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Analysing the existing challenges in the Buying process of Fashion Retail industry and suggesting a possible solution using Artificial Intelligence.

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Abstract

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New technologies are disrupting the way business is done and the need for adapting these technologies within the business processes and value chain is increasing. The aim of this thesis was to analyse one such business process under the fashion retail industry and explore the use of technology in it. The study examined the challenges faced by the retail buyers and professionals in the buying process of the fashion retail industry. In addition, Artificial Intelligence applications were explored to solve the identified challenges and suggest a possible solution. The work was performed in collaboration with Yanca Oy, a fashion retail consulting company, with an objective to find a possible solution for the major challenges faced by the fashion retail buyers.

The study was done in two main parts: literature review and empirical research. The first part of the study analysed the literature on retail industry, fashion retail industry and the retail processes such as buying, merchandising, marketing and range planning. In addition, the technical aspects of Artificial Intelligence and its use cases in the Fashion Retail industry were studied. The empirical research investigated the challenges faced by the retail professionals in the fashion retail buying process. Also, the challenges were brainstormed with Artificial Intelligence and Machine learning experts to suggest a possible solution. Data for the study was collected by means of online survey, semi-structured interviews and in-depth interviews. A Qualitative Research methodology was therefore applied.

The analysis of the research results identified the challenges faced by the retail buyers in the buying process. Based on the challenges, a solution with possible features using Artificial Intelligence applications was suggested. Also, a functional prototype was created. The study could be further applied to create an AI assistant tool for the retail buyers using the suggested features.

Keywords: retail industry, fashion retail industry, fashion industry, retail buying, artificial intelligence, machine learning, artificial intelligence applications, online retail, e-commerce.

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1 Introduction

The thesis presents a study of the buying process in the Fashion Retail industry across the world. It focusses on analysing the challenges faced by the retail buyers in the buying process and how technology can help create a solution for the same.

Fashion retail involves sales of fashion products for consumers from stores, stalls or online ecommerce shops (Herald 2018). In order to retail the products, the retailers need to first buy the merchandises from the manufactures and this whole process is known as the buying process in the retail business.

Buying is till date one of the most cumbersome and challenging aspect of Fashion Retail industry. A buyer is required to have multiple skills to fulfil the job including visual creativity, analytical skills, negotiation skills, and a keen awareness of fashion (Hebrero 2015, p.33.) The buyer determines what stock needs to be purchased for the store that further determines the success or failure of the overall season sales. The success of any fashion brand hugely depends on the work done by the buyer and therefore, it is important to understand the challenges faced by this segment. The main goal of any business is to make the customers happy while making considerable profits and for the fashion retail industry to succeed it is important the study the role of buyers in detail, understand their challenges and create possible solutions to help them perform better.

The fashion industry is going through a considerable shift. One of the major factors for this shift is the consumer behaviour. With the growth of digital platforms, the online sales are growing rapidly. Online data reveals that an average consumer in Southeast Asia spend about eight hours a day on social media, video streaming and online shopping. The availability of such huge content has changed the consumer journey and expectations. The easy availability of information and decision-making power has made the consumers less brand loyal. Among millennials, two-third prefer to switch brands for a discount of 30 percent or more. Their purchasing decisions are also based on company's practices, mis-

sion and values. This shift has forced the companies to be able to deliver: convenience, values, newness, quality and price. (The Business of Fashion and McKinsey & Company 2017.)

With the shift in consumer behaviour it is also essential for fashion retail companies to rethink the way the stock is purchased for their stores. The overall fashion retail buying process also needs to shift from push analogy to pull analogy. This means that rather than buying the stock based on the available products the companies must focus their buying based on the customer demands.

The use of new technologies such as Artificial Intelligence (AI) is also gaining popularity among the leading fashion retail companies. The top players and innovators are trying every possible way to introduce AI across the value chain exploring new ways to provide value to the customers and their employees. The use of AI will go considerable high in next two years, 75% of the fashion retailers plan to invest in AI in 2018-2019. This mix of technology and creativity will have a huge impact on the fashion industry. (The Business of Fashion and McKinsey & Company 2017.)

The use of AI and other latest technologies such as Augmented Reality (AR), Big Data, Internet of Things (IoT), Virtual Reality (VR), Extended Reality (XR) etc. are increasingly adopted in the fashion industry. Many of these technologies have also been adopted in the brick and mortar stores to enhance the customer experience and save their time. Although, using these latest technologies across all the fashion value chain is in progress and needs more research. Therefore, for this research I have decided to research on the possibilities of using the latest technologies in one of the most challenging area i.e. The Buying Process in the fashion retail industry.

My personal goal for this research is to understand the most common challenges faced in the buying process and how can it be solved using latest technologies especially Artificial Intelligence. Within the framework of the study, the key objective is to find the pain areas in the fashion retail buying process and propose an outline or prototype of the solution. In addition, some technical aspects would also be analysed for a deeper understanding of the solution.

Based on the aim of the research, the existing challenges of the fashion retail buying process has been investigated using online survey and semi-structured interviews. In addition, the information about the trends and challenges in the worldwide fashion industry has been gathered and analysed. Therefore, the Research Methodology used for this research is Qualitative Research and Literature Review.

The structure of the thesis is divided into two parts: the literature study and the empirical study. The theoretical framework includes the detailed analysis of retail industry, fashion retail industry, retail buying process, range planning, merchandising and the latest technologies such as Artificial Intelligence, AR, VR, Big Data and IoT. In the empirical part of the work, qualitative research has been chosen as a suitable approach for this research. The next part of the study will include the analysis of the theoretical and empirical results and present findings and recommendations. Finally, a prototype of one possible solution/case is created.

1.1 Industry Background

Fashion industry did not begin initially as an industry, the industrialization and recent advances changed the face of fashion. In 1910s the products were made to order based on the necessity, in 1920s departments stores were developed and only in 1930s the stores expanded into big chains and affordable clothing was available to everyone. The growth of fashion industry started in real sense by the mid-50s. The 2000s witnessed a change in consumerism, greater expectations and choices on online platforms created new demands and a new era for fashion industry was born. (Hebrero 2015, p.6.) This continue today, and new technological developments are now governing the advancements of this industry.

Figure 1: The timeline of fashion industry. (Hebrero 2015, pp. 6-8.)

The global fashion market is valued at 3 trillion dollars and accounts for 2 percent of the world's Gross Domestic Product (GDP) (Kumar 2018). The McKinsey Global Fashion Index forecasts a growth of 3.5 to 4.5 percent in the fashion industry in 2019. (Amed et al 2018, p.11.) The revenue of online global fashion industry is also expected to show an annual growth rate of 8.7% (CAGR 2019-2023) (The Statistics Portal 2018).

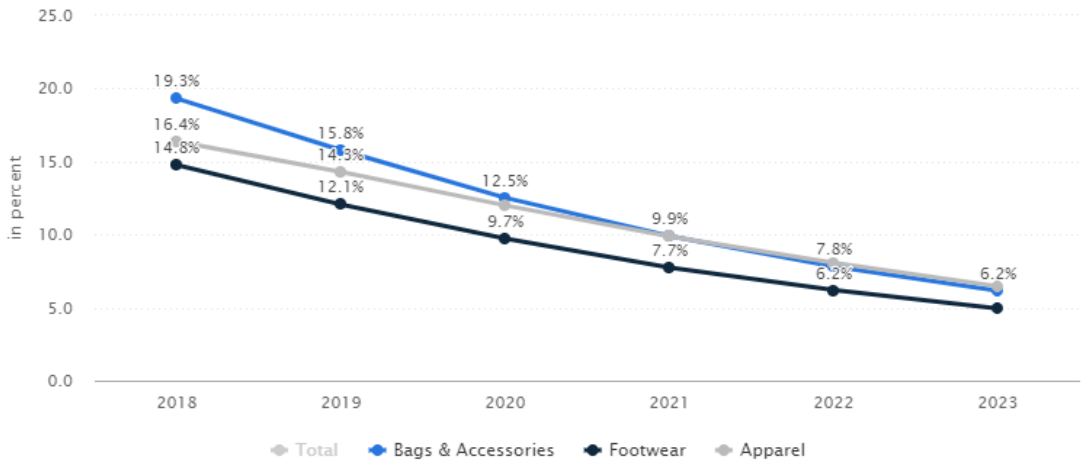

Figure 2: Revenue growth in online fashion industry (2019-2023) (The Statistics Portal 2018.)

1.2 Research Objectives and Questions

There are two different objectives of this study. The first objective is to dig deeper in to the existing challenges in the buying process of the fashion retail industry, this objective helps to pinpoint the pain areas of the retailers and help focus on the components that needs to be worked on. The second objective is to analyse the pain areas concluded from the first objective and understand and outline a solution using latest technologies. The outcome from the second objective might give an idea to create a product for solving the challenges of the retailers in the Fashion retail industry for at least one business process.

Research Questions

1. What are the challenges faced by the retailers in the buying process of the fashion retail industry?

a. How can the above challenges be solved using the latest technologies?

1.3 Scope of the study

The study has been conducted between 2018-2019. Moreover, this study is limited to only one business process of the Fashion Retail Industry I.e. Buying. Therefore, a large chunk of important business processes is left behind to research on and provides scope for future research activities in that direction.

Another limitation is the technological aspect, for this research Artificial Intelligence has been focused upon for creating a solution for the final solution. The other latest technologies are only touched upon shortly based on the literature review.

Also, the geographical aspect plays an important role in this study. The study has been majorly focussed on Europe and India. A big chunk of fashion industry is in United States and China, but for this research we have not included these geographies to analyse the challenges in the Fashion Retail Buying process.

1.4 Collaboration

The research has been conducted in collaboration with Anna Juusela, a Retail Professional and the founder of Yanca Oy. Yanca Oy Ltd (www.yanca.fi) is a company offering services for small and medium sized retail companies in the field of online and offline visual merchandising, purchases planning, stock control and financial administration. She is also an educator, teaching students and entrepreneurs, how to measure the effectiveness of Visual Merchandising, Merchandising & Buying planning and E-commerce Merchandising. Her interest from the research is to understand the possibilities of Artificial Intelligence in the retail sector deeply and this thesis would be a part of it.

2 Literature Review

The theoretical aspect for this research is carried out to understand the concepts underlying the study. A broad context of theories related to the Fashion Retail industry and Artificial Intelligence including books, journals, research papers and online resources are selected to produce a background for the research problem of the thesis.

To understand the challenges in the buying process for the fashion retail industry it is essential to dive deep into the related processes and identify the steps required for succeeding in buying. The experience of Ms. Anna Juusela from Yanca Oy, as an educator in the field of Fashion industry was helpful in structuring and selecting the sources. Along with her inputs, the theory was constructed to provide the base for the empirical research and to make sure that every aspect of fashion industry especially the buying process was explored before carrying out the semi- structured interviews.

For the concepts of AI and machine learning, the related use cases are studied, along with the latest development in the technology. The combination of these two factors was the basis for deciding the sources for the technical aspect. The researcher's background in Information Technology industry was also helpful in structuring the sources and deciding the concepts relevant for the research.

2.1 Introduction to Retail Industry

Retail is the sale of goods and services by the businesses directly to the end users for their consumption. The sale takes place from a single point of purchase traditionally from a brick and mortar retail store. This single point of purchase could also be an internet shopping website, a catalogue, a mobile phone etc. (Farfan 2018.)

Retail industry is one of the oldest industries in history starting from the era where human exchanged animals such as cows and sheep in exchange of products or services, this was known as the barter system. Later, the currency system was developed, and retail became an industry. Slowly the industry began to grow, in

1930 the very first supermarket was established in Dallas and by 1950s the mall culture had already started. (Braun 2015.)

Traditionally, retail was considered mostly as a localized commercial sector and its scope was limited to small- scale operations. Small scale operations still play an important part of the sector but in the 1990s, the international operations became the largest enterprise sector. International Retailing now became not just an option, but a necessity for the retail companies to grow. (Akehurst & Alexander 1995, p. 1.) The importance of retailing and internationalization of retail sector is considerably significant. It is the final link in the supply chain between the manufacturers and consumers. The Retail Supply Chain consists largely of manufacturers, wholesalers, retailers and consumers. The task of the retailer is to simplify the process of purchasing the goods or services for the customers that manufacturers cannot provide. The retailers display the product and its features, stock the products, process the payments and does everything to ensure that the right customer receives the right product or service at the right time. (Farfan 2018.) Therefore, the internationalization of the retail sector also became important. With globalisation the markets are open to explore, manufacturers cannot set up their expensive manufacturing units in different countries, but the goods can be retailed to different countries making it more profitable for the retail companies. With the growth of the internet in the 2000s the retail sector yet again underwent major changes. Ecommerce or internet retailing has been adopted as the new shopping style by the consumers. The overall internet retail sector has tripled in the past few years, but brick and mortar remain the major contributor of the retail sector revenue. (Mordor Intelligence 2018.)

The overall retail industry is valued at USD 23 460 billion in 2017. It is expected to show an annual growth rate of 5.3% (CAGR 2018-2023) and is expected to reach USD 31 880 billion by 2023. (Mordor Intelligence 2018.) It is a large sector contributing 31% of the world's GDP and comprises of many different sub sectors such as fashion, grocery, automobiles, healthcare, skincare, home accessories and decor, entertainment, toys etc. (Business Wire 2016.)

2.2 Fashion Retail Industry

Fashion retail industry is a sub sector of the retail industry umbrella. It comprises of only 2% of the world's GDP and accounts for USD 3 trillion. (Kumar 2018.) Fashion industry includes designing, manufacturing, distributing, marketing and retailing of different kinds of apparels and accessories ranging between high street designer wear to everyday wear. Fashion retail involves sales of fashion products for consumers from stores, stalls or online ecommerce shops. (Herald 2018.)

The term 'fashion' can be defined as a style of dressing existing among a group of people for a substantial length of time. It can refer to anything that adorns the body starting from clothing, accessories to footwear. Fashion has become an important part of popular as well as traditional culture and therefore, the fashion industry itself has become very influential among people. (Hebrero 2015, p.1.)

Fashion did not emerge as an industry, it only existed as a necessity. Although, it still had difference between what common people wore and what the elite wore. This difference was big in many cultures and traditions, the fashion was made-to-order work not available to everyone. The Industrial Revolution marked the beginning of fashion as an industry providing affordable clothing for masses. With the manufacturing of mass apparels, the distribution and retail industry also boomed. Fashion Retail Industry has continuously grown ever since. (Hebrero 2015, pp.4-5.)

Fashion could also mean many different things such as cars, house decor, mobiles phones, music, toys etc. But in this study, we focus on the fashion apparels and accessory business. Fashion apparels includes clothes for men, women, children and accessories could range between several categories such as shoes, hats, glasses, scarves, gloves, bags, belts, ties, jewellery and watches. (Le Bon 2014.)

Women fashion has mostly been on the leading numbers in the fashion industry. Most of the women prefer having the latest apparels and styles in their wardrobe. Women apparel account for 44% of the clothing industry and only 28% of the industry is dedicated for men's clothing. Although, it has been seen that men are

getting more and more fashion conscious and brands are opening men's clothing lines to satisfy their demands. Teenagers are also another growing target market for the fashion brands, a demand of youth collection is now more than ever. (Le Bon 2014.)

The actual function of Fashion Retail industry is to serve the customer demands in the very competitive online world while creating profits for the brands, this needs a very strong marketing and understanding of the target market. Bruno Reaury, a fashion scholar mentions that traditional marketing is defined by a need, but fashion is not built on a need, it is a desire and therefore, marketing in fashion industry is very important and creative aspect (Tungate 2012, cited in Kiltilä 2018).

Since the 1990s, certain important phenomena such as the annulment of multi-fibre agreement in 2005, 2008 economic crisis and the saturation of traditional markets have changed the face of traditional fashion industry models, bringing more customer-centric models in view due to low demands (Abecassis-Moedas 2006, cited in Caniato 2014) and strong competition (MacCarthy & Jayarathne 2009, cited in Caniato et al 2014).

Another important aspect of this industry is analysing the trends, brands can not only push the products to the consumers, but they need to forecast what they want in advance to be able to successfully sell the purchase stock. (Hebrero 2015, p.3.)

Fashion retail is unlike other retail sub sectors such as grocery or automobiles. It is highly challenging and needs specialized knowledge in order to excel in this sector. The Fashion Retail sector includes some very specialized processes and roles to ensure profitability.

The industry comprises of many different roles and business processes, but for the line of this research we will discuss only the ones that have a considerable impact on the overall sector. Some of the most important roles in the fashion industry are that of a Buyer and a Merchandiser. Some of the important business processes includes Fashion retail buying, Retail Marketing, Retail merchandising, Range planning and budgeting.

2.3 Retail Buying Process

2.3.1 Retail Buying

As we already discussed, retailing includes all the business activities where goods and services are sold to the ultimate consumer. This can happen from a brick and mortar store, catalogue sales, vending machines, internet sales or door to door sales etc. To perform all these actions, first buying of the goods and services is required by someone from the manufacturer or the wholesalers. Buying can be defined as the business activity, where the buyer needs to select and purchase products to satisfy the target consumers demands. The buying process thus involves many complex decision makings before the buying has been performed. (Clodfelter 2008, pp.4-5.)

Fashion buying refers to buying action performed within the fashion industry. The buyer needs to buy the apparels, accessories, footwears etc. based on the target market and the brand strategy. Buying involves some of the very specialized activities such as; (Clodfelter 2008, pp.4-5)

- Customer demand forecasting.
- Merchandise assortment planning based on the target market.
- Selecting the vendors to buy from.
- Negotiating deals with the selected vendors.
- Ascertain the cost involved in distribution of the good. (Diamond & Pintel 1997, p.4).
- Pricing the merchandise and maintain the sales & inventory records.
- Merchandise recoding.

These are some of the actions performed in the buying process and therefore, the buyer plays a very important role in order to satisfy the customer and generate profits for the brand. The person needs to be a strong decision maker having specialized knowledge about the various topics mentioned above. Retail buying is very demanding and requires a blend of creativity, knowledge of fashion & life style industry along with good interpersonal skills (Jacobsen 2008).

Buying in retail also depends largely upon the format of the Retail for which the buying needs to be done. Retail buying is also highly dependent on Retail Marketing. But the most important aspect of Retail buying is the buyer.

