running range. Cost efficiency is therefore an adequate choice of direction, and there should theoretically be no need for hedging uncertainty by building unnecessary stock (Fisher, 1998).

At the same time, the mind-set in Kitchen and Dining is that key system articles must always be available for customers. With only a few exceptions, virtually everyone that was interviewed working with the BA's range, reported that availability was the top-of-mind across the organisation, even prioritised before cost savings. Knowing that customers may invest a lot of time in kitchen purchases and that there are many articles involved in creating a complete kitchen, it is difficult to blame this mind-set, especially considering that key system articles belong to the S1 range. The question is, to what extent can these two mind-sets, cost efficiency and "always available", coexist?

In the build-up to one of the improvement suggestions was highlighted this potentially conflict of interest, namely postponing supply of new products to increase flexibility. Flexibility (which can be used interchangeably with responsiveness) and efficiency are,

in literature, often seen as two opposing ends of the spectrum of types of supply chain management. There is Fisher (1998) who recommends that the two be separated, and this sort of thinking can be traced back to Hayes and Wheelwright (1979) who similarly recommended that a certain type of product (a functional product) is best matched by certain type of process strategies (efficient supply chain). On the other hand, there are scholars who deviate from this idea, suggesting that a combination is possible. Christopher (2000), one of the pioneers in this respect, believes, upon observing real case companies, that flexibility and efficiency can successfully be used as a hybrid, if they are applied in different parts of the supply chain, with a decoupling point somewhere along the way, much like the suggestion to introduce postponement of assembly for new product launches.

The apparent confusion as to which strategy is the best fit, is clearly reflected in the work of Fawcett et al. (2008) who found mixed results when trying to clarify what are seen as the greatest benefits of supply chain collaboration. Their survey showed that on a total, customer satisfaction was a more beneficial indicator compared to cost savings, although functional differences were highly apparent. Surprisingly, though, the most cited benefit during their interviews was cost savings. The suggestion is that, while literature has not come to a unison conclusion, neither has the industry.

It seems that, although there are potentially conflicting interests within IKEA Kitchen and Dining, there is to date no clear answer as to how to best deal with it. With that in mind, it has nonetheless been show that there are indeed areas of possible improvement, and while the question of maximising availability in a cost-efficient environment may always create friction, the company still has a way to go reach the new targets.

7 Further Research

This final section brings forward the recommendations for future actions both directed to the case company and to literature.

7.1 Recommendations for the company

The wish is that this report can help IKEA manoeuvre towards the right direction in pursuing its availability goals. There are challenges ahead, but the findings of improvement suggestions and the discussion that was held in relation to this, hopefully generates inspiration. If the company wishes to act upon the suggested improvements, the summary (figure 9) proposes the extent of feasibility, in terms of resource requirements, for each. Some things are already done at the company (1), meaning that it is only a matter of continuing to do so. Some things should be done but are lacking (2), being a matter of compliance. (3) requires both competence, which is most often at place, and intelligent tools, which sometimes is lacking. Groups (4) and (5) may be more difficult to implement, as they require a more long-term effort. Figure 9 is merely a proposal; the company may not necessarily agree with the ranking. It should be noted, however, that it is important to keep in mind the discussion in relation to this (communication and incentives alignment).