2.3.2 The Role of a Buyer

Buyer is the person responsible for the buying for a specific brand. The buyer selects the merchandises suitable for the target market, creates a merchandise assortment for the store, and ultimately purchases within a definite budget. All these makes the role of a buyer very complicated and hectic, although it also comes with a hint of glamour. Buyers for exclusive fashion brands need to travel to various fashion shows or meet influential people to analyse the trend. They also need to keep their personal preferences aside and focus completely on customers (Jacobsen 2008).

There are various factors that affects the scope of a buyer:

- **Organizational Structure:** The buyer's role depends largely on the type and size of organisation he/she is working for. Broadly, we can categorise the retail business operation in five organization categories: (Diamond & Pintel 1997, p. 4)
    - **Chain or Corporate Stores:** These are large corporate retailers having more than one stores around the geography they operate in. They have a Central Management and it is possible that (Diamond & Pintel 1997, p. 4.) In this case, the buyer is also centralized working from the company headquarters and do not have any interaction with the customers or the target markets. In this case, if the size of the corporate is very large, the buyer's job could be very specific and specialized buying only for one department such as Men's Jeans. In smaller organizations, the buyer might be responsible for buying the complete stock for different departments. (Clodfelter 2008, p.40.)
    - **Specialized Departmental Stores:** Departmental stores are umbrella stores having wide variety and range of products. Some might

focus on apparels and accessories but in most of the cases, retailers need to decide what assortments the customers are looking for. (Jacobsen 2009, p.4.) These are speciality stores having multiple branches. In many cases the buyers of these stores are not only buying the stock but also responsible for the sales of their department. They might or might not be performing the task of a store manager selling the products to the customers. Therefore, they might be interacting with the customers about their needs and demands but most of the time buyers do not want to handle the sales themselves and are dependent on the store manager for the customer feedback. (Diamond & Pintel 1997, p. 4; Clodfelter 2008, p.40.)

- **Single Unit Small Retailer** (Diamond & Pintel 1997, p. 4): These are the small business owners having their one-unit retail store. Generally, these stores do not have a big workforce and therefore, the owner might be handling the tasks of a buyer, salesman and other business units.
- **Licenses and Franchises:** A franchise is a legal contract made between a business and the franchisee that gives a franchise the right to sell the company's product under mentioned rules, territorial domains and commission fees. Strategy of franchisee was traditionally used by service sectors such as restaurant business but now it is becoming common for fashion industry as well, with increasing internationalisation (Quinn & Alexander 2002). In this case, the franchisees receive or purchase the products from the company itself. (Diamond & Pintel 1997, p. 4).
- **Catalogues and Home Networks:** Many big retail organizations and chains have a separate catalogue division and some companies they work only as catalogue sales. The companies with an additional catalogue division generally have a separate buyer for this purpose. The businesses relying completely on catalogues or home shop networks need a large merchandise assortment and therefore the task of the buyer is more quantity extensive. (Diamond & Pintel 1997, p. 4.)

- **Merchandise Collection:** Another important factor determining the scope of a buyer is the merchandise collection of the store. This is the category where Fashion buyers have an important role than other basic buyers. The fashion world is very volatile and keeps changing frequently, for this reason the buyers needs to constantly forecast and keeping themselves in touch with the market trends. Fashion buyers, therefore, must keep looking for unique products, styles and trends that differentiates them in the market. On the other hand, fashion buyers for discount stores might not look for the uniqueness but the best prices to buy the collection, their decision might be based on past sales records. (Diamond & Pintel 1997, p. 7; Clodfelter 2008, p.39.)

- **Location of Retail Outlets:** Big retail organizations having branches across geographies far from one another have different buyer responsibilities. It is not possible for the buyer to personally do the floor management of the different stores. The store location influences the customer buying choices. Stores located near home, work place etc. have different performance than stores on the outskirts of the city, competitor location also play a role in the customer buying behavior, therefore the buyer needs to be aware of all those factors. Buyer in the companies where the stores are closer to each other can manages the in-store activities and are closer to the customers. (Diamond & Pintel 1997, p. 9; Tiwari 2009.)

2.3.3 Buyer's Responsibilities

The buyer is responsible for selecting the collection of the store that would impact the store's sales as well as its brand image. Buyer develops the merchandising strategy of the store, analyse the customer demands, clasify the assortments set pricing for the merchandises, observe the trends and aims at the profitability of the company. The buyer is also responsible for creating the profit budgets, stock levels and discounts. (Jacobsen 2009.)

The scope of the buyer depends on various factors but there are some important responsibilities and duties that the buyer must perform in a retail organization. Here are some responsibilities of a buyer:

- **Merchandise Selection:** The buyer is primarily responsible for selecting the merchandise based on the customer demand, company strategy and profit goals. Every product has a NAMAD (net achieved margin after discount) or a target profit margin, the buyer needs to keep this in mind while selecting the merchandise based on the profit goals. They must also partner with the merchandiser to understand the perfect mix required for the store based on the trends. The buyer also needs to decide in what quantities the products needs to be purchased, from what vendors and what time. (Diamond & Pintel 1997, p. 10; Hebrero 2015, p. 36.)

- **Acquiring and Developing Products:** The retail stores, not just acquire the labels from outside but also might sell private labels. This makes it important for the buyer to understand what trends are in demand by their target market to be developed by the private inhouse label. Acquiring products is yet another aspect, the timely delivery of the goods from the selected vendors is of utmost important in fashion industry. The buyer needs to keep in mind the company ethics while selecting the vendors. With the rise of environmental concerns and other ethical buying decisions by the consumers, it is paramount that the buyer selects the vendor very carefully. One wrong decision could lead to negative publicity from the media jeopardizing the brand reputation. (Diamond & Pintel 1997, p. 10; Hebrero 2015, p. 37.)

- **Negotiation:** After selecting the merchandise assortment for the store, another important aspect for the buyer is to negotiate the price with the supplier requiring strong negotiation skills. They are also required to decide the mode of payment, delivery time of the stock and the payment time. (Hebrero 2015, pp. 37-38.) A good buyer needs both skill and tact to be able to negotiate clearly and concisely without being arrogant or forceful. (Jacobsen 2009, p.33).

- **Trend and Sales Forecasting:** To be able to perform the Range Planning efficiently the buyer needs to forecast the upcoming fashion trends and analyse the current and past sales records. The successful analyses of data and the market trends is essential for a buyer. It requires good analytical skills, for trend forecasting buyers generally depend on some external industry trend reports such as WGSN. Although, the buyers are mostly creative people they need to understand numbers to make profitable choices for the company based on the data. (Hebrero 2015, p. 38.)

- **Stock Management:** The buyer is responsible for managing stock, they must keep a track of stock levels in different stores and understand what products are moving better in which locations. They might have to move stock from one location to another to enhance sales and engage customer requirements. (Drapersjobs 2017.)

- **Management:** Management for a buyer refers to managing the product teams, suppliers, merchandisers, cross departments and the senior management of the organization. Communication between all these areas is essential for a smooth working and therefore, the buyer needs to have good communication skills to be able to communicate efficiently to various audiences. (Hebrero 2015 p. 39.)

- **Travelling:** The buyer needs to attend various trade fairs, fashion shows etc. to be able to stay updated with the trends. Also, to understand the product quality and maintain good relations with the suppliers, they also might have to travel and meet the overseas manufacturers. (Jacobsen 2009, pp.33-34.)

  Management of the Sales Force: Apart from managing the above-mentioned sectors, an important role of the buyer is to manage the sales force in certain organizations. Some organization works with a four-function organization plan known as the Mazur plan. Under this plan the buyer is directly responsible for the sales person and the stock people. Although, with the increasing number of Chain organizations, the expansion of the duties has

forced the buyers to only concentrate on the buying and not selling. Nevertheless, the buyer still needs to stay in contact with wither the store manager or the sales person to get consumer demands and information. The Mazure plan for these organizations has shifted and selling responsibilities are given to the store manager. (Diamond & Pintel 1997, pp. 14-15.)

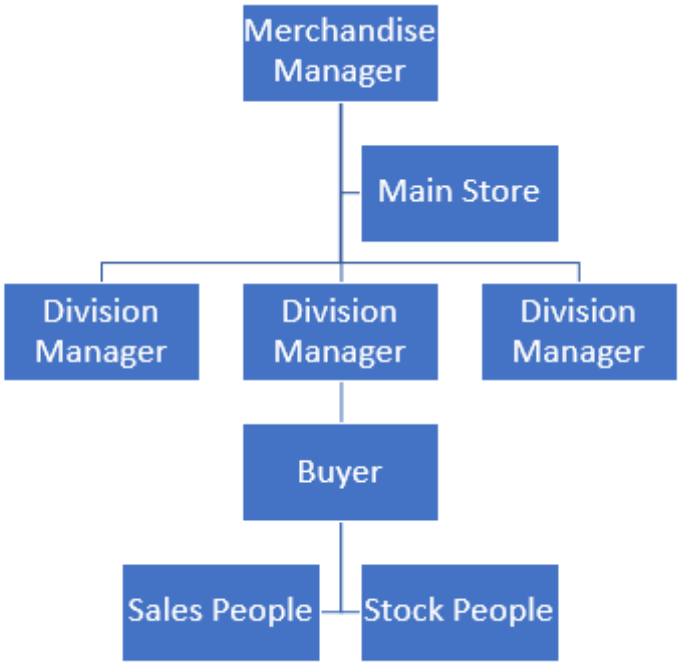

Figure 3: Mazur four-function organization plan (Diamond & Pintel 1997, p. 14)

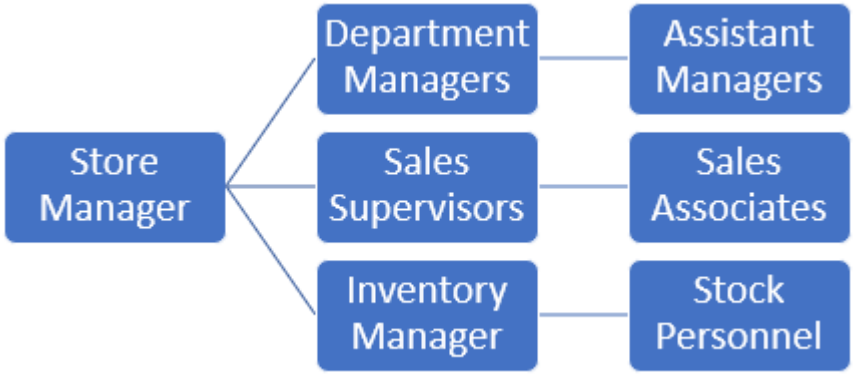

Figure 4: Mazur plan variation for big organizations. (Diamond & Pintel 1997, p.15)

- **Operating with brand's merchandise planning:** Buying includes parameters such as budget, store size, inventory management, past sales records

and customer demands. The buyer must work within these parameters without bias. Every individual has personal choices, but the buyer needs to stay true to the customers and the company planning in order to be successful in their tasks. (Hebrero 2015, p. 39.)

2.4 Retail Marketing: The Key Concepts

Retail industry works in a fragmented environment of needs, changing channels such as social media, hybrid consumption, real-time reviews and discussions, big data among others. Managing the brand image and marketing ROI is becoming very complex with these factors. (Perry & Spillecke 2013.) In the retail industry, the success is largely dependent on the consumer satisfaction. (Clodfelter 2008, p. 5). The understanding of the market and marketing concepts, therefore, are crucial for the industry. The objective of the Retail Marketing as a business process is to increase the sales and profitability of the company. An important concept of marketing in retail industry is Branding, brands not only attract customers but also good employees and potential investors. A strong brand can be sustained by three key elements, art, science and craft. The art is about creating an emotional attachment of the customers with the brand, the science is about understanding and measuring the customer demands and performance, and the craft is about managing the brand. (Perry & Spillecke 2013.) A buyer is an important aspect of maintaining the brand image with the selection of merchandise, customer satisfaction and implementing the concepts of retail marketing.

2.4.1 Key Marketing Concepts used in Retail

- **Consumer Orientation:** Retail sector similar to other industries are becoming more customer oriented. The demands and expectations of the consumers are increasing, and the companies need to make sure that they understand their customers to be able to serve them efficiently. To ensure that the company can satisfy its customers proper planning is required, which is also termed as the Retail Strategy. A Retail Strategy is a set of plans and actions that guides a retailer to achieve the company goals. The strategy developed by the management must include all the factors that would impact customer

satisfaction and company revenue such as store location, merchandise selection, pricing and promotions. (Clodfelter 2008, pp. 5-10.)

- **Branding:** Brand is the direct perception of the company for the customers. The relationship between the consumer behaviour and brand perception has been researched thoroughly, based on these research McKinsey & Company has created its own framework called, the Brand Diamond. This framework helps in mapping the image of the brand and is an important for the buyers to understand the attributes in order to maintain the brand of the company. (Perry & Spillecke 2013, pp.37-38.)

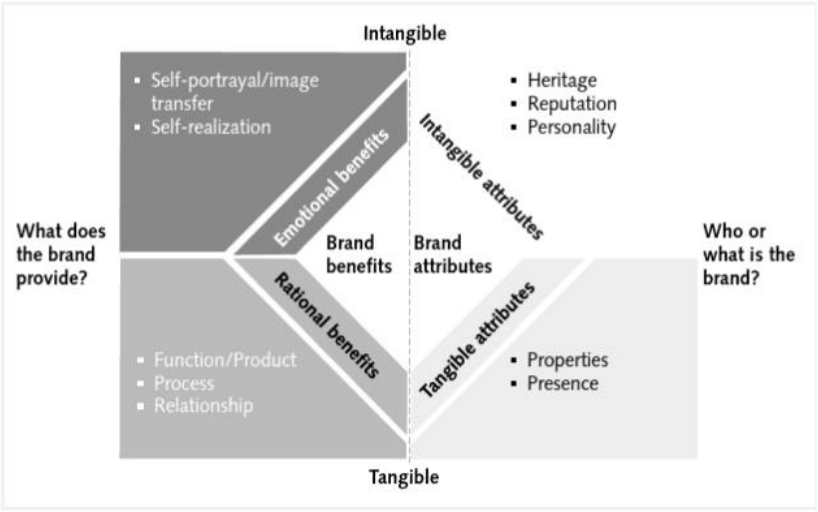

Figure 5: The Brand Diamond framework (Perry & Spillecke 2013, p.38).

- **Retail Store Positioning:** The store image is an important criterion for the customers to buy from that location. The Retail Strategy must include the factors about how the customers perceive the company's brand and stores. The different categories could be innovative, conservative, budget, high priced and exclusive. The brand must understand their target market and how they want to be positioned in the market. For example, Walmart targets the middle class and their strategy is to advertises sales and offer a wide range of merchandise collection. On the other hand, Neiman Marcus position itself for the upper-class customers and it offers exclusive brands at high price. (Clodfelter 2008, pp. 5-10.) Another important aspect of positioning is keeping track of the competitors, it is important to have differentiation and uniqueness in the products

of the brand and showcasing those points of differences in the marketing strategy is also critical. (Hetrick 2014.) Differentiating the atmosphere and surrounding of the store from its competitors also helps a brand to separate itself from its competitors (Turley & Chebot 2002, cited in Koski 2017).

- **Target Market:** Target market refers to a group of people who are aligned to the brand offerings and are willing to buy the products at the marked price from the available stores. In short, they are the potential customers. The target market could vary in shape and size based on the company's strategy. To understand the target market deeply, the market is segmented based on various factors, this is known as the Target Market Segmentation. There are four major factors that defines the target market. (Clodfelter 2008, pp. 5-10.)

- **Demographic Data**: Characteristics of a customer such as age, gender, income, occupation, interests, and choices are known as the demographic data. The customer characteristics impact their buying decision and therefore, this factor helps the brands to create a tailored strategy for their segmentation. For example, a middle-class family with one earning member and three kids would not be the perfect fit for brands offering high-end exclusive products, but it would be fit for brands that offer big discounts for middle class. The retailer must make sure that they have enough market of individuals who fits their strategy. (Clodfelter 2008, pp. 5-10.)

- **Geographic Data:** The consumer location such as the country city, state, zip code, neighbourhood makes the geographic data. As a buyer and a retailer, it needs to be ensured that there are enough potential buyers located in the store's geographic area who would buy your products. For example, dresses meant for urban youth might not be very fit for a smaller village. (Clodfelter 2008, pp. 5-10.)

- **Psychographic Data:** The lifestyle, interests and opinions of a customer form the psychographic data. The buying habits of the consumers are highly biased by their personality. For example, a person who love saving would prefer a brand offering discount quite often. (Clodfelter 2008, pp. 5-10.)

- **Behavioural data:** The customer's buying activity comprises of the behavioural data. Collecting data such as what time of the year customers are purchasing more products, or what locations customers are visiting more frequently, or the average purchases a customer makes gives the retailer, buyer and the merchandiser to plan the products efficiently. (Clodfelter 2008, pp. 5-10.)

- **New Media:** With the rise of internet, social media has become one of the greatest channels of marketing in retail industry especially in Fashion industry. Targeted marketing on sites such as Instagram, Facebook and collecting insights from the online world is the new form of marketing. (Perry & Spillecke 2013.)

2.5 Retail Merchandising

Fashion Retail Merchandising refers to stock planning, management process and control process (Hebrero 2015, p.50). It also refers to the way the items are displayed in the store i.e. the arrangement of the retail store (Dhotre 2010). The merchandising function is almost similar to the buying function in retail. They forecast the customer trends, aim at maximizing the company profits and assist the buyers in narrowing their choices per the company strategy and interests. Merchandisers also ensures that a good merchandising mix including different colors, styles, models, sizes, price range etc. is available in the inventory to satisfy the customer needs. The buyers have a fixed budget to purchase the stock, merchandisers help them in this task and provide the OTB (open-to-buy) additional budget based on the company's performance and goals. (Diamond & Pintel 1997, p.50; Hebrero 2015, pp.51-53; Dhotre 2010, p.136.)

A merchandiser is a person who ensures that the right product reaches at the right time to the right customer in the right quantity at the right price (Makhija 2017). Merchandisers in the modern world are assisted with number of IT tools to help them analyze the past sales and inventory data. In the buying process, the buyer is responsible for forecasting the trend of what is selling where and when. It is a very volatile area and the merchandisers play an important role here

to manage the risks and optimize sales based on the available information. (Hebrero 2015, pp.51-53.)

2.5.1 The Structure of Merchandising

The structure of merchandising varies in different organizations based on the size and needs. The figure below shows a typical organization structure in merchandising (although these structures largely depend on the Organizational Planning):

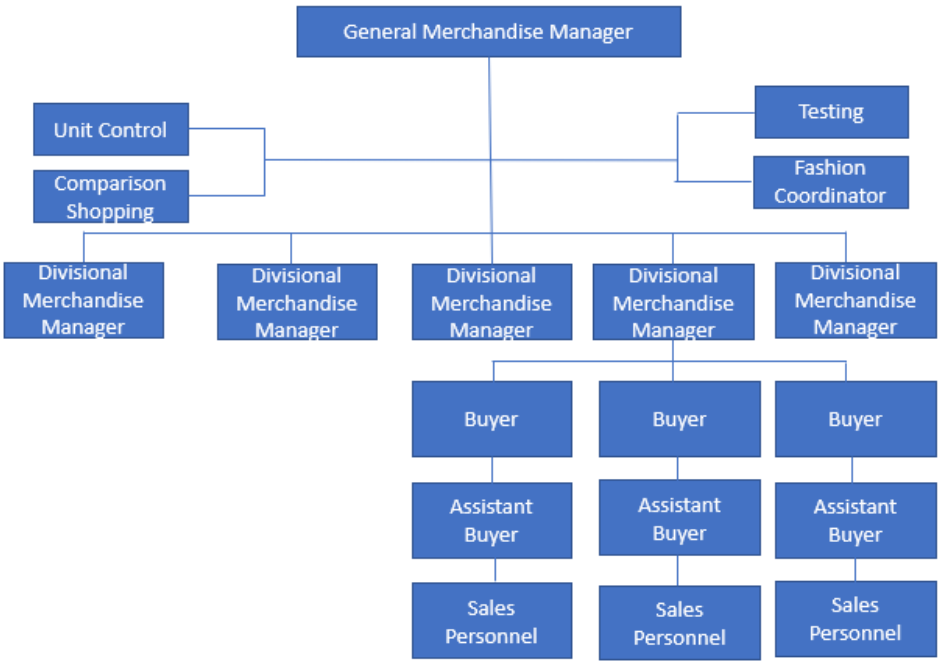

Figure 6: Organization chart of a Merchandising function in the Retail industry (Diamond & Pintel 1997, p. 51)

The above figure explains the role of Merchandising unit and how it incorporates the buying function. The role of a General Merchandiser is a management role, he is a part of policy making within the company and ensures that the policies are followed by his unit. He directly manages the divisional merchandise managers, who are then responsible for assisting and supervising the buyers. In many organizations the buyers are responsible for handling the sales personnel. Although, the positioning of the sales person might differ in various organizations. Many organizations assign the Store Manager role to handle all the sales and stock related activities within the store. (Diamond & Pintel 1997, pp 51-53.)

The Divisional Merchandiser, therefore, is an important role connecting the higher management to the buyers and ensure that the buying is done based on the company strategy and policy.

Modern Structure

Over the years, large organizations have added an additional team for distribution of the products. With the increasing number of stores and wide geographies, it is important to understand the allocation details of products based on size, color and preferences for the specific store. The distributors are given these guidelines by the buyers. The dynamic stock demands are updated by the distributors to the merchandisers and the buyers to assist in additional or repeat buying. This team works very closely with the merchandisers and the buyers. therefore, the inclusion of this role is important within the modern merchandising organizational structure. (Hebrero 2015, pp. 52-53.)

2.5.2 Responsibilities of a Merchandiser

A fashion merchandiser is responsible for all the activities including trend forecasting, product development, sample planning, product specification, merchandise planning, sales and profitability (Khandalkar n.d.). Here are the roles and responsibilities of a Merchandiser within a Retail Organization in detail: (Diamond & Pintel 1997, pp.52-53)

- **Managing the Buyers:** The company makes a strategy for the complete organization and it is the role of the merchandiser to keep all the buyer unified in order to achieve the final goals set by the company.
- **Assist the Buyers:** The requirement for being a merchandiser is having a previous buying experience. This enables the merchandiser to have relevant knowledge about buying and can help the buyers with the problems faced during the buying process. The merchandiser can also assist the buyer in narrowing down their choices based on the company budget and requirements. Sales forecasting and budget planning are another important aspect, where the merchandiser helps the buyer with their expertise.

- **Trend Updates:** The buyers are often involved very deeply in the market and might oversee the worldwide trends. The role of the merchandiser here is to stay updated with the overall trends and update the buyer with the relevant information. For example, if the market seems to show a trend for recession it is not smart to have a huge inventory. The merchandiser is also responsible to show the latest fashion trend presentations to the higher management (Khandalkar n.d.)
- **Managing the Unit Control System:** Another important role of a merchandiser is to provide the buyer with required information and details such as existing inventory, stock units and sales analysis. The merchandiser needs to know the content of the budget and stock reports in order to manage the buying activities of the buyer. It is the important that the buyer does not over buy or go over budget.
- **Quality Control:** The merchandiser is responsible for maintaining the brand image and therefore, it is essential that the quality of the products is maintained based on the company's image and offerings. The merchandiser keeps a check on the quality of the products coming in the stores to ensure that the brand values are met along with customer satisfaction. (Makhija 2017.)
- **Managing Stock demands:** Merchandisers are responsible for managing the orders and the purchased stock by the company. They must forward the received stock for distribution to the stores. They also need to track what stock is coming at what time and what needs to be replenished. Any delays or changes in the schedules are also managed by the merchandisers to keep the customers happy. Timely arrival of the stock to prevent from lost sales is an important responsibility handled by the merchandisers. (Hebrero 2015, pp.57-58.)
- **Marketing:** Although, the marketing department handles the promotions, advertisements and campaigns for the company, the merchandiser is responsible to enable those teams with information and track that all departments are aware of the purchasing budgets and plans. They also provide them with important information about the upcoming stock and planned products that needs to be promoted.

- **Merchandising Plan and Assortment Planning:** Before the season, the merchandiser creates a plan that includes standards for buying, sales promotions, targets etc. He/she is also responsible for creating an assortment plan along with the buyers including a good mix of products based on customer requirements. (Khandalkar n.d.)

2.5.3 Profitability Factor

Generating profits over the purchase stock is one of the most critical roles of Merchandising. 'Buying Profit' can be defined as the difference between the retail selling price and cost of producing a garment. Mathematically, it can be represented as: (Hebrero 2015, pp.113-115.)

Retail Selling Price – Cost Price = Gross Margin

Generally, the retail prices are placed three to four times higher than the cost price to ensure profitability, but the high-risk fashion market is not always profitable as expected. In the retail world, it is not possible to sell everything and managing these left-over stock or inventory adds to the expenses. The marked down products or products on discount could also bring the profit margins of the company. (Hebrero 2015, pp.113-115.)

The merchandisers need to understand how the net profit can be calculated. The operational costs of the company must be deducted from the gross margin to get the net or actual profit. To remain a healthy business, the organization must aim at selling 70 to 80% of their total stock value at the marked price. Therefore, the merchandiser needs to plan the stock in such a way so that the above values can be achieved. (Hebrero 2015, pp.113-115.)

2.5.4 Merchandising in the Digital World

Technology and the development of IT has also impacted the Merchandising business unit. The organizations now have the access of a large amount of data, online retail is a completely different branch which depends on this data solely but also the traditional retail has been revolutionized by Business Intelligence and Big Data. This large amount of data is not always helpful because it causes confusion and requires expertise to analyse it. (Hebrero 2015, pp.62-63.)

The goal of the merchandisers in the digital world is to remove the barriers in the sales channels to ensure that consumers can evaluate, make decisions, pay and receive goods from different modes, anytime and anywhere. This also means that a huge data is collected to make this experience smooth. (Rosen 2017.)

The Merchandisers can also use this data for forecasting consumer trends, analysing sales and customer behaviour etc. This makes this position an important strategic role that is not just limited to merchandising and buying but across the supply chain. (Hebrero 2015, pp.62-63.)

Merchandising unit is now also integrating IT department to analyse and perform predictive and descriptive analysis on the data. With the growing technologies, this business unit will also be enriched with Artificial Intelligence and advanced data analytics if not already.

2.6 Range Planning

After understanding the concept of Retail buying, Merchandising and the role of a buyer and a merchandiser, it is important to now bring together all these aspects within the Range Planning in the Fashion Retail Industry.

Range Planning is the overall concept of planning with an aim of selecting the final range for the online or offline retail store. This range must meet the customer expectations and produce profitable sales for the company. The buyer and the merchandiser together are responsible for Range Planning and coming up with an ultimate range for the upcoming season in the stores. The buyer aims at creating an innovative range showing the brand values and aligning with the customer trends, while the Merchandiser aims at receiving high profit and sales margins via the final Range. The final result must meet the customer demands in a profitable way. (Retail Acumen 2010.)

In the Range Planning, the buyers and the merchandisers need to answer various questions for the successful selection of the range. Based on the company strategy and brand positioning, the buyers need to define the style, design, fabric, details, suppliers and the price of the range. (Juusela n.d.)

A well sorted range includes a wide selection of styles and designs. Some styles are part of a package and some of them are sold as individual pieces. The planning of these individual pieces is considered as Level Planning. The garments that are part of a similar group are placed in one category. For example, all blazer styles are placed under the category of blazers. During the weekly or season analysis, overall category can be analysed as a single feature saving time. (Hebrero 2015, pp.115-117.)

Another way of categorizing the garments is by themes or stories. In each collection the brands generally have around 8 to 10 themes placed strategically by the visual merchandisers to showcase a theme of color, pattern, look etc. During the sales analysis, the themes can be analysed as one entity to see what parts are doing good, and which are the poor performers helping them to plan the next collection better. Line Planning is important to define the sub-categories under the defined categories to analyse the sales pattern. Line-level sales data help the buyers and merchandisers to analyse what sub-category is performing better than others. For example, within the Blazer category, formal and casual blazers are sub-categories. Sub-categories can also be defined based on material, print etc. (Hebrero 2015, pp.115-117.)

While performing Range or Assortment planning, certain factors are generally thought upon such as planning by classification, planning by type, planning by brand, planning by price range, planning by material or fabric, planning by color, planning by styles, planning by range, planning by size, planning by vendor etc. All these factors included ensures that the range has been planned exhaustively and includes all the aspects of customer requirement. (Jacobsen 2009.)

Organizations terms for categorizing their range are different but some commonly used product classification levels are mentioned below: (Hebrero 2015, pp.115-117)

- Line Level: The individual pieces of garments of every color and size.
- Category Level: These are broad categories of similar products. For example, shoes, handbags, skirts.

- Sub-category Level: These are the further narrowed down groups under the Category level. For example, high heels under shoes category, leather wallets under the category wallets.
- Department Level: These are the products grouped as per departments or broad definition. For example: women's wear, kid's wear, accessories.
- Total Business Level: Every product and offering of the organization.

After the categorisation of the product levels, the range is created. Range or Merchandise Planning is a process; every step ensures that the range is being selected efficiently. For a proper Range Planning, a buyer must understand 'What to Buy', 'How Much to Buy' and 'From Where and When to Buy'. These steps are discussed in the coming sections and are used to create a Range plan.

Usually a Range Plan includes the following features: (Juusela n.d.)

Total number of garments to be purchased.

Illustrations and flat drawings of every garment. Flat drawings are the exact technical drawing of the garment that shows all the details, scale and measurement as if the garment was lying flat. (Fashion Illustrations n.d.)

Proportions and mix of various product lines.

Specific garment types, fabric, material, color or style.

Cost Price of each garment

Planned selling price of each garment.

Sizes of each garment.

Manufacturer and Vendor details.

2.6.1 What to Buy

Trend Forecasting

Trends are an important aspect of selecting a range. It is also one of the riskiest aspects of range planning. Timing is essential, planning too early or too late could

give imprecise trend results. The figure 6. below shows the complete timeline of a garment from its inception to the customer's shopping bag.

As summarized in the figure 6., the Spring 2020 collection's color and styles are already forecasted in the Fall of 2018. The other aspects of the garment such as the fabric, prints are showcased to the designers in the famous shows such as Premiere Vision in the early 2019. The designers take their inspiration from these early forecasts and shows. By fall 2019, the designers have converted their inspirations into the sample products ready to be showcased in the fashion shows and fashion weeks. This is the place where the buyers first see the products and decide the selection for their stores. (Juusela n.d.)

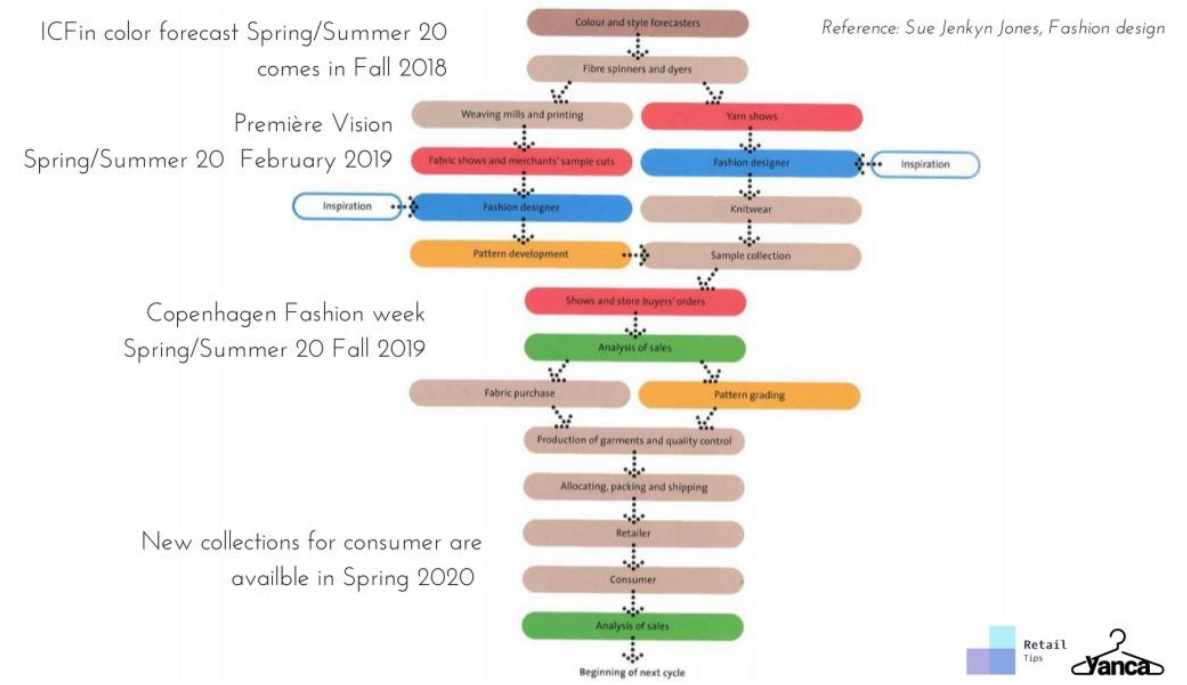

Figure 7: The timeline of a product from inception to consumer's bag. (Jones n.d., cited in Juusela n.d.)

After the buyers have ordered the selection, the products are shipped to the stores on the decided time between both parties and are brought to the retail stores in the fall of 2020. At the end of the season, the sales are analysed for understanding the good and bad performers within the selected range. Also, in the season, shop managers usually do weekly analysis for sales and reports the buyer, by that re-orders are made, and necessary actions done for slow and non-movers (Juusela N.D.)

During this process, when the buyer visits the fashion shows and place their order with the designers or manufactures or via catalogues they need to have a complete picture of, what are they going to buy. They need to understand what styles, patterns, colors are in trend with their target customers and geographies. They also need to know the budget of their purchase, that is determined by analysing the past sales, existing inventory and the company targets. Therefore, trend forecasting is crucial for Range Planning. There are two kinds of trend prediction possibilities, predicting the upcoming future trends and predicting the performance of different products by analysing the past sales.

After the end of the season, the role of the buyers, merchandisers and the overall buying department is to review and analyse the sales data and key trends of the season. They identify the best-sellers that impacted the overall profitability positively, these products can be recycled in the next season. The worst-sellers are also identified and documented not to be purchased in the upcoming seasons. Similarly, all the line levels, categories and sub-categories are analysed and documented to record this information. (Hebrero 2015, pp. 118-119.)

Within the season, it is important to focus that the inventory is controlled for profitability. Improper sales forecasting can lead to overstock or under stock situations. It also spoils the customer experience and the customers could decide to shop from a competitor. Therefore, it is essential to perform a sales forecast. In the fashion industry, the trends change very quickly with new products coming every season without any past sales record, customer preferences changes and many external factors might impact the sales in the next season. (Loureiro et al 2018.)

Moreover, the analysis of sale is not enough to ensure a good range. Product lines that have had a poor sales history might spring back in trend in the coming season, or the best seller of last season could go out of trend overnight and is not sold at all in the coming seasons. (Hebrero 2015, pp. 118-119.) Sales analysis only gives a general idea to the buyers about what could they buy based on the history. For more accuracy, predicting the future trends is very important.

Fashion trends are highly unpredictable, to avoid stock-out situations buyers they order safety stock, but this could also lead to overstock situation. To avoid this inventory fill, fashion retailers adopt various techniques such as accurate response policy (Fisher and Raman 1996, cited in Au et al 2008) and quick response policy (Iyer and Bergen 1997; Au and Chan 2002; Choi et al 2006; Choi and Chow 2007, cited in Au et al 2008). Although, the smart way to improve decisions is by improving the market research and forecasting to reduce the buying errors, reduce inventory cost and increase the profitability (Au et al 2008).

Future trends are of two different types; long-term trends and short-term trends. Short term trends are very volatile and can be based on some popular culture, campaigns (such as #loveislove, #metoo), sports events (such as Olympics, World Cup), science and technology etc. These are the trends emerged due to current happenings across the world and remain for weeks, months or a year. These trends are created by innovators or trend creators in the Trend Model. The long-term goals on the other hand, are the ones to stay for a longer time. These are the result of major changes in the across the world such as changes in the population group (for example, more young people are currently existing in population), political and economic changes, emerging cultures shaping the development of the society (such as hippies, hipsters). These trends are forecasted by the Global Trend forecasting companies such as WGSN (Worth Global Style Network), Peclers Paris, Promostyle, Sacha Pacha. (Hebrero 2015, pp.103-105.)