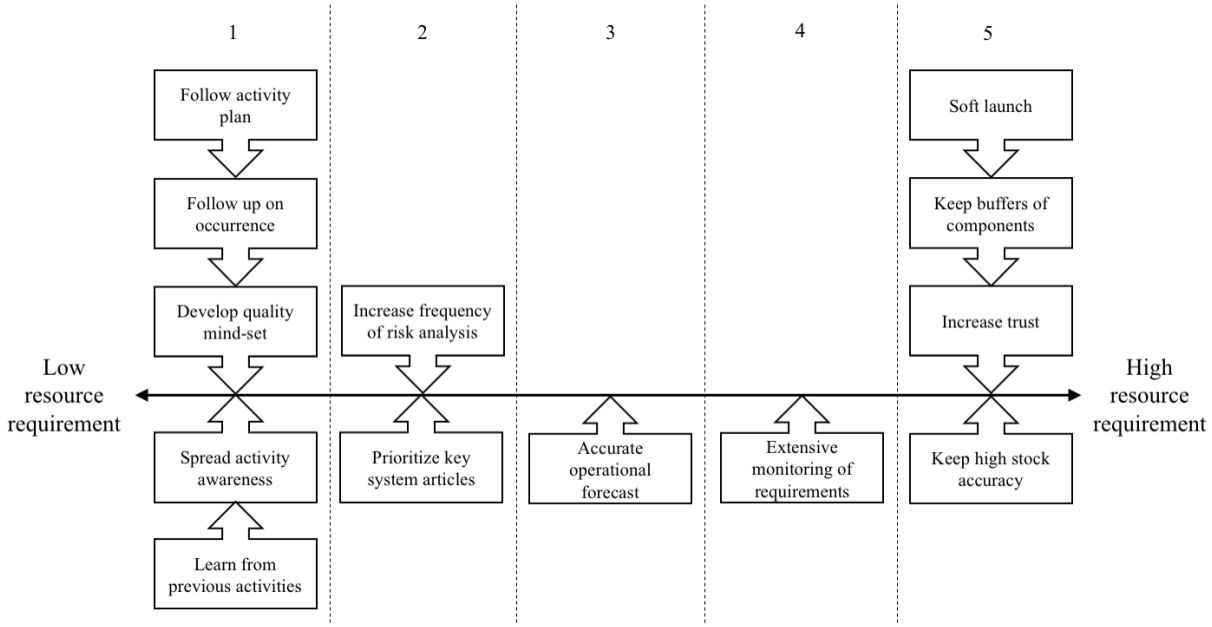


Figure 9. Feasibility of suggested improvements.

The problems that were brought forward from the UAE market, represent a wonderful opportunity for learning. As the global expansion continues and new markets are entered, the UAE case can be seen as an example, demonstrating how market specific customer behaviour can have varying impacts on the business, how important it can be to equally equip all franchisees with adequate tools for planning and performance follow-up, and how the organisation can tackle times with extensive changes. On a holistic level, however, it cannot be ignored that strategic alignment is key, and that there needs to be clarity throughout the supply chain, as to how product availability should be treated at all cases.

A practical recommendation is to make better use of the periodical availability reports. This is a resource with high potential. Today, the reports only have an operational, short-term value. It has been shown, however, that they can be used to deal with shortages more methodically. Firstly, a requirement must be to always note every issue and shortage in an articulate manner. A standard, robust procedure for compiling the reports musts exist for all regions. These reports can then be gathered into meaningful data -- an availability portfolio -- that can be used for analysis and thus form the basis for annual, or more frequent meetings, during which patterns, peculiarities, areas of interest, and so on, are discussed. Instead of risking forgetting about an issue as soon as it has been solved, or oversimplifying matters by for instance saying “central” or “non-central” shortages, this can be a source of long-term learning, keeping everyone not only updated but also stimulated to work proactively in the future.

7.2 Recommendations for literature

Root causes of stock-outs as per several sources studied in the literature review, could not be fully applied to the setting in which IKEA Kitchen and Dining operates. Deriving the causes to “in-store” or “out-of-store”, without considering what functions/processes are failing and relating it to the corresponding set-up, might imply that causes are true for all cases independent of the context. Depending on, among other things, whether or not planning units are centralised or decentralised, root causes can be manifested accordingly.

This report calls for more focused, context-specific research in relation to product availability, root causes of and remedies to shortages, and the implied trade-offs to maximising availability. First of all, there is a need for more case studies that look at other industries than retailers of fast moving consumer goods, possibly businesses active in different and/or border transcending markets. Secondly, it ought to be of high interest to juxtapose availability initiatives to overall business strategies, bringing closer the field of retailing and supply chain or operations management, as in this way trade-offs can more thoroughly be assessed. Moreover, as it is seems to be quite rare, structured and prescriptive empirical research, in the form of simulation and optimisation of real cases, could add substantially to the field.

8 Conclusion

The Kitchen & Dining BA differs from many other furnishing businesses at IKEA due to the vast number of unique articles needed to complete a customer order. Satisfying a customer purchasing a kitchen requires more articles being available at any given time. As a result, the BA has acted as a driver in availability initiatives in the organisation. An introduction of a companywide new in-store availability measurement is about to be realised. Albeit tougher in terms of requirements, the ambition is to keep the same targets as previously used. In this paper, it was aimed to describe root causes of major shortages, find what can be done to mitigate out-of-stock situations and what the trade-offs of increasing in-store availability are.