The Retail companies and the buyers often purchase the services of these trend forecasting companies to analyse the future trends. Again, these trend magazines are full of information and the buyer need to spot the trends for their target customers and market.

The buyers and the retailers also need to be aware of all the major changes happening across the world that could impact the trends. (Juusela n.d.)

Sometimes there are some other factors that could create a sudden change in the sales of some trends or styles. For example, if the winters are longer than expected the sales of winterwear might increase suddenly, the buyers and merchandisers need to adapt and ensure that they have enough stock to prevent loss

of sales. Similarly, certain holiday seasons account for more than half of the annual sales in some countries, this pattern would differ from geographies and culture, but Sales Phasing and its analyses plays an important role in the profitability of a company. While analysing the trends the buyers and merchandisers should ensure Quality Phase planning, this means that they should take in to account the seasonal differences in sales, seasonal sales peak and the standard ratios. For example, in colder countries the sales in winters are much higher than in the summers, in some countries the holiday sale seasons account for 50% of annual sales and based on your sales history brand has analysed that the ratio of selling their top to bottom is 3:1. These data points help the buyers in creating a quality range and increase the profitability of the company. (Hebrero 2015, pp.124-125.)

Using the future trend predictions and the sales analysis, buyers and merchandises get a very close idea of the range to be purchased for the coming season.

Impact of Social Media on Trends

Social media has impacted our society in many ways, yet one of its major contribution has been in fashion and lifestyle. Many Instagram influencers posting their photos and videos online impacts their followers and can create or outdate any trends overnight.

Media, celebrities, influencers, brands and even consumers themselves are contributing to fashion inspirations. This has accelerated the trend; more communications mean faster changes in fashion and the need to adapt even quicker by the retail brands. The brands have too much data to go through and decide what trend needs to be incorporated to their company based on their values and goals. It is important that the brands maintain their identity in this era of data and find what suits best for them. It makes the task of trend forecasting and the execution much complex. (Hebrero 2015, pp.107-109.)

Social media has not only become one of the most used marketing platforms but is also used by the brands for consumer awareness. All the fashion shows, fashion weeks etc. have opinions on the social media and it has now become a fashion runaway itself. Engaging customers on social media brings a huge following to the brands, fashion bloggers are key elements in this era as they act as the

influencers on the social media sites such as Instagram, Twitter, Facebook etc. The brands are engaging the fashion bloggers to promote their products also known as influencer marketing. Social media is now serving as the bridge between the brands and consumers, in between trend setters are influencing the fashion trends. It is important for the retailers to use this data and knowledge smartly if they want to succeed in the digital world. (Ahmad et al 2015.)

Pricing

Pricing is one of the most important aspect of Range Planning. While deciding what to buy, the buyer needs to understand the price line of each category and sub-category of the products. There are two important aspects to analyse to decide the pricing for each merchandise: (Diamond & Pintel 1997, p.128; Juusela n.d.)

- Analysing the cost price: The buyer needs to analyse the overall cost price considering all the aspects of manufacturing. For example, if we want a shirt that has a specific type of fabric, buttons, collar, the total manufacturing cost with all the accessories must be accounted. The pricing of a certain garment needs to be done keeping the profitability in mind, therefore, the cost price must be analysed accurately. After that, the profitability can be accounted and the Marked Price for a product decided.
- Analysing the past sales: The information of sales is very important in Range Planning, not only for analysing style trends but price trends as well. For example, if a high-priced merchandise has been sold quite a lot in past few seasons, it shows that the customers are ready to purchase the products in that price line and the brand can introduce more products there. The data can tell what prices are doing well in what customer groups and locations, this helps the buyer to price the products based on the customers choices. The sales and price history of the products that the buyer has planned to purchase for this season can also help the buyers to price the merchandise accordingly.

2.6.2 How Much to Buy

After the buyer has studied all the available data points and decides what would be the style, design, color, type, price line and the overall style selection for the

Range, the next decision is about the quantitative consideration. The following section 2.6.2, is based on the insights from Diamond & Pintel's (1997) book 'Retail Buying', where they have explained the details of how to plan the quantity of buying.

The buyers list all the product lines they decided to purchase for the coming season collection along with the price line for every garment type. The company provides them the planned sales goal for the next season, and the planned budget that could be spent for purchasing the stock. The purchasing budget is decided mostly by the finance and control teams based on the company's performance, past sales and target goals but the merchandisers are also a part of the decision-making team. Together the tasks of the buyer is now to analyse the previous seasons stock and purchase quantities of the similar categories and calculate how much stock is needed for this season based on all the above data points. This gives the buyer the number of units for each category needs to be purchased.

Along with this, the buyer also needs to work with the merchandisers and visual merchandisers to understand how many units of each product can fit within the selling space available in the store. The visual merchandiser will plan the way the store looks attractable for the customers and the colors, patterns and number or styles must fulfil those requirements. (Jacobsen 2009.)

For Example: The below table shows a classification summary of a women's wear department. The buyer creates a similar report for determining the planned number of stocks for the coming season range based on the previous sales and planned company goals.

Classification	Last Season Sales (EUR)	Planned Sales (EUR)	Last Season Budget (EUR)	Planned Budget (EUR)	Last Season Purchased Stock (Units)	Planned Stock (Units)
Skirts	20 000	25 000	40 000	50 000	1000	1200
Tops	10 000	20 000	30 000	40 000	800	850
Blazers	5 000	10 000	15 000	20 000	500	500
Accessories	7 000	10 000	12 000	15 000	700	800
Total	42 000	65 000	97 000	125 000		

Table 1: The Classification Summary for a Women's wear department (Diamond & Pintel 1997, p.149).

Although, finding out only the category quantities is not enough for the buyer. To make a purchase he/she must also the know the number of sub-categories under each category that needs to be purchased. In case of the above-mentioned example, the buyer will create a similar report for each sub-category under the given categories.

Continuing the example of the women's wear department mentioned above in Table 1. The buyer now mentions the sub-categories under the category Skirts, the buyer now divides it in to different sub-categories such as Mini's- textures, Mini's-plated, At the knee- texture, Below the knee- plated. In this way, the buyer creates a very detailed Range with the exact number of units required for each sub-category within the categories.

Style	Last Season Sales (EUR)	Planned Sales (EUR)	Last Season Budget (EUR)	Planned Budget (EUR)	Last Season Purchased Stock (Units)	Planned Stock (Units)
Mini's- Textured	7 000	10 000	15 000	20 000	350	400
Mini's- Plated	5 000	6 000	9 000	10 000	250	300
Above the knee-textured	4 000	4 500	8 000	10 000	200	250
Below the knee-plated	4 000	4 500	8 000	10 000	200	250
Total	20 000	25 000	40 000	50 000	1000	1200

Table 2: The Sub-Classification Summary of Skirt Category for a Women's wear department (Diamond & Pintel 1997, p.151).

The decision in the sub-category levels are often highly impacted by the trends, last season the mini's might be in the trend but this season the trend forecasts might show an increase in the demand of the below the knee skirts. However, the garment that has done considerably well last season must remain in trend this season as well. These decisions are made only after the buyer has analysed all the sources and decided, 'What to Buy' as described in the previous section.

Price

Next, the buyer needs to further narrow down the plan based on the price line for each sub-category. It is important that the buyer understands how many units of sub-category garment needs to be purchased in order to meet the sales goals. The change in the prices of raw-materials, labour the price might differ from the previous seasons, all these needs to be accounted for when fixing the prices for the season.

Let us see, the refined plan that the buyer creates for each sub-category based on the price line taking the same example of the women's wear department. The buyer created a Sub-classification summary of Skirts and now that plan is refined based on the price lines for one sub-classification for example, Mini's- Textured. In this case, a new price line of 70EUR is introduced for this season due to various factors. Similarly, any previous price lines can also be removed from the plan if the buyer see it fit.

While deciding the price range, the buyer also needs to understand the profit lifecycle of the products. The items sold in the beginning of the season and during the peak time gives the highest profit, later the slow movers are discounted at some rates to still be able to make some profits and at the end of the season the non-movers might have to be sold without any profit margin. This calculation is essential to be done based on the past sales records, to ensure that the sales and profit targets are met based on the pricing, mark downs and number of units. (Jacobsen 2009.)

Price (EUR)	Last Season Sales (EUR)	Planned Sales (EUR)	Last Season Budget (EUR)	Planned Budget (EUR)	Last Season Purchased Stock (Units)	Planned Stock (Units)
30	4 000	5 000	9 000	10 000	200	250
50	3 000	2 000	6 000	5 000	150	100
70	-	3 000	-	5 000	-	150
Total	7 000	10 000	15 000	20 000	350	400

Table 3: Price breakdown- Mini's Textured Skirts (Diamond & Pintel 1997, p.151).

Similarly, the buyer keeps narrowing down the plan further based on size and colors to create a Distribution Summary of each sub-category. These decisions are also based on the availability of the selling space, if the selling space is not enough the buyer might have to decide among all the color options based on the previous records. (Jacobsen 2009.) This summary is then utilized by the buyer as a quick guide of the Range purchase. It also makes it easier for the buyer to understand what to buy from where.

The below table shows the final Distribution Summary of one Price line of the Mini's Textured Skirts.

Style	Price (EUR)	Planned Quantity	Colors	Size XS	Size S	Size M	Size L	Size XL
Mini's-Textured	30	250	Blue	10	20	10	5	5
			Red	10	10	10	10	10
			Beige	12	15	11	6	6
			Black	9	9	10	11	11
			Golden	10	20	10	5	5

Table 4: Distribution Summary of one Sub-Category of Skirts. (Diamond & Pintel 1997, p.154).

Similarly, distribution summary for all the sub-categories are created by the buyer before the final purchase. This is an essential part of Range Planning.

2.6.3 From Where and When to Buy

The selection of resources to source the materials for the store is an important decision. The brands and the labels decided to be used in the store must align to the company strategy, values and ethics. Sourcing from a wrong party could hamper the company's reputation and sales.

In many cases, the 80-20 rule can be applied in selecting the vendors, this means that 80% of the purchasing is done within the 20% of the selected suppliers. The buyers can keep some reserves to try new suppliers from time to time. (Jacobsen 2009.)

The buyer, therefore, needs to analyse from where the merchandise would be sourced, and how many different vendors is required based on the size of the company. The buyer needs to have good personal relationships with the vendors in order to maintain a beneficial business. Nevertheless, the buyer needs to analyse the vendor before selecting them, certain aspects mentioned below can be used to help the buyer in making this decision: (Diamond & Pintel 1997, pp.168-169)

- **Merchandise Selection:** Every retail company has their own market positioning. The buyer needs to ensure that the merchandise fits the brand reputation in terms of price, range, quality and customer preferences. An exclusive store cannot purchase a mid-quality garment for their store, but the same garment can be purchased by a discount store. Therefore, it is essential to analyse the vendor's merchandise selection. Another aspect to be identified is the availability of the stock. The buyer needs to check with the vendor in advance about the availability of required merchandise, only if the vendor ensures that the stock will be available on the decided date should the buyer initiate further discussions.
- **Policy of Distribution:** The buyer needs to ensure that the vendor is not selling similar products to local competitors that could impact the sales of the company. Although, it is not guaranteed as the manufacturer takes the call here, but there are certain possibilities that can be discussed and negotiated before the order is placed. For example, the vendor might agree that upon

buying x units of merchandise he would not sell any more to the local competitors.

- **Shipping and Inventory:** The importance of delivery time in fashion business is paramount. The retailers need to have enough stock at the beginning of the season to make profitable sales. Throughout the season the buyers might also make reorders based on the demands, the vendors must agree to the possibility or reorder and the speed of delivery in this case. Some vendors do not necessarily agree to reorders if the order size is very small. The buyer needs to discuss this in advance with the vendor in order to have a smooth experience.
- **Vendor Relationship:** The manufacturers are one of the sources of information about trends. A good vendor relationship includes the manufacturer giving the buyer hints about what products have been doing good and what has had bad sales record across different locations. Although, the buyer cannot completely rely on the vendor sales person as they could be trying to move the slow items. This information source could be helpful in cross checking the trends analysed by the company. Vendors can also help the company in many ways; some producers willingly advertise the retailers, providing point-of-purchase aids, inventory control and other services. All these aspects are important to create a profitable relationship with the vendor.
- **Price and Profitability:** Resources needs to be analysed also based on the price line offered by them and that of the store. The buyers also need to decide how many resources are needed for each price line and what would be more beneficial for the company in terms of delivery time, quality and price.

After selecting the vendor, it is also important to measure their performances, review the collaboration and make attempts, programs and agreements for better cooperation that could bring more profit for both the parties. Supplier Management is therefore important, the figure 8, explains in brief the steps for a good supplier management. (Jacobsen 2009.)

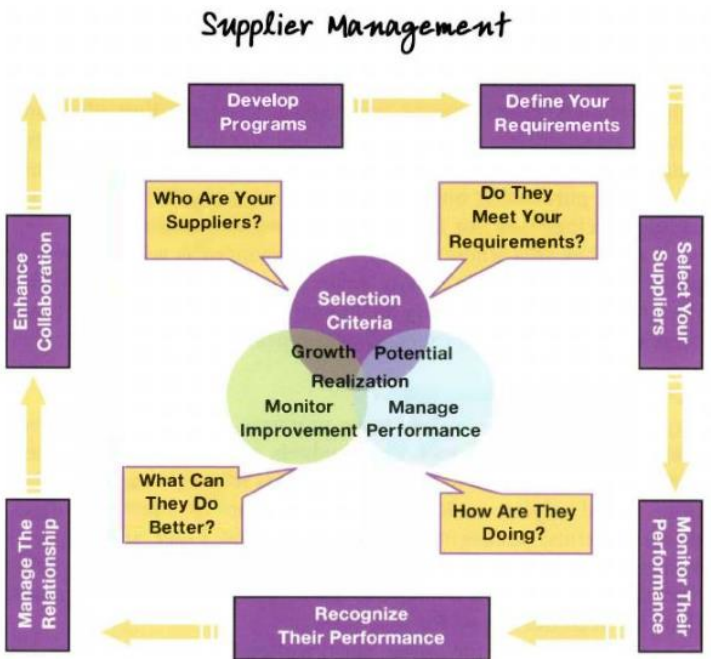

Figure 8: Supplier Management steps (Jacobsen 2009, p. 268)

Time of the Purchase

On the preparation of the overall buying plan including what to buy, how much to buy and from where to buy, the final decision is timing the purchase. Timing is an important aspect as it would determine the final sales in the store. Having lack of stock at the beginning of a holiday season and plenty at the end is not profitable for the company.

Diamond & Pintel (1997) mentions certain factors that needs to be accounted for before timing the purchase such as the market conditions, seasonal influences, vendor's availability and store's strategy. Some high-end retailers, for example Neiman-Marcus have clients who are not price conscious, but want the merchandise as early as possible. These retailers then must order the merchandise much in advance to fulfil the customer demands. Buyers buying from very popular manufacturers need to order early as well in order to guarantee on time delivery. Buyers who are far away from the manufacturing locations must also order the stock well in advance. Certain industries such as women's clothing is highly saturated and are sold very quickly, such product lines must be ordered early enough to ensure availability. Market conditions play an important role as well in the timing of the purchase. For example, if Jeans are in demand and the availability of the

textile is limited the buyers might decide early to time the purchase. Although, in some cases retailers who prefer to purchase Off-price products for the customers who value price more than the fashion can wait for placing the orders, so that they can get a better price at buying the leftovers from the manufacturers.

Timing also depends on the weather factors, having seasonally appropriate products are essential for the stores. It is important for the buyer to understand when to time the order so that it reaches the store while the season is on. (Jacobsen 2009.) Timing is everything, therefore, depending on various factors and buyer experience the best-case scenario can be drawn for every individual case.

2.6.4 Other Terminologies used in Fashion Retail Range Planning

Some important terminologies that are used in Range Planning are Technical Cards and Flat Drawings.

Technical Cards

Also known as garment or product description cards consists of the technical description for the use of production team. These cards can also be used to contain a database of styles that could be used in forecasting trends about what features and styles sold good and what not. The technical cards are very important from a data point of view for the retailers. (Fasanella 2009.)

The figure 8 and 9 shows examples of some technical product cards, these examples are taken from Juusela's (n.d.) teaching material as a reference. Technical descriptions in a product card must include the following details, although these features might differ based on the company: (Fasanella 2009)

- Type of the product such as shirt, skirts.
- Patterns or styles in the product such as ruffled, A-line.
- Fabric, type or patterns such as printed, woven.
- Size
- Manufacturer's details

Manufacturer`s name Contact information							
PRODUCT CARD						**Product**	
						Collection	
						Model	
						Product number	
						Season	
Size **Measurement point**	x	x	x	x	x	**Instructions made by:**	
Bust line Waist line Center back lenght Shoulder + sleeve						**Date**	

Figure:9 Example of a technical product card (Juusela n.d.)

Technical model drawing, measurement tables and tolerances							**Manufacturer's information**	
Drawing or photo of product							**Product**	
							Collection	
							Model	
							Product number	
							Season	
							Instructions made by	
							Date	
							Patterns	
	Measurement point	**tolerance mm**	**X**	**X**	**X**	**X**	**X**	
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
Other quality definitions:								

Figure:10 Example of a detailed technical product card (Juusela n.d.)

Flat Drawings

Flat drawings are also a part of the technical specification of a garment. They are also known as flat sketches or just flat. The flat drawings are simple sketches of your product without any color shading. It can be described as a drawing of an

apparel as if it was lying flat on a table. The flats are used by the pattern creator to create patterns on the actual clothing and therefore, the sketch must include only solid lines showing seams or stitches. The flat drawing is accompanied by the technical card with all the measurements such as body length, waist or shoulder measurements etc. Together, they give an exact idea to the pattern maker about how the apparel must look like. (Row 2016.)

Figure 11: Flat drawing of a jacket showing the stitch type, shape and trims of the apparel (Clothier Design Source 2006)

2.7 Artificial Intelligence: The Technical Aspect

The term Artificial Intelligence (AI) was first coined in 1950s, although the idea was born much earlier in time, now it has been developed to a state where software can perform many of the human tasks. People have different views and definition about AI, one view is that Artificial Intelligence is an extension of human intelligence and Machine Learning is like human learning. (Massis 2018.)

Russel & Norvig (2003), divided the definition of AI into four categories in their book, Artificial Intelligence, a modern approach. They mention that these categories are based on two main dimensions, thought process and behaviour. Two definitions are based on the measurement of a machine against humans, Systems that think like human and systems that act like human.

The exciting new effort to make computers think…machines with minds, in the full and literal sense. (Haugeland 1985, cited in Russel & Norvig 2003).

The study of how to make computers do things at which, at the moment, people are better. (Rich & Knight 1991, cited in Russel & Norvig 2003).

The above two definition shows a human centred approach for explaining what Artificial Intelligence is about. The other two definitions mentioned below, define AI as a measurement against the concept of intelligence or rationality: systems that think rationally and systems that act rationally.

The study of the computations that make it possible to perceive, reason, and act. (Winston 1992, cited in Russel & Norvig 2003).

Computational Intelligence is the study of the design of intelligent agents. (Poole et al 1998, cited in Russel & Norvig 2003).

Similarly, there are a lot of different ways people have defined Artificial Intelligence but from the all above definitions it is evident, AI are intelligent systems, that can learn and perform intelligent tasks.

Using this understanding, we can think that AI can perform tasks that human can perform, sometimes even with better precision and help reduce the workload especially where a large amount of data is prevalent. Therefore, the researcher decided to explore this technology more to see how it can solve the existing challenges in business processes of industries, for this research the fashion retail industry. The research focuses on the human aspect of a buyer in the fashion retail industry and tries to explore how a machine can help them to simplify their tasks and provide more accurate results.

The researcher understands that the field of Artificial Intelligence and machine learning is very wide with increasing advancements every day and therefore, it is impractical to explain each aspect of it in the theory for this research. The theoretical framework in this section has been decided, based on the possible topics that seem relevant to be useful in the applications of fashion retail industry.

In simple technical terms **Artificial Intelligence** is a field of Computer Engineering that focuses on creating systems that can gather data, make decisions or solve problems. For example, a computer is fed with thousands of cat pictures, the computer then determines the similarities and differences of these pictures and learn what a cat picture would look like. Now, when it sees new objects or data it can decide, whether it is a picture of a cat or not, with its own learned intelligence. (Greene 2017.)

Another important terms in understanding AI are **Algorithms and Machine Learning**. Algorithms in simple terms, can be defined as rules, mathematical formulas or programming commands that help the computer to learn and find out things by themselves. The process where AI uses these algorithms to perform any artificial intelligence function is then called, Machine Learning. (Greene 2017.)

How does AI work?

AI needs a lot of data at the first place to be trained. After it is trained, it can perform the specific tasks it has been trained for. These learnings tasks can differ and majorly could be: (VV 2016)

- Recognizing patterns such as telling apart a cat from a table.
- Predictions such as stock values.
- Detecting anomalies such as frauds in artefacts.

These tasks can be performed after the computer has been trained and for training the machines there are various learning techniques that are used.

Supervised Learning: In this form of learning, the output is known and expected. Based on the required output, the machine is given inputs. For example, if the

machine is expected to identify English handwriting, it will be fed with English alphabets and different English handwritings until it can identify any English handwriting. After the system is trained, it can be used for any application that needs to read English handwriting such as signs, cheques. (VV 2016.)

Unsupervised Learning: In this form of learning, only the input is known, and the output is unknown. This form of learning is used to understand the underlying structures or patterns in data to discover new learnings. (Brownlee 2016). For example: in a set of data, the machine itself categorizes the images of sunrise and a car. It cannot label the categorized data as it has not been trained to do so but it given the structure of the data given as the input. (VV 2016.)

Another terminology used often in Machine learning is **Deep Learning.** Deep learning is a sub-set of machine learning (Zendesk 2017). Deep learning is a self-teaching or an autonomous system, where the existing data is used to train the algorithms to find patterns in the data and then predictions can be made on the new data. (Marr 2018.) If a Machine learning algorithm makes a mistake, it would then need an external adjustment by an engineer but in the case of deep learning, the algorithms can determine themselves if the prediction is wrong. (Zendesk 2017.) Deep learning algorithms are like the neural system of a human brain enabling it to perform various cycles to narrow down and improve the predictions. Apple's Face ID is a practical example of deep learning. **Reinforcement learning** is yet another self-teaching and autonomous system, but it learns by trial and error method. It is similar in the way humans learn to ride a bike by falling and learning, similarly the machine learns by doing to achieve the best outcome. (Marr 2018.)

In terms of fashion industry, AI can be used for various functionalities. More of which will be discussed in the empirical part of the thesis. Based on the researchers understanding of different concepts and algorithms that have been used into various applications of fashion industry (refer section 2.8) as well as in other industries that seems apt for this research are discussed here.

Natural Language Processing (NLP)

Natural Language Processing is a field of understanding the language in which humans communicate via text and speech. It is an overlap of Machine learning and linguistics. The analysis of human language by the machine is NLP and can be used where there is a considerable amount of data in terms of text or speech where we want to get insights. Many applications are using NLP for different insight collections such as sentiment analysis, where the general sentiment of the text is analysed for example movie reviews, information retrieval, search etc. For fashion applications, it can be used to analyse the sentiment of text data for certain styles, features, colors. (Mulkar 2016.)

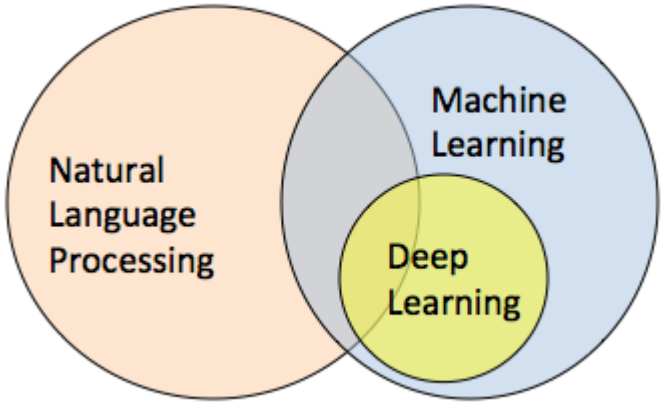

Figure 12: NLP in terms of Machine learning and Deep Learning (Mulkar 2016).

Neural Networks

Artificial Neural Networks (ANN) or Neural Networks are models that are inspired by human brain or the biological neural network. These networks are capable of processing nonlinear relationships simultaneously between the input and the output. (Castrounis 2016.) Neural networks are a set of algorithms within machine learning and can be applied to any ML problem where learning requires a complex mapping between input and output space. (Le 2018.)

Image Recognition and Convolution Neural Networks

Computer vision is a process of understanding any visual data by the computer. In AI, computer vision is used for enabling image recognition. Image Recognition

makes it possible for the machine to interpret the input received by computer vision and categorize it. (Greene 2018.)

Image recognition works by creating a neural network to process the individual pixels of an image input. The network is fed with many pre-labelled similar images that teaches to recognize similar images. (Greene 2018.) Although, identifying complex images with varying attributes such as angles, lighting is difficult to understand by the machine. In the last few years, machine learning has developed to tackle these difficult problems using Convolutional Neural Networks (CNN). CNNs enable high performance on identifying complex visual recognitions similar to humans and sometimes even better than humans. (TensorFlow 2018.)

CNN takes input images, process it and classify them under different categories, this is known as Classification. To train the CNN models, every image passes through a series of convolution layers with filters. The figure 11, shows how an input image passes through various convolutional layers to identify and learn features and then classify the images. (Prabhu 2018.)

Fashion industry is highly rich in image and video data on social media,therefore, image recognition feature of AI would be surely beneficial in applications meant for this industry.

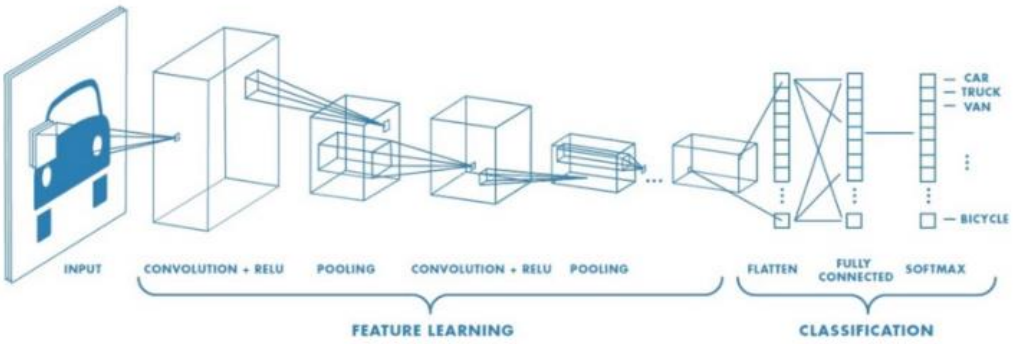

Figure 13: Multiple convolutional layers for image classification in CNN (Prabhu 2018)

Generative Adversarial Networks (GANs)

One of the latest advancements in machine learning in the introduction of unsupervised generative model for creating images. In an adversarial model there are

two networks involved, playing a game of generator (G) and discriminator (D). (Schaal 2017.)

In simple words, we can explain the working of this model as a game between a counterfeiter and a policeman. The counterfeiter is learning how to fake the images of an authentic painting and the policeman is learning to spot the fake images. It is a dynamic system where both the networks are learning simultaneously. The generator network creates new fake images to confuse the policeman and the discriminator network tries to identify the image as real or fake. The discriminator also receives labelled real images and based on that learning predicts the image received from the generator network as real or fake. (Skymind n.d.)

Although, GANs are difficult to train they have many advantage and applications. The possibility of high-quality images could be very beneficial in the fashion industry. They can also generate a high-resolution image using a low-resolution image, it could be beneficial in the effective utilization of past records of low-quality images possessed by the fashion companies. This opens the door to a vast amount of unlabelled image data. (Creswell et al 2017.)

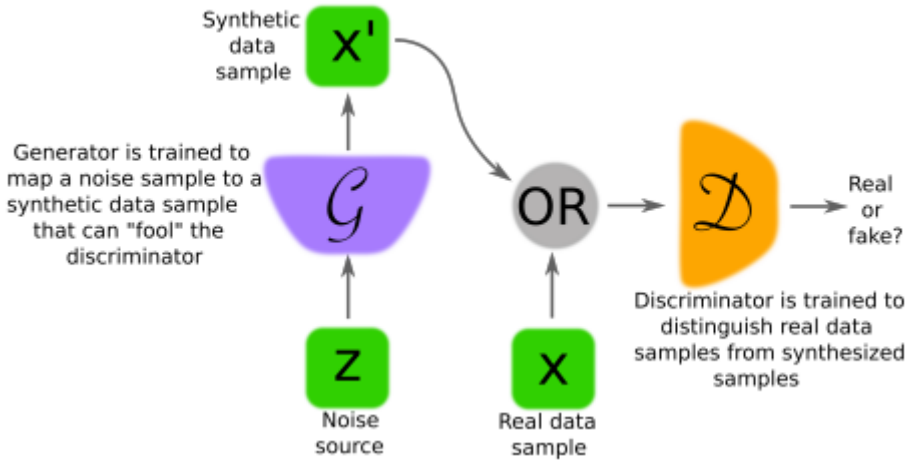

Figure 14: Working of a GAN model (Creswell et al 2017)

Time Series forecasting

Time series forecasting has been used in many scientific fields, however it also has many applications in the real life. Stock market forecasting has been one of the most traditional application of time series forecasting but other applications

such as budget forecasting, inventory forecasting etc. also exists. (Pritzsche 2015.)

Time forecasting is an important field of Machine Learning. It includes an additional dataset for time component, the observations taken are sequential in time. Forecasting using time series means using models that are fit for the historical data, and then use it to predict the future observations. (Brownlee 2016.)

Time series forecasting can be used for applications where future patterns or trends needs to be analysed. In fashion industry, it would be very helpful in predicting future fashion trends.

2.8 Artificial Intelligence in Fashion Retail Industry

Technology has changed the way business was done traditionally, the growing developments in Information Technology has impacted various industries including fashion and retail. For this research, Artificial Intelligence (AI) has been studied among the various latest technologies. Fashion and Retail industries are very data rich industries and therefore, AI and Machine Learning are being explored for possible applications.

With the increase in online applications and internet retail many fashion companies are facing challenges in maintaining the traffic in their physical stores. Different ways are being explored to innovate and create immersive customer experience within the stores. This trend has forced some big names such as Gucci to optimize their supply chains and save time. Speeding up the process is important with the rise of social media introducing trends to the customers. AI is no longer a future, companies are using AI applications to optimize their value chains but based on the current situation, companies are also exploring creative ways for increasing customer interaction and improving efficiency. (McKinsey & Company 2017.)

2.8.1 Future Possibilities of AI in Fashion Industry

Fashion industry has not yet been a leader of utilizing AI, but fashion companies are now are eager to explore the potential of Artificial Intelligence in their creative

fields. Twenty percent of executives taking part in the BusinessofFashion-McKinsey Global survey that AI will be an important trend in the fashion industry in merchandising, marketing and design. The benefits of using AI in fashion industry is considerable, it can improve the speed, flexibility, cost and improvement across the supply chain and increase customer satisfaction with better product availability. The companies are looking forward for innovation in AI for predictive forecasting, merchandising and capacity planning. (McKinsey & Company 2017.)

AI is not just for improving the supply chain but applications to enhance the creative process such as design and product development are also being explored by the companies. Amazon is already working on creating the first AI designer to design clothes. The algorithm will analyse images, popular styles and build completely new designs. Bollywood is not behind in this race; Indian designers Falguni and Shane are using the cognitive tool Watson by IBM to analyse over 600,000 images of Indian couture and fashion runaway shows to predict the future. Stitch Fix is another fashion start-up using AI to go through 30million combinations of attributes to predict which attributes of an apparel customers will prefer. Customer Relationship Management is yet another area, where AI can be used to improve customer insights. In the online world, chatbots and recommendation using data are already engaging the customers, but AI can also help in offline in-store customer experience using sensors and digital mirrors. Demand projection is yet another untapped area where AI could reduce the projection errors by 50% (Bughin et al. 2017). AI has all the potential to disrupt the fashion market and the early adopters would have a competitive edge. (McKinsey & Company 2017.)

2.8.2 AI Use Cases in Fashion Industry

Artificial Intelligence has shown its promising benefits in the last few years. The technology is growing fast, and it is at the verge of outperforming humans at many tasks. The technology is improving every day, GPUs today are 40-80 times faster than the fastest versions in 2013. AI algorithms are now able to analyse unstructured data types such as images and natural language, this has given access to a huge amount of data previously inaccessible. It can formulate patterns from a

large amount of data simultaneously that is humanly impossible to do and therefore, it helps to understand and analyse the current and the future better. Investors are investing a future on AI, an estimated amount of $20-30 billion was invested by various tech giants and $6-9 billion by Private Equity and Venture Capitalists in 2016 on AI. The fore players in these investments are concentrated in US and China. (Bughin et al. 2007; McKinsey & Company 2017.)

Although, fashion industry is far behind other industries such as logistics and financial services, it has seen some success stories as well.

- Amazon: Amazon acquired Kiva in $775 million that reduced the Click to ship cycle time from 60 minutes (manual handling) to 15 minutes. This increased the inventory capacity by 50% and gave Amazon an ROI of around 40%. (Bughin et al. 2017.)
- Topman: Topman work with Granify, an AI company to optimize the men's wear store's e-commerce conversion rates giving the retailers a 3 to 5% uplift conversion. (McKinsey & Company 2017.)
- BrandAlley: BrandAlley, a flash sale site works with marketing automation company Emarsys for email campaigns based on customer persona. This has increased the conversions to 16%. (Arthur 2017.)
- Rue La La: US retail company Rue La La increased their revenue by 10% by collaborating with MIT to explore AI technologies in demand forecasting. They developed a system that predicted demands in their flash sales and accounted for important data set such as brand information, price, color and other factors. (Narayanswamy, cited in McKinsey & Company 2017.)
- Otto: An e-commerce company from Germany, Otto reduced their surplus stock by 20% and return items worth 2millions each year using deep learning. The deep learning algorithm analyze billions of transactions and produces 90% accurate results about what would sell in next 30 days. (Bughin et al. 2017.)
- Myntra: An Indian e-commerce company Myntra's brand Moda Rapido use AI to generate designs including T-shirts, shoes, jeans etc. without any human intervention. The system utilizes data from various sources such as social

media, customer data, fashion houses etc. and creates a variety of design combinations. (Chengappa 2018.)

- Skechers: Skechers works with an AI company Sentient Technologies to create a tailored library of shoes for the customer based on their unique style preferences using recommendation systems. (Arthur 2017.)
- Picalike: Picalike collaborated with Bon Prix to reduce the drop-out-rate on the out of stock items by 43% by creating personalized recommendations based on visual similarities. (McKinsey & Company 2017.)
- Levi: Levi collaborated with Mode.ai to create a virtual stylist chatbot to help them provide a physical store like experience of helping them with the fit and style of jeans to suit them. (Arthur 2017.)
- Dior: Dior announced the launch of its AI beauty assistant chatbot throughFacebook messenger called Dior Insider, helping their customers to determine what type of products they want. (Sennaar 2018.)
- Nike on Demand: Nike partnered with advertising company R/GA to launch the Nike on demand campaign. The campaign used IoT data for an AI assistant service to encourage exercising awareness in Germany. (Sennaar 2018.)
- The North Face: North Face uses IBM Watson's technology for its Fluid Expert Personal Shopper (XPS), an AI assistant to improve the consumer shopping experience by providing an interactive platform. (Sennaar 2018.)
- Many fashion companies are partnering with AI visual search companies to improve customer experience. Some examples are the partnership between Tommy Hilfiger and Slyce, Zalando with Flashwell and Pinterest with Target. (Bughin et al. 2017.)
- Some companies have introduced AI in more than two steps of fashion value chain such as price optimization, trend forecasting, competitor intelligence gathering etc. StyleSage, EDITED and BlueYonder are few such examples. (McKinsey & Company 2017.)