Observing availability in two stores, doing interviews, workshops, a questionnaire, and studying internal availability documents, six causes of shortages were identified.

Supplier deficiency:

- Supplier failing to communicate quality issues

Planning & ordering:

- Insufficient production capacity
- Poorly set order parameters in store

Systemically related:

- Unexpected demand fluctuations during planned activity (campaign)
- Unexpected changes of regulations at receiving country
- Uncertainty in forecasting News

The shortage causes can be categorised in the attributes proposed in Table 1 with the exception of the systemically related issues, as defined by Moussaoui et al. (2016). The causes in the organisation, with near full ownership of warehouses, partial ownership of suppliers and a global central planning unit, add to the understanding of what availability related issues can be expected in the effort of retailers improving product availability.

Corresponding mitigation approaches for each cause were proposed in dialogue with IKEA co-workers. The validity of the identified issues was discussed with regards to

research in the field of retail product availability. It was found that the context in which IKEA operates is limiting the applicability of generalising studies which attributed root causes to “in-store” and “out-of-store” operations. Regarding mitigation approaches, a revisit was made to literature in which communication was found to be key in driving availability. Incentive alignment is discussed as an enabler of communication, and it was found that a disconnection between some metrics, working as incentives, are apparent at IKEA. Discussed in relation to trade-offs was also the potential conflict of interest between maximising availability and maintaining a cost-efficient foundation.

Furthermore, it was suggested to the company, that learnings are to be taken from the late 2016, and ongoing, turbulent situation which the UAE store has been subject to. A practical method to follow up on causes to shortages was suggested to make the most of the periodical availability reports issued by each region. To future researchers it is called for focused, context-specific research in relation to product availability since the applicability for current literature has been questioned.

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9.1 Literature

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9.2 Figures

Figures not referred to under section 9.1 can be found below. Figures in the text without citation are courtesy of the authors.

Figure 1: Inter IKEA Group Financial Summary FY16, (2017), Annual Reports, [online] Inter IKEA Systems B.V., p.6, Available at: http://preview.thenewsmarket.com/Previews/IKEA/DocumentAssets/457172.pdf [Accessed 25 Apr. 2017].

Figure 5: ISA and OSA Logic, (2016), SL New training awareness 161111, Unpublished internal document, Inter IKEA Systems B.V.

Appendices

Appendix A: The 17 Availability Rules

1. Only co-workers with an always available competence (knowledge, motivation and capability) will work with S1 products.
2. The S1 range must be selected from the SBAS range, and should be fairly stable over time. All store will stock the global S1 cash and carry range as a minimum.
3. The BA technician has the responsibility to create, communicate and maintain the technical documentation. The documentation shall be clearly communicated to the TA technician, who will ensure it is fully understood by the supplier. This must be verified in contract review by business developer. In doing this we eliminate risks when changing design, material and/or construction.
4.
    a) Activity planning: There will be a 6-months advance notice to the demand planner for sales activities that increase sales above the normal pattern. Without 6-months advance notice there will be no commitment of supply.
    b) Sales planning: Prior to each fiscal year the country sales manager and the BA manager will make an agreement according to the agreed sales forecast for the coming fiscal year. The sales plan agreement will be followed up during the yearly forecast revision. Actions will be taken to meet up the plan.
5. Always have a signed and understood S1 agreement in place for all S1 article suppliers. Conduct an annual risk analysis on the supply structure and transportation network. Maintain and secure confirmed back-up plans for S1 articles annually.
6. Conduct an annual audit of all tools that produce S1 articles and check:
    - The tool's remaining life length.
    - Availability of a back-up or second tool.
    - Availability of additional tools as sales increase.

    Make the necessary investments to insure that the number or condition of tools does not interrupt availability.