Along with these fashion names, there are technology companies creating innovative solutions for the fashion industry players using Artificial Intelligence. Some examples are given below:

- Syte.ai: Founded in 2015, Syte.ai is a visual search engine that offers an image recognition tool that can be integrated into e-commerce sites to help customers search using images. Customers can upload images and the system will present results based on similar styles and patterns. Many fashion names are using this tool including Boohoo.com, that doubled its revenues in a year after using this tool. Other companies such as Intu, Marks & Spencer and Kohl's are using the services. (Jesus 2018.)
- FindMine: A New York based company founded in 2014, FindMine offers a search engine that uses machine learning to recommend products to the users by composing an outfit based on one single product that the consumer has purchased. John Varvatos and Milly are their existing users. (Jesus 2018.)
- Truefit: It is an online fit recommendation system to help customers to find customized styles and brands to the consumers. (Segura 2018.)
- Finery: It is an automated wardrobe planning platform using predictive analysis to offer customized online wardrobe to women based on all of their past purchases and gathering data from over 10,000 shopping sources. (Segura 2018.)
- Hook: Hook at Intelligence Node is a personal designer. It learns what customers like in the real time by investigating their online Wishlist, likes etc. to show them things they like. (Newgenapps 2018.)

  All these results confirm that AI has a huge potential in the Fashion industry and it is just the beginning. Therefore, a research in this area could lead to interesting innovations and disruptions.

3 Empirical Research

3.1 Research Method

In terms of the thesis, the empirical research is conducted in order to understand the existing challenges in the Fashion Retail Industry and how Artificial Intelligence can be used to solve them. The empirical part of the thesis uses a Qualitative Research Methodology to understand the challenges of the Retail Buyers and brainstorming the solution with the Artificial Intelligence experts.

The researcher wants to study the feelings, experience and ideas through this research and therefore, a Qualitative Research method has been used. The qualitative data would help in understanding the above-mentioned aspects more accurately. (Wisker 2007, cited in Crocamo 2015.) The advantage of using the Qualitative Research method is that if offers the complete analysis of the research topic without involving limitations in the participant responses and the overall scope of the topic. (Collis & Hussey 2003, cited in Langos 2014.) As, this research is based on finding a solution that does not exist, it would benefit from a more subjective and rich data collection. Due to the above reasons, the Qualitative Research Methodology has been selected for this study.

3.2 Research Approach

The research approach used for this study is an inductive one. In the Inductive approach, the researcher keeps an open mind without any presumptions about what will be found during the research process. The aim is to generate a new theory or result using the collected data. (Gabriel 2013).

In this approach, the researcher begins with an observation, which is used to create generalized theories and finally conclusion is drawn from the research. The inductive approach is suitable for smaller samples such as in this research and the context is considering all the while research is active. (Langos 2014).

3.3 Data Collection methods and Tools

For the purpose of this research three different data collection methods were used. To understand the existing challenges in the Fashion Retail industry an online survey and semi-structured interviews were conducted. Based on the data collected, in-depth interview was conducted with Artificial Intelligence experts. Data collection was also done using networking events, industry meetups, conferences and cross-industry brainstorming events.

Interviews and surveys serve different purposes; questionnaires are used to perform a preliminary and large-scale survey and to achieve deep understanding about a topic appropriate interviews are beneficial. (Gillham 2005).

For the purpose of this research, online survey was used in order to gather data from different geographies, achieve preliminary idea and due to constraints, such as busy schedules etc. The semi-structured interviews and in-depth interviews were done to receive more compelling and comprehensive data. The advantage of having face-to-face interviews is that it helps in reducing non-response rates and involves a personal relationship between the interviewer and interviewee (Fisher 2005; Wilson 2003, cited in Langos 2014).

As for the data collection tools, the online survey was prepared in Google Forms. A set of nine questions were prepared, and the answers were collected as short-answer text, single choice selection and long-answer text. For the semi-structured interviews, a set of questions were prepared to assist the researcher during the interview. Although, the questions were not asked in the same order and based on the received answers the questions were added, removed or changed. The semi-structured interviews ranged between 10-20 minutes based on the availability of the interviewee. For the in-depth interviews 1-2hour time was booked to brainstorm the ideas in an interactive manner and was done either face-to-face or on video conferencing tool Skype.

The data collection process was completed in three phases; the first phase included the online survey that received 12 responses from six different countries. The first phase produced some preliminary idea, which was validated using the second phase of semi-structured interviews with nine Fashion Retail industry experts. The analysis of first and second phase data were used in the third phase of in-depth interviews. In this case, the interviewee was first briefed about the analysis of the first two phases, and then brainstorming was done in order to achieve the desired results. As the in-depth interview required the intervention of two industries expertise, brainstorming style of interview was done. The in-depth interview was done with four Artificial Intelligence industry experts.

3.3.1 Online Survey

The main task of the online survey was to gather information about the current situation and challenges faced by the Fashion Retail buyers. The list of questions was created based on the research questions of this study and possible future

business opportunity. (see Appendix 1 for the complete online survey interview questions).

The online survey was created on the Google Forms and placed on various Social media channels such as Facebook, LinkedIn and Emails. It was conducted between October 2018 – December 2018.As the target group was specified as Fashion Retail experts, the channels were selected in order to have a wider reach. Specific groups related to Fashion Retail Business Industry were chosen to place the online survey. The survey was sent to 25 fashion retail professionals via different channels and was also placed on the open Facebook and LinkedIn groups, out of which 12 respondents replied. Although, it was challenging to find the relevant respondents for the survey having expertise in the fashion retail buying, the survey received responses from a very diverse group of individuals belonging to six different countries, different roles under fashion industry and working in small, medium and large fashion retail companies. The below diagrams and tables show the diversity of the online survey results in terms of geography, company size and job roles.

Countries Participated: India, Finland, Spain, United Kingdom, Nepal and Russia.

Job Roles Participated under Fashion Retail industry: Retail Buyer, Retail Planner, Retail Shop Owner, Retail Store Manager, Head of Visual Merchandising, Sales representative and Finance Controller

Company Size participated: Micro, Small, Medium and Large.

Figure 15: Summary of countries participating in the online survey

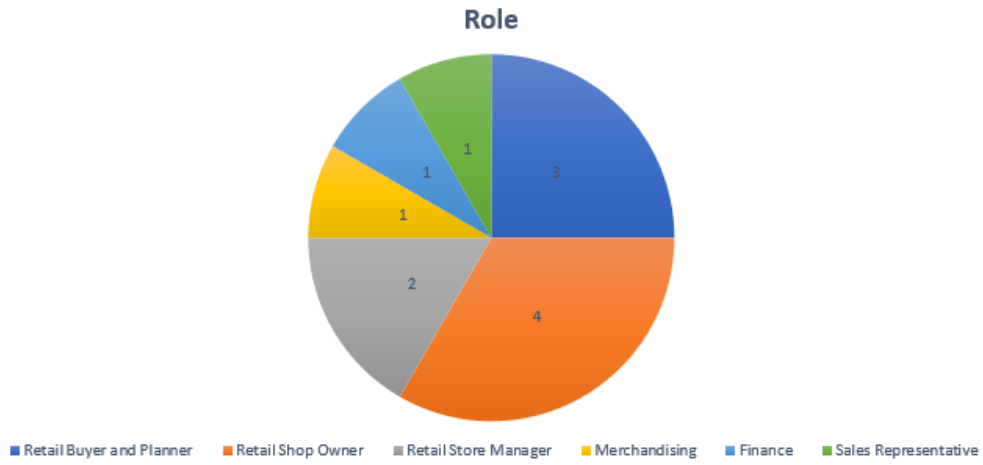

Figure 16: The different roles participating in the online survey

Company Type	**Annual Sales Revenue (in EUR)**	**Number of Response**
Micro	2500 to 18 000	3
Small	180 000 to 400 000	2
Medium	2 500 000 to 16 000 000	4

Large	140 000 000 to 12 000 000 000	2

Table 5: Number of responses based on company size.

3.3.2 Semi-structured interviews

Semi-structured interviews were conducted after or simultaneously with the online survey. It was conducted in November 2018. The aim of this interview was to validate the data collected from the online survey, and to collect more comprehensive data about the challenges faced by the retail professionals in Retail buying process. A structure of the interview was created although, the interviews were altered as per requirement. (see the structure of the semi-structured interview in Appendix 2).

The semi-structured interview was chosen as it provides a flexible conversation between the interviewer and the interviewee. It is one of the most appropriate method to research about explorative studies and allows focussing on the experience of the respondent. (Krishnaswami & Satyaprasad 2010, pp.104-105, cited in Abramova 2018.)

In total nine interviews were conducted either face-to-face or over phone. As the researcher is based in Finland, most of the face-to-face interviews were possible to be conducted within the Finnish market. The details of the interviewees have been kept confidential as per mutual agreement before the interviews were conducted, but the general details are mentioned in the table below.

Company Name (Not for publication)	**Company Size based on Revenue (in EUR)**	**Role**	**Country**
Fashion Retail Store #1	100 000	Retail Store Owner	India

Fashion Retail Store #2	119 000	Sales Agent	Finland
Fashion Retail Store #3	200 000	Retail Store Owner	Finland
Fashion Retail Store #4	276 000	Retail Store Owner	Finland
Fashion Retail Store #5	753 000	Sales Repre-sentative	Finland
Fashion Retail Store #6	800 000	Retail Buyer	Finland
Fashion Retail Store #7	983 000	Retail Buyer	Finland
Fashion Retail Store #8	3 200 000	Retail Buyer	Finland
Fashion Retail Store #9	10 900 000	Retail Buyer	Finland

Table 6: Details of the semi-structured interview response

3.3.3 In-depth Interviews

The last phase of collecting data was using in-depth interviews with the Artificial Intelligence experts. This kind of interview format generally consist of a one- to-one discussion, where the interviewer encourages the respondent to discuss the topic freely, the interviewer controls the direction of the interview and is attentive in receiving the information. (Collins n.d.)

Interviews are more flexible in nature and includes everything from asking questions to listening in a real-life setting. This enables the researcher to produce in-

depth research about a topic. (Gillham 2005.) In terms of this research, the in-depth interview was selected as a data collection method as the researcher wanted the respondent to ideate without limitations and produce as many opinions about the topic as possible. The researcher was keen on probing and making sure that the respondent remained on track with the topic. The researcher had four years of experience as an IT professional, which was enough to understand the concepts explained by the AI experts, but as it was not her expertise, she wanted to have the opportunity of clarifications and justifications of the suggested solutions. The interviews were kept in notes as the taping option was not possible for confidentiality reasons. This was possible in a direct face-to-face and deeper discussion; therefore, the in-depth interview method was selected for the last phase of data collection.

Overall, four AI experts from India and Finland were interviewed. The details of the interviewees are shared below.

Company	**Role**
Valuemotive Oy	Analytics Expert
VXT Research	CEO and co-founder
Zen Technologies	Research Engineer ML and Computer Vision
Infosys	Deep Learning Expert

Table 7: Details of the In-Depth interview respondents.

3.4 Data Sampling and Data Analysis

Research Sampling is a process of selecting a sample to study the research. A sample is a group of people selected out of a larger population for the purpose of measurements. The selected sample must be representing the complete population to ensure the findings could be generalized. (Bineham 2006.) In this research, the Purposive Sampling method has been used to select the sample for

studying the research. This sampling technique is used to select the sample based on their knowledge, relationships and expertise in regard with the research topic. (Freedman et al. 2007, cited in Langos 2014.) In this research, the sample was selected based on their knowledge and expertise in Fashion Retail industry and Artificial Intelligence.

Data analysis is an important step in the qualitative research to conclude the research findings. The collected data is organized and analysed during the research process, in order to conclude the findings based on the theme of the research. This process is known as Data Analysis. (EvaSys n.d.)

For this research, the Content analysis method was used for analysing the qualitative data. In this research, we had to analyse two different sets of data, one to analyse the challenges in the Fashion Retail buying process and the second to create a solution using Artificial Intelligence. As or both the cases, the data was in an unstructured text format, the same coding concept was used.

The advantage of using Content Analysis is that it helps in simplifying the collected data into themes and sub-themes and at the same time producing results. It helps the researcher to structure the data in a way that satisfies the accomplishment of the Research Objectives and answer the Research Questions. (Langos 2014.)

To analyse the data in this research, the collected data was first transcript in to text format using Microsoft Word and Excel tool. The data was then analysed to produce repeating ideas, these repeating ideas were grouped in to themes. The themes were then analysed and grouped into abstract concepts and a theoretical narrative created to answer the research questions. (Auerbach & Silverstein 2003.)

3.5 Research Findings

This section presents the findings of the empirical research. As the data was collected in three different formats, the findings will be explained separately and then converged together to give the desired answer to the Research Questions.

3.5.1 Online Survey findings

As mentioned in the section 3.3.1, the online survey received 12 responses. These responses were broken down in to different themes and based on the themes the findings were concluded. The objective was to get as close as possible answer to the context of the research questions. The survey aimed at understanding the challenges faced by the Fashion Retail professionals in the Buying process.

Out of nine questions asked in the survey, the first three questions were asked to understand the demographics of the respondents. This was important to understand if the challenges mentioned by the respondents are dependent on the demographics or not. The demographic response has been explained in detail in the section 3.3.1.

Question Four Findings: The next question was a paragraph style question that would give the closest context to our research question, i.e. to understand the challenges in the retail buying process. For this question, the received answers were grouped in to three themes.

- Forecasting: Out of 12 answers 4 responses mentioned that they had challenges in forecasting the demand, future trends and to rely on the forecasted future trends and past sales analysis. Better facts are required to make better decisions.
- Stock Purchase: Five respondents mentioned that they have challenges in understanding how much stock needs to be ordered. They were unsure about how to buy the right stock based on the trends and therefore, overstock was a major issue. In some cases, understock has also been an issue for them, since the right number of pieces for each model type and size is difficult to analyse.
- Pricing: 3 out of 12 respondents mentioned that they had challenges in pricing the apparels. The customers are constantly looking for discounts and providing the good quality material in the desired price range of the customer was a challenge. Maintaining the revenue and cash flow for the store has also been difficult.

From the literature review of the Retail Buying process, mentioned in section 2.3, we know that all the above themes, forecasting trends, stock purchase and pricing are critical aspects of Retail Buying. Therefore, we can say based on the theoretical framework, the answers are relevant and give a preliminary idea of the challenges faced by the retail professionals.

To understand these challenges in more detail, we analyse the next questions in the questionnaire.

Question Five findings: Another important aspect of buying the right stock for the store is to understand the target customer. The next question dealt with understanding, how the respondents think they know their customers on a scale of 1 to 5, 1 means that there is no understanding of the customer segment and 5 means the customer segments are defined very precisely. The following results were recorded for this question:

Figure 17: Target Customer Definition Rating

As seen from the diagram, five out of twelve respondents rated their target customer understanding as 3. Three respondents rated themselves as 4 and four respondents rated themselves as a 5. One of the most important aspects of successful buying is understanding your customers very well, as per this survey only 4 out of 12 respondents i.e. only 33.3% of the participants are confident that they understand their customers precisely well. Improper customer targeting could lead to challenges in defining the Range to purchase. Although, respondents who

have rated themselves as 5 also face challenges after precise customer definitions.

Question Six findings: The next question tells us about how the buying process is happening in the company where the respondents work. The number of times the stock is purchased in a year reveals about the challenges that could be faced during the buying. In the figure below, we can see that the respondents have two totally different approaches, 41.6 % of the respondents purchase their stock either 4 times in a year i.e. all four seasons separately Spring, Summer, Autumn and Winter or just two times in a year that is Spring/Summer and Autumn/Winter collections. Another 36% of the respondents purchase their stock monthly. The rest of 18% respondent purchase the stock based on the customer demands.

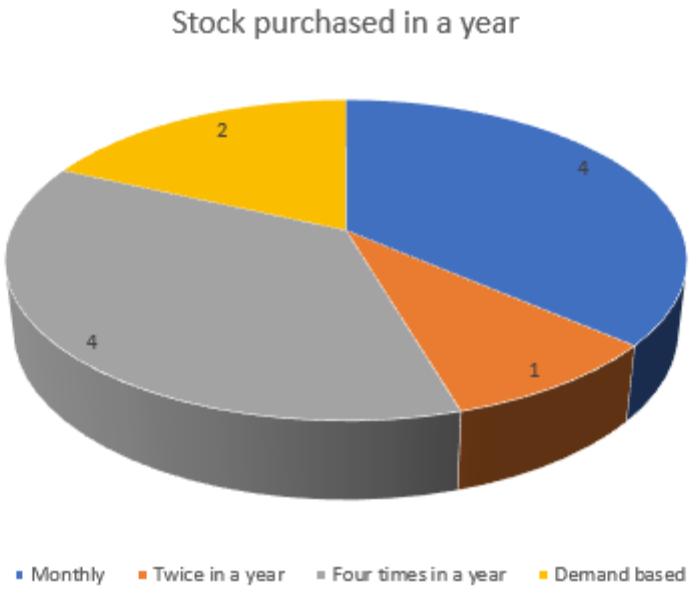

Figure 18: Number of times stock purchased in a year by the respondents in their company.

These numbers show a pattern related to the geography and the company size, all the 36% respondents who purchase their stock every month are from India and are either micro or small size companies. This explains the fact why the buying is done monthly; the companies might not have the budget and inventory space to accommodate large stocks purchased in bulk. They also share the common challenge of buying the right collection based on the future and past trends. The researcher has a previous understanding of this market and mentions that

most of these companies forecast trends based on intuition and the insight of the producers or distributors. This explains why trend forecasting is seen as a challenge by this group of respondents.

The similar trend can be seen in the other 41.6% respondents buying the stock four times or just two times a year. Most of these companies are either large or medium sized. They might have the budget as well as the inventory space to accommodate bulk purchase of the collections.

Reponses to this question reveals the difference in the buying process of the small sized companies versus the medium/large companies.

Question Seven findings: The next question investigates the challenges of Buying, in this case Trend Forecasting. The question aimed at understanding if the respondents are using any trend forecasting method already in their work or not. As we understood from the findings of Question four, Forecasting is one of the themes in the buying process where respondents have challenges, this question will reveal the shortcomings of the trend forecasting done currently in the companies.

For this question again, the answers were grouped into three themes:

Predicting Trends: Only 3 out of 12 respondents mentioned that apart from previous sales analysis, their company predicts the upcoming trends using different sources. These sources are the available trend analysis agencies such as WGSN, runaway shows, consumer data, fashion houses trend magazines, tracing brands, designers and competitors.

Sales Analysis: Most of the companies, 6 out of 12 depend only on the previous year's sales data. The companies might be using certain software or just manually analysing the sales and conversion rates to purchase the stock for the upcoming season.

No Trend Forecasting: 2 out 12 companies mentioned that they do not use any trend forecasting methods, they get the information from their agents or producers and purchase the stock based on intuition and own market knowledge.

These results reveal a pattern, only 25% of the companies that are large or medium sized predict future trends along with the previous year sales analysis. Rest 75% of the companies rely only on the past data or do not use any forecasting methods before purchasing the season stock. As per the literature review on Range Planning section 2.6, Trend forecasting is an important step to buy the right products for the store. This includes both past sales analysis and future trend predictions, response to this question reveals that 75% of the respondents are not doing the trend forecasting as it should be done.

Question Eight findings: As forecasting trends properly are important, so is budgeting the purchase. The next question aims at understanding how the companies manage and plan their purchase.

The findings of this questions suggest that 58% of the respondents use statistic or software tools to plan their purchase budget by planning sales target and goals. The rest 42% respondents were still doing the budgeting and planning manually and based on the market demands. Again, the companies using manual methods were the micro or small size companies, and they stick to market demands and insights to plan their purchases.

The last question was a general question about the specific product line the companies operate in within the Fashion Retail Industry. The respondents belonged to almost every product line type in the Fashion retail industry including Women's Wear, Men's Wear, Footwear, Beauty and Accessories, General Clothing and merchandise, fragrances, cosmetics and luxury business.

Overall Online Survey Finding Results: Combining the results and findings of all the questions, the following results can be concluded from this survey:

The target of this survey was to understand the challenges faced by the Retail Professionals in the Buying process. Based on the responses, the challenges can be grouped in to two categories (also explained in section 2.6.1 and 2.6.2), what to buy and how much to buy. Under 'What to Buy' category, the participants faced challenge in forecasting trends and pricing the merchandise per customer re-

quirements. Under the category, ‘How Much to Buy’ the respondents faced challenge in deciding, how much entities of a product type and size should be ordered to avoid over and under stock situation.

Apart from the challenges, the survey also highlighted certain existing processes used by the respondents that might be a factor of the challenges faced by them.

The challenges faced in trend forecasting could be since only 25% of the respondents are doing it right. Rest, 75% of the participants are not predicting future trends in the world of fashion where trends change rapidly, and only past analysis might not be enough.

A difference in the buying process was also evident between micro/small and medium /large sized companies. The small sized companies are purchasing the stock every month without using any trend forecasting measures or automated sales analysis, this could be the cause of the trend forecasting and stock issues faced by them. On the other hand, the large companies are purchasing the stock twice or four times in a year leaving a gap for fashion trends to evolve, with the lack of proper trend forecasting methods the stock they purchase might not fit the customer requirements leading to overstock situations.

The pricing issues faced by the respondents could be because only 33.3% of the participants are confident about defining their target customers. Without knowing the customers and their requirements very precisely, deciding the prices or discounts could be tricky and might lead to customer dissatisfaction.

3.5.2 Semi-structured interview findings

As mentioned in the section 3.3.2, a total of nine retail professionals were interviewed in this phase. These professionals were either working in companies or were shop owners, therefore, the results are a mix of small and large companies.

The online survey done prior to the semi-structured interviews gave some preliminary idea on the challenges faced by the Retail professional in the buying process of the fashion industry. These interviews were performed in order to validate the findings done in section 3.5.1 and to get a deeper understanding on the reasons behind the challenges. The details of the respondents are mentioned in the

section 3.3.2. The interviews were performed based on the company size, style and available time-limit; therefore, the structure might not be the same for each interview.

The main questions asked from each participant were the challenges they face in the successful buying for their fashion retail stores. Some other questions were also asked such as trend forecasting methods, buying time of the stock etc. to probe the respondent to provide the necessary information and to guide the interview to the right direction.

The data collected under the major challenges faced by the sample fashion retail professionals were grouped in to five different categories. Three categories remained the same as found in the online survey, in addition, two more challenges were identified by the interviews. The five categories are mentioned below.

Trend Forecasting: Most of the challenges faced by the respondents belonged to this category of forecasting trends.

The Retail buyer of Fashion Retail Store #8 mentioned that they were facing troubles deciding sizes of different merchandises in their different stores. Every store had some sizes in more demand, and it was getting difficult to understand the pattern causing them to lose sales. On asking how they perform the trend forecast, she mentions that they analyse the past sales, track the trending items and the buyer is mostly on the floor interacting with customers to gain insights. Even then, the buyer cannot be at every store and cannot decide the customer requirements for 16 different locations. They order the stock 8-10months in advance and therefore, it is essential to forecast the trends to avoid issues such as improper size and styles for different locations. She was also interested in getting some external help to be able to perform her trend forecasting more efficiently. This response was important as it revealed a need in the market for getting help on trend forecasting.

The sales agent from Fashion Retail Store #2 mentioned that the short-term changes such as weather are creating difficulty in analysing the trends. For example, this year the summer was very long, and the stores did not have enough stock for the season.

The shop owner of Women's Traditional wear in India was facing challenges in keeping track of the trends. He mentioned, the trends are changing rapidly, there are many influencers on social media, television and other factors. It becomes very difficult to understand, which trend to follow and need to depend on the insights given by the producers and self-analysis of the market.

The sales representative of Fashion Retail Store #5 was worried about the slow movement of certain items over others. She also mentioned that they lost sales due to the unavailability of a specific merchandise which was very popular last season and was high in demand in the current season as well, but the buyers did not decide to purchase that product for the store causing them loss of sales.

The best seller buyer from Fashion Retail Store #6 gave her expert advise on how trends are difficult to analyse for the bigger brands as well. She mentioned that generally brands keep a good track of trends, but their collection might not be exhaustive enough to include different styles. This creates a challenge for buyers in selecting a perfect mix and match of various popular trends to showcase themes during the seasons.

All these responses show the area of forecasting trends and deciding 'What to Buy' is one of the most challenging aspect for the Retail buyers and professionals.

However, there were positive responses as well on this topic. The owner of the Fashion Retail Store #9 chain does the buying for all her 16 stores. She takes into consideration all the insights from the sales staff and store managers, and she also interacts with her customers and tracks the major happenings across the world impacting trends for example, the royal wedding. As the owner of the chain, she also influences the designers with her ideas inspired by the customers. The stock is ordered six months in advance but with good trend forecasting strategies it is possible to achieve satisfactory results. This creates a strong customer loyalty and is among one of the examples of good trend forecasting based on past sales as well as future predictions keeping customer at the centre.

The next category of challenges recorded by the respondents were the Market conditions.

Market Conditions: Market conditions play an important role in the success of any industry, this category was not discovered in the online survey but is one of the major challenges faced by the Fashion industry.

The shop owner of Fashion Retail Store #3, a kid store in the Kamppi mall explained her difficulties in running the business in Finland due to difficult market situations. As per her, Nordic market was not very fashion conscious in comparison to other Southern European countries. The extreme weather played an important role making it difficult to sell variety of stock. Another aspect was the competition faced by online fashion giants such as Zalando. She mentioned, that customers demand for styles and price are impacted by the online styles and availability, which is hard to compete. On asking about her trend forecasting methods, she mentions that it is mostly based on the past sales analysis, her discussion with the customers and her self-intuition that comes with a long experience working in her store.

The above example again shows that unplanned trend forecasting, market research about competitors, weather forecast and customer segmentation impact the performance of the brand. External market conditions do impact the growth to certain extent, but internal processes need to be strong in order to succeed.

The sales agent from Fashion Retail Store #2 also presents the aspect of market conditions in the changing customer behaviour. She mentions that the changing socio-economic conditions of the country and increasing percentage of unemployment the purchasing pattern is changing. Earlier, it was easy to say if weekends sales were higher than weekday sales, but now this difference is decreasing and recognising the purchasing pattern is becoming more complex.

Surely, difficult market conditions in certain geographies, economies or regions might impact the buying for the stores. With uncertain patterns, fear of economy and changing customer behaviour are important factors to remember while purchasing the stock. It was a different opinion which surfaced during the discussions along with the planned structure and helped in gaining a different perception on this topic.

Stock Issues: The next category of challenges discovered during the interviews was Stock issues. A similar theme was also seen in the finding of the online survey and therefore, it consolidates the claim that stock issue is a major challenge for the retail professionals.

The buyer for Fashion Retail Store #7 mentioned that they are recovering from an overstock of products worth 1 million euros. It has been a learning process and they are slowly impoving. He mentioned that they purchase stock only twice a year and forecast trends based on the past sales and self-intuition. He also mentioned that he is himself a skateboarder and therefore understand the trends in the field.

The above response again solidifies the idea that without a proper forecasting method and relying only on the past sales and self-intuition for purchasing might not fulfil customer requirements leading to overstock problems.

The buyer of Fashion Retail Store #6 mentioned that the stock issues occur mostly due to the poor control of the existing in season stock. The slow movers or the products, which are less preferred by the customers, are very difficult to sell and might result in overstock situations.

The shop owner of Fashion Retail Store #4 also agrees that buying the right stock at the right time is very crucial. It is difficult to understand what the right time is for ordering the stock, and what is good for the store that could lead to understock or overstock conditions if not decided properly.

Vendors: The role of vendors is important for the buying process and during the interviews this aspect was also seen as one of the challenges by some retail professionals.

The buyer of Fashion Retail Store #6 mentions that vendors play an important role is purchasing the right range for the store. The old suppliers may not be good anymore, they might not have the right products or good quality required by the retail brands. The brands supplying products to the retail stores might not have a good collection for the season, or they might lack some key items in demand which impacts the overall range. It is also possible that brand does not have the

collection apt for the target customer. In these situations, the buyer needs to look for other brands and decide what would be the best way to create a good range for the store.

The owner of Fashion Retail Store #3 tells that they must order the stock one year in advance because the vendors are not ready to take reorder for small orders. This makes it challenging to anticipate and forecast what trends would be in one year from now, it also makes it difficult if a wrong purchase is done because no reorders are possible even if certain trends are recognised later. Ordering one year in advance is also difficult in terms of the quantity to be purchased, some seasons are better than others, currently she is managing based on her experience but agrees that it is a challenging situation to be in.

Pricing: The last identified category for the challenges is Pricing. The same category was also seen in the findings of the online survey results. Profitability being one of the major goals for any business, undoubtedly pricing becomes an important aspect.

The sales representative of Fashion Retail Store #5 expresses her concerns that the store sells the merchandises designed mostly for the youth styles but being an environment friendly brand, the prices of these products are very high for this target group. She says that the price range suits 35 or 40+ female audience, while the apparel are designed keeping in mind the females between 20-25 years. The difficulty is that the manufacturing price of the products is high and reducing prices is not profitable for the company. However, some product lines such as dresses are performing better than T-shirts and jackets brining some relief to the brand.

The owner of Fashion Retail Store #4 also mentions that keeping a steady cash flow is difficult for her store. The right time to purchase the stock is crucial in keeping the money coming in. As we discussed in the topic of Range planning in section 2.6, it is essential to have enough stock at the beginning of the season to reduce the loss of sales. Too much dependency on reorders might lead to loss of sales and reduce customer experience.

Summary of the Semi-structured interview findings

The semi-structured interview helped validate the findings from the online survey and produced new findings in the topic. The combined goal of the online survey and the semi-structured interviews was to answer the main research question about finding the major challenges faced by the retail buyers in Fashion retail buying. This goal has been achieved as the findings reveal 5 major challenges faced by the retail buyers in the buying process. It also highlights one of the most common challenges out of the five revealed in the research.

Based on the findings:

The most common challenge faced by the Retail professionals in the Buying process is Trend forecasting. The decision 'What to Buy', is the most difficult one. The buyer finds it difficult to analyse and purchase the right size, style for different store locations per customer requirements. Short term changes such as weather conditions and rapidly changing trends on social media make it even more confusing to decide the right choices for purchase. Overall, creating the perfect mix and match range of popular trends that fulfils the customer demands is easy to plan but very difficult to execute.

Other challenges faced by the retail buyers are Overstock issues, vendor selection, pricing and market conditions. Unplanned trend forecasting, poor sales analysis and too much dependency on self-intuition rather than data are some of the reasons of ordering too much or ordering the wrong products not wanted by the customers. Overstock is a liability and reduces the profitability of the company.

Vendor selection is important, but it becomes a challenge when the available supplier does not meet the requirements of the season, forcing the buyer to find other brands and suppliers to fulfil the desired range. Ensuring proper quality and timeliness of the delivery are important aspects that come along with the vendor selection. Selecting a supplier who does not take mid-season reorder might impact the flexibility as well as profitability of the company.

Pricing the merchandise is important to maintain the cash flow and to create profits for the company. Pricing the products too high or too low with respect to the target audience reduces the sales. It is important to study the customer demographics properly before pricing the products. Market conditions also create

difficulty in the buying process; poor socio-economic conditions of a region, increasing unemployment rates, or big players taking away the major share of the business, all these factors make it challenging for the buyer to plan a profitable range.

3.5.3 In-depth interview findings

The in-depth interview was done in order to brainstorm the possible solution for the challenges identified from the online survey and semi-structured interviews done with the fashion retail professionals. In the section, 3.5.2, the challenges were summarised, and the most common problem faced by the retail professionals in the buying process was highlighted.

During these in-depth interviews the most common challenge identified in the last section, that is Trend Forecasting, was taken as the topic of discussion. The details of the interviewees are mentioned in section 3.3.3, these interviews were done in a very interactive way. The researcher introduced the fashion retail industry and its most common challenge, that is Trend Forecasting to the respondents. After which, the respondents produced different ideas and ways in which Artificial Intelligence can be used to help the buyers.

Ideating with different AI and ML experts, similar concepts were recognised for using the existing AI algorithms and processes in trend forecasting retail applications. Here the findings are explained for the possible solution (s) for Trend Forecasting in Fashion Retail Industry:

Predicting Future Trends: Predicting future trends are important for the fashion and many fashion companies especially e-commerce businesses have already started using it in their operations. Predicting trends for fashion industry means using social media, fashion magazines, market trends, competitor trends to get a good picture of what would be good range to plan for the store that customer wants. This means analysing a considerable amount of structured and unstructured data.

Image and video recognition are one of the important breakthroughs for predicting trends in AI industry. Since 2012 the technology behind image recognition

started gaining momentum, it has a long way to achieve perfection but today we are still doing somewhat good in this field. (Seif 2018.)

Social media platforms such as Instagram, Pinterest, Facebook are rich with image contents. Influencers, celebrities and trend innovators are using these channels immensely to impact future customer trends. The machine that has been trained to identify different features such as styles, designs, colors, patterns etc. can then search the social media for the targeted customer demographics required by the brand and find the trending features. The program can also give sentiment analysis on text data for the different features or products to see their popularity. This can help the buyers to plan their range better using the predicted trends.

The introduction of Generative Adversarial Networks (GANs) is also one of the latest developments in AI that can help the retailers predict trends. This algorithm learns about a fashion style using images and can then create new items of similar styles from scratch. This technology is far from replacing designers but can help the buyers in understanding what the customer wants based on the results. Amazon is already experimenting this algorithm to create its AI designer. (Knight 2017.)

Another AI application being used a lot in e-commerce business recently is the image search also using image recognition techniques. Once the AI system predicts the popular trends using time series forecasting, the buyers can use those images directly to search their inventory (if an online inventory exists) to check if similar styles already exist. During the season, this feature can help the buyers to discover what are the missing items from the stock and needs to be reordered based on the sales analysis.

The automatic image product tagging feature using computer vision could also be used by the brands in their inventory and on their e-commerce stores. Once the product image is uploaded, the computer vision automatically tags the product with relevant keywords saving manual work and time.

In an ideal situation, this could lead to a tool where retail buyers can define their target customer including their demographics, behaviours and the software can

predict product trends for a given time series to help them plan the best possible range. The other image recognition features such as image search and automatic image tagging could also be beneficial in creating more efficiency in the processes.

Incorporating Past Sales Record: The future predictions and forecasts using sales analysis goes hand in hand for a successful outcome. There are multiple statistical tools and data analytic applications helping the retail professionals gain insights on their data. What new can Machine Learning bring?

One case using machine-learning could be applying a Case based reasoning to the stock system. The existing Point of Sale system that the companies are using, contains the information about the items from previous years, their sales performance and in some cases probably their picture or flat-drawings (refer section 2.6.4). These items can be further broken down in to features such as colors, size, style. Most of the brands are already using these distinctions to plan their range and might have this information in their systems, if not, it can be created.

The machine is then trained with all these past data, performance of each item and each feature along with their prices and the time of sale. After the machine is trained, it can recommend the buyers what features have been successful and predict if the items they want to purchase would be desirable or not. The buyers can enter the image of a merchandise they are planning to purchase in the system. The system can then analyse all the features of that dress in the image such as color, style, pattern and advise the buyer if the item with existing features are desirable or not. It can be done for the overall range planed by the buyer.

This feature is not just helpful for the buyers or merchandisers but also for the designers. The AI system can predict what are the desirable features to be incorporated in an item and what not to help the designers. For example, in dresses a color and length is selling good, but its zipper and button style are not performing well making it undesirable. This insight can help the designers to then fix the button and zipper to make the item more desirable for the customers. For buyers this insight is also good to know that they need to look for dresses for the desirable color and length but leave out the undesirable zipper and button styles.

How would the ideal solution look like based on the above findings?

The aim of this research is to suggest a possible solution for the challenges in the retail buying process. There are other solutions and everyday new innovations and advancements, are changing the way any problem is visualised and perceived. Many new start-ups are bringing new innovative solutions, big companies are trying new technologies to stay ahead in the game. The aim for this research is also to initiate the ideation process of creating a possible solution. There are many ways to approach a problem and in this research one approach is selected. Therefore, the term 'ideal' is used to recreate the scenario exactly as imagined by the researcher. Based on the above findings and researchers understanding, to improve the Trend forecasting in the retail buying process an AI assistant tool can be created for the Retail Buyers.