7. All S1 product moves must be approved by moving council prior to a move. (Checklist including transport according to transport rule no 13)
8. All suppliers delivering to IKEA shall fulfil all “no go” requirements, according to SDP quality standards.
9. Risk assessment in production must be done and documented by the TA together with the supplier.
10. A product audit is conducted annually by the TA technician. The BA technician is always invited.
11. The supplier must deliver the ordered quantity IN TIME. When the need for an urgent delivery has been detected in order to avoid, or resolve, a shortage situation the supplier will do whatever it takes to ensure the product is delivered right away.
12. If an S1 article is out of stock in the DC, or if there is a risk of central shortage, DCG Ops must bring the item available for store orders as fast as physically possible. The Supply BA specialist (regional supply team) communicates with DCG Ops, giving information that an urgent delivery is anticipated which needs priority for unloading and what store orders to be prioritised (in case of central shortage). If the Supply support specialist (at the Service office), or the In-store sales and supply support specialist (store), detect a shortage or risk of a shortage on an S1 article not being out of stock centrally, they will take actions right away to ensure that an existing order is being prioritised and sent to the store as soon as possible.
13. Support full availability for S1 articles by taking an active role in the tactical planning and by cooperating with concerned Trading areas in the operational execution of the plan, supported by different transport solutions. Pay extra attention to planning and preparation for crucial periods (holidays, catalogue drop and special activities), provide short term flexibility and communicate transportation limitations. Together with DC managers secure transport solutions for clearing.
14. Maintain appropriate safety stock in the CDC in order to live up to the customer promise.
15. Maintain the right safety stock of low selling items in stores in order to live up to the customer promise.

- On low selling items the store should keep minimum of 4 pieces as the safety stock.
- Review S1 stock daily - if available stock is less than 4 pcs always check for corrections between system and physical stock. If necessary, start the inventory process as soon as possible.
- Review upcoming S1 shortages on daily bases.
- Secure the highest priority on replenishment to sales space location on S1 items. Avoid the creation of local shortages.

16. The Shopkeeper has the responsibility to maintain the right sales location planning on all items in stores in order to live up to the customer promise. To be able to secure “always available” on all S1 items the Shopkeeper need to follow the actions below:
    - Secure the right sales space capacity.
    - Secure right system parameters which can have an influence on the ordering process.
17. If supply is interrupted for more than 60 days the commercial manager must make a decision to:
    - Stop sales and remove displays in certain markets, to provide full supply in other markets.
    - Stop sales and remove displays in all markets until supply has been stabilised.

Appendix B: Interview Form

1. Short presentation of organisational role/title: “What do you do?”

2. What is your specific assignment in ensuring product availability for customers?

3.1. Would you say that your assignment is about maximising product availability to customers?

3.2. Is product availability an established concept throughout the work environment?

4.1. What do you experience as the general challenges and causes in relation to OOS situations?

4.2. Why are exactly those things challenging?

5. High performing versus low performing items; general reasons?

6. Specific issues with certain items/categories/suppliers/region/replenishment methods/demand patterns?

7. How can IoS support these issues?

8. How can DC and supplier support these issues?

9. How can retail stores support these issues?

10. Adding/Closing

Appendix C: Questionnaire

For each of the causes listed below, the following questions were asked. Each question also allowed for additional comments; an overall comment could also be added in the end.

Question 1: Grade the following; 0: low impact on availability; 7: high impact on availability; alternative: unable to answer;
Question 2: Grade the following; 0: difficult to change; 7: easy to change; alternative: unable to answer;
Question 3: Choose between Sporadic, Periodic, or Chronic; alternative: unable to answer.

Shortage Causes

A: Supplier failing to communicate product quality issues
B: Insufficient production capacity
C: Unexpected demand fluctuations during planned activity
D: Uneven allocation of forecast per country
E: Unexpected changes of regulations at receiving country
F: Uncertainty in forecasting news
G: Insufficient time to focus on all tasks as a co-worker
H: Inflexible allocation between locally sourced and imported goods
I: Unexpected lead-time variations
J: Failure to conform to the 6-month activity frame
K: Inadequate shelf space allocation for important articles
L: Poorly set order parameters in store
M: Retail not ordering from DC due to lower DD price

Appendix D: The six shortage causes and suggested improvements

Shortage Cause	Improvement Suggestions
Supplier failing to communicate quality issues	Develop quality mind-set Follow up on occurrence Increase trust
Insufficient supplier capacity	Increase frequency of risk analysis
Difficulties forecasting news	Soft launch Keep buffers of components
Unexpected demand fluctuations during planned activity	Follow activity plan Spread activity awareness Learn from previous activities
Poorly set order parameters	Prioritise key system articles Accurate operational forecast Keep high stock accuracy
Unexpected changes of regulations at receiving country	Extensive monitoring of requirements