This tool incorporates different AI and ML techniques and help the buyers to create desired and profitable range for their stores. It could have the following features:

Possibility to define one or many robust customer segmentations.

Future trend predictions for the target customers from social media, fashion houses, trend magazines etc.

Generating new styles based on popular features and styles.

Creating automated Range plans.

Easy integration between AI system and the Stock system containing past sales records.

Forecasting trends based on past sales records.

Integrating online inventory or web shops for collecting customer insights for trend prediction.

Using automatic image tagging feature for tagging the products in the inventory for analysing the in-season sales.

Using image search feature for searching products in the inventory or web shops based on trend prediction results.

Integrated image library for creating own Range Planning dashboards.

User friendly and easy interface.

Based on the suggestions of the collaborator of this research Ms. Anna Juusela, who has 10 years of experience in the Fashion Retail industry having first-hand experience of the target challenges and researchers' findings on the above-mentioned possible features, a user-friendly prototype has been created only for the purpose of explaining the idea of the platform. The platform needs to be very user-friendly showing only what is required by the Buyers. The technology runs behind, and the users are not expected to have any technical background to use the product. This prototype might be used for the purpose of gaining further feedback from the real users and improved upon with time. The prototype can be seen and experienced using the link mentioned in Appendix 3.

Technical Possibilities and Challenges

Apart from ideating the possible solutions and possible features, certain technical aspects were also discussed during the interviews. The researcher wanted to understand if the features discussed above are technically possible and the existing machine learning algorithms can be used in the above-mentioned features. The researcher was also interested in the field of AI and went through some courses to develop her vocabulary in the field.

The following technical observations were done for the possible features:

Image recognition: Computer Vision is a process that makes the computers understand images. Image Recognition systems help the machines interpret the inputs received using computer vision and categorize them. Driverless cars are examples of using computer vision and image recognitions to recognise signs, distractions on roads, pedestrians. (Greene 2018).

In terms of AI, deep Convolution Neural Networks (CNN) are used for the image classification tasks. This can help in achieving reasonably good image recognition performance, in some cases better than humans. (TensorFlow 2018). The concept has been explained in detail in section 2.7.

This shows that it is possible to implement the image recognition systems for predicting trends in fashion retail industry. However, there are certain challenges involved in the process. As discussed in section 2.7, to train the image recognition systems the amount of labelled data needed is incredibly humongous. The training also needs to include diversity for achieving proper results. The Supervised learning methods used to train the machines is very expensive and time consuming. Even if the business is using a pre-trained ImageNet network to fine-tune the images for specific use might be bit tedious and expensive. (Seif 2018).

Image Generation: Generative Adversarial Networks (GANs) are introducing CNNs to unsupervised learning (Schaal 2017). This could take trend prediction to a whole new level. GANs were recently introduced in 2014 and have been in discussion ever since. (refer section 2.7). (Skymind n.d.) After the machine is trained using CNN for specific preferences of a user or customer segment, the GANs can help the retail buyers to understand what customers want beyond the existing items or products. (Snow 2017).

Data Collection: The discussion also introduced topic about data collection. To train the machine, a large data is required. Collecting that amount of good quality data was also seen as a challenge. Let us illustrate an example of what kind of data might be needed to train the machine to perform the task we require in our AI Retail Buying Assistant Case.

For example:

In the fashion industry, technical cards and flat drawings are used as technical specification of a merchandise (Refer section 2.6.4). As discussed in section 2.6.4, technical card includes the information of the apparel such as size, various measurement points, model number, product name, season, manufacture de-

tails. Flat drawings on the other hand, provides the visual guide of the real merchandise showcasing all its features. These can be useful to collect the required data about the features of a merchandise.

For example, the features or tags mentioned for a product using technical cards, the visual 2D image of merchandise including detailed features from the flat drawings and the real image of the apparel could be a set of data to train the machine.

Using this data, the machine can learn to understand the similarities and differences between various features of a merchandise. Once the machine is completely trained, it can recognise the images of the apparels from social media channels and compare what features it possess and recommends the buyer desirable and undesirable features for the Range Plan.

Similarly, the machine can be trained with a different logic based on the requirements and availability of data. In the above case, a database of flat drawings and their respective garment image might be needed to perform the task. It is a challenge, but also such data is available with the brands or fashion schools etc.

Trend Predictions: The Time-Series forecasting technique can be used to predict future trends. To train this system, we need to collect observations sequentially in time. Based on the past and present data, the system will then predict the future trends. (Garcia n.d.) This can be used to predict future trends of different features such as styles colors, from social media or internet using sentiment analysis on text data and image recognition for images and videos (refer section 2.7), but also to analyse future trends based on past sales records of the company.

All the technical aspects mentioned here are probably not the only way to achieve the results. As none of these methods have been practically implemented to validate the target results, they cannot be deemed right or wrong. The objective of the paper was to ideate the possible scenario or scenarios that can be used to solve certain challenges. Based on the in-depth interviews, theoretical framework and researchers understanding on the topic the technical aspects are presented. The goal of presenting the technical aspects is to show that the possibilities exist for developing a solution for the identified challenge.

What can be the starting point?

The features mentioned in the above section for the AI solution have not been implemented practically and therefore, the mentioned features are only the possibilities. Although, the project needs to start somewhere and, in this case, based on the interview discussions, the first application can include the time series trend forecasting of social media data using image recognition techniques. In the beginning, the forecasts can be done for single feature such as color or style, to create an MVP (Minimum Viable Product). In the next phase, more features can be added followed by the integration of the past sales records. In the last phase, additional features can be added, AI technology is also developing every day and the research would continue to keep improving the performance of the offerings.

The step by step development of this tool would enable to collect feedback from the real users and help in the improvement of the concept.

4 Discussion and Analysis

The goal of this section is to summarize all the research findings, analyse their relationship with the theoretical framework and make a conclusion taking in to account the research questions.

Within the framework of this study, the fashion retail business and the buying process has been discussed in depth. The empirical research findings identify the challenges faced by fashion retail professionals in the buying process and possible solution using Artificial Intelligence has been proposed as the outcome of the study.

Technological advancements are disrupting every industry. It is said that the fourth industrial revolution is coming, and the lines between the physical, digital and biological spheres will be thin (Schwab 2016). One of the key terms in this revolution will be Artificial Intelligence, to prepare themselves industries have already started to find places in their existing models to fit AI and benefit from it. Fashion industry is not behind, but it is also not a forerunner in the adoption of these latest technologies, this has led to the need for research in this field and

finding possibilities of innovation. The big players such as Amazon, are ahead in their game and experimenting tremendously with AI. The competitors, especially, the brick and mortar retail stores, need to start preparing themselves for this coming change. This thesis was an attempt to find gaps and challenges for one business process in fashion retail and try to understand how AI applications can improve the performance.

Fashion Retail industry is complex and with the rise of social media it has become more volatile than ever. The fashion retailers constantly face a challenge to satisfy customer needs. In the literature review, the Buying process and Range Planning (refer section 2.3 and 2.6) was explained in detail along with the challenges faced by the retail buyers. The findings of the empirical research coincide with the theoretical aspects in this case. The online survey and the semi-structured interviews conducted in total 21 fashion retail professionals, reveals the challenges faced by them. The most common challenge that was mentioned by these respondents was trend forecasting; analysing the past sales and future trends to decide what range should be purchased for the store during a season, was challenging for most of the retail buyers. The research also revealed, that most of these retail professionals do not use any of the latest technological tools to determine their trends. Most of the focus is based on analysing past trends but only 25% respondents in the online survey were using any future trend prediction methods. The smaller size companies do not have the budget to use expensive data analytics or prediction tools and therefore, find it challenging to keep a track of the trends by self-market analysis. The large companies, on the other hand, have the resources to apply trend forecasting methods, but they order their deliveries an average of 6 months in advance (twice or four times in a year). This makes it important for them to have a precise knowledge of their target market, customers and the factors influencing the trends. Based on the findings, only 33% of the respondents were confident about their definition of customer segmentation. The improper customer segmentation also leads to the challenge of pricing the goods at right price, which was one of the difficulties faced by the retailers. Another important challenge, overstock is the result of improper customer segmentation and trend forecasting. If the products are not purchased and priced

based on customer demands, it is possible that they perform bad during the season leading to overstock situations. To understand how much quantities of what needs to be purchased is an outcome of proper Range Planning, if the 'What' has been forecasted properly the 'how' is easier to be predicted. Other challenges such as selecting the right vendors and market situation are external factors but can also be dealt with better market and competitor understanding.

If we look at the theoretical framework of Retail Buying and Range Planning (refer section 2.3 and 2.6) closely, we will understand the relationship of the challenges faced by the buyers and retailers. For a profitable range it is essential to understand, 'what to buy', 'how much to buy' and 'when and from where to buy'. When the buyers are not confident on their customer segmentation, and when they do not forecast properly what to buy for the coming season due to poor trend forecasting methods, it is difficult to estimate the pricing or how much quantity is needed to ensure the right stock. This leads to improper buying and can eventually lead to over or under stock problem. Poor trend forecasting also means that enough market research has not been done on the trends impacting their industry and hence, they are not ready for sudden market changes. Similarly, selecting vendors also depend upon understanding the range, if the buyers know exactly what they want it is easier to select the right vendors.

This shows that the challenges faced by the buyers are somewhat related yet different. But, if they can answer to the 'What' correctly, the other answers might be easier to find.

Therefore, in terms of this research, it can be said that, the theoretical aspects discussed about fashion retail industry correlates with the research findings.

The other aspect of the research was to find a possible solution or solutions for the identified challenges using Artificial Intelligence. To fulfil this objective again related theory was studied and in-depth interviews with AI experts were conducted. Based on the previous findings, the most common challenge of trend forecasting was discussed for finding solutions.

A solution of creating an AI Assistant, was proposed to help the retailers and retail buyers. The features of the solution are identified using the literature review and

the in-depth interview findings and there are lots of possibilities to innovate in this field. Solutions based on Time-Series trend forecasting of future trends and past sales record using Image Recognition systems in Machine learnings was proposed. The predictions based on image recognition from social media and internet would be very beneficial in the fashion industry to understand the trends based on features such as styles, colors, patterns. In addition, an idea of using the developing technology of Generative Adversarial Networks (GANs) in machine learning can be explored more to help generate images based on the customer preferences helping the buyers to know what customers want. This feature can be incorporated in creating Range Planning boards for the buyers within the AI assistant tool. To enrich the tool, additional features such as image search on online inventory and automatic image tagging for e-commerce sites and inventory uploads can also be included.

The features mentioned above are based on the theory and ideation process. No practical implementation has been done and therefore, how much of this can be achieved within a single tool can only be seen with test and trial. The project can start with one feature first and then eventually adding other aspects to it. Based on the findings, a time-series forecasting of future trends using image recognition of at least one single feature such as color could be the very first application. The prototype of this basic version can be seen in Appendix 3.

The next phase could be the addition of other features such as styles, patterns, followed by the integration of past sales records and addition of additional features. The step-by -step process of developing this AI Assistant enables quick development of an MVP (Minimum Viable Product) and it can be improved using the feedback received in the early stages.

The possibilities mentioned in this research are backed by the theoretical developments in AI discussed in the literature review. This also fulfils the objectives of the research and answers the second part of the research question.

Summarizing the overall research, the objectives of the thesis have been fulfilled and the answer to the main and sub research question are answered in the thesis.

The main research question was: What are the challenges faced by the retailers in the buying process of the fashion retail industry?

The answer to this question has been explained above, in this section. To summarize, based on the findings of literature review and the empirical research, five main challenges were identified in the buying process of the Fashion Retail industry by the retailers and other retail professionals. The most common challenge was Trend forecasting, the other challenges were the issue of stock maintenance (overstock or understock), pricing the products correctly ensuring profitability, market conditions and vendor selection.

The sub-question to the main research question was: How can the above challenges be solved using the latest technologies?

The answer to the sub-question is also discussed above, in this section. To summarise the answer based on the theoretical framework and research findings, the most common challenge of Trend forecasting was selected for ideating solutions using AI. It was understood that if the main challenge is simplified, the other challenges would be easier to solve. To solve the main challenge, an AI assistant for the Retailers or Retail buyers was proposed. The AI assistant is a trend forecasting tool based on image recognition that helps the retailers or buyers to understand what the customers want and help them to plan the range within the tool.

A prototype of the early version has been created and is placed in the Appendix 3. The prototype will be now validated with real users and based on the results, the development of the project will be decided in collaboration with Ms. Anna Juusela from Yanca Oy.

5 Conclusion

Within the framework of this thesis, the buying process of the fashion retail industry was studied. The research problem was to identify the challenges faced by the retailers and retail professionals in the buying process of the fashion retail industry. The research also aimed at suggesting a possible solution for the challenges using Artificial Intelligence. This study was done in collaboration with Anna

Juusela, the founder of Yanca Oy to help her validate the existing challenges of the Retail buyers and create a prototype for solving them.

The empirical research investigates the existing challenges in the Fashion Retail buying process and includes the participation of 21 fashion retail professionals with diverse roles and company size. Furthermore, the challenges were analysed to suggest a solution using Artificial Intelligence and included brainstorming with four different AI and Machine learning experts. A Qualitative Research methodology was therefore applied. The data for the research has been acquired in three directions: online survey and semi-structured interviews for identifying challenges in the fashion retail buying process and in-depth interviews for analysing and suggesting a solution for the major challenges using AI. The Purposive Sampling method was used to select the sample population based on their expertise and knowledge in the subjects.

Overall, the study was conducted in two major directions: literature review and empirical research. In the first part, the fashion retail buying process, range planning, challenges in the buying process, Artificial Intelligence and its use cases in fashion retail industry were explored. In the empirical research, online survey, semi-structured interviews and in-depth interviews were conducted (refer Appendix 1 and Appendix 2).

As a result, five major challenges were identified in the fashion retail buying process and for the most common challenge a solution using Artificial Intelligence was proposed and an early prototype was created. Most of the findings were correlated with the literature review. According to this research, the penetration of latest technologies in the fashion industry is not high but is growing and therefore, the need for research in this area could result in innovative solutions, not only in the value chain, but across the industry. The research revealed that retail buyers face five major challenges in the buying process including trend forecasting, stock maintenance, pricing, vendor selection and market conditions. There could be many different individual reasons for these challenges, but as per the study these reasons could be mostly due to non-precise customer segmentation, under-utilization of existing data and lack of technological advancements in the overall process.

In terms of suggesting a solution using Artificial Intelligence, a time-series trend forecasting AI assistant, using image recognition technique, was proposed for solving the challenge of Trend forecasting in the buying process. Based on the interview findings and literature review, the features were suggested that would help the buyers to understand, 'What to Buy' better.

Considering the above-mentioned information, the results of this thesis will help Yanca Oy to understand and validate the challenges of the retail buyers in the buying process, and enable a possible development of an innovative solution for the same. This research could be useful in initiating a new business proposal and collaboration between the researcher, Yanca Oy and the interested AI experts in developing the solution.

The overall process of the research provided various insights and learning for the researcher. The process of learning more about the topic also included networking with experts in various networking events, it provided a very deep understanding of Fashion retail and AI concepts. Apart from the research findings, meeting with cross industry people also helped in ideating different approaches that could be applied in the fashion industry. Collaborating with Yanca Oy, was helpful in learning wide aspects of fashion industry other than the buying process such as Visual merchandising and budgeting. Participation in brainstorming events, helped to narrow down the idea to make it more practical and helped with the part of the research, that what can be the starting point (under section 3.5.3). In short, the research did not just yield learning about the research findings, but provided an overall knowledge of industry, implementation requirements, network of experts, cross-industry skills and market research that could be used for further research or development of a successful business model around the idea.

Finally, the thesis can be evaluated highly because of the following reasons:

A combination of business and technology has been used in the thesis making it futuristic.

A highly volatile industry with huge potential of innovation has been used for the study.

Latest technological aspects are used in the thesis increasing its validity.

The literature review and the empirical research are relevant to the research objectives and answer the research questions.

A comprehensive data analysis approach has been used giving detailed and relevant findings.

It has the potential of being converted into a business opportunity making it practical and readily implementable.

Thesis results are helpful for the researcher and Yanca Oy for making future business decisions.

5.1 Limitations of the research findings and future research possibilities

In terms of this study, only a few geographies took part in the research. Therefore, there could be a risk of bias in the conclusion about the challenges in the fashion retail industry. However, the scope of the study does not specify the inclusion of all geographies.

Also, the features suggested in the solution are theoretically comprehensive, but their technological aspects and user benefits could be validated only after the development and implementation of the solution. Although, the scope of the study does not include the development of the solution or the post-development user satisfaction. In a nutshell, the thesis is the first exploration done before a new application or tool can be developed and launched for an untapped industry.

There is a major scope of future research possibilities in this area. Fashion industry is slowly opening its arms to technology and it is the right time to explore different business processes within the industry. In this research, only the buying process is explored, future studies can be done on different business processes and components of the value chain. More research can be done to explore the possibilities of using other latest technologies such as Internet of Things, Block Chain, Extended Reality (AR, VR and MR) etc. within the different parts of fashion, or retail industry.

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APPENDICES

Appendix 1: Fashion Retail Online Survey

Fashion Retail Buying Online Survey Questions. The actual survey can be seen on the following link: https://goo.gl/forms/pwuKueIx4YPGB3aW2

1. Which country are you from? *
2. What is your profession? *
    a. Retail Shop Owner
    b. Retail Buyer
    c. Retail Store Manager
    d. Other
3. What is the approximate annual turnover of your company or the company you work for?
4. What are the most challenging steps for you or your company in the Fashion Retail Buying process and Range Planning? *
5. How well do you define your target customers? Rate between 1-5. *
6. How often do you purchase stock for your store in a year? *
    a. Twice (Spring/Summer and Autumn/Winter)
    b. Four times (Spring, Summer, Autumn and Winter)
    c. Monthly
    d. Other
7. Do you use any Trend forecasting methods before the season buying? *
8. How do you plan and budget your purchases? Do you use any tools for the same?
9. What products do you sell in your store/company? *

(* refers to a mandatory question).

Appendix 2: Semi-structured interview structure

Structure of the questions for the semi-structured interview.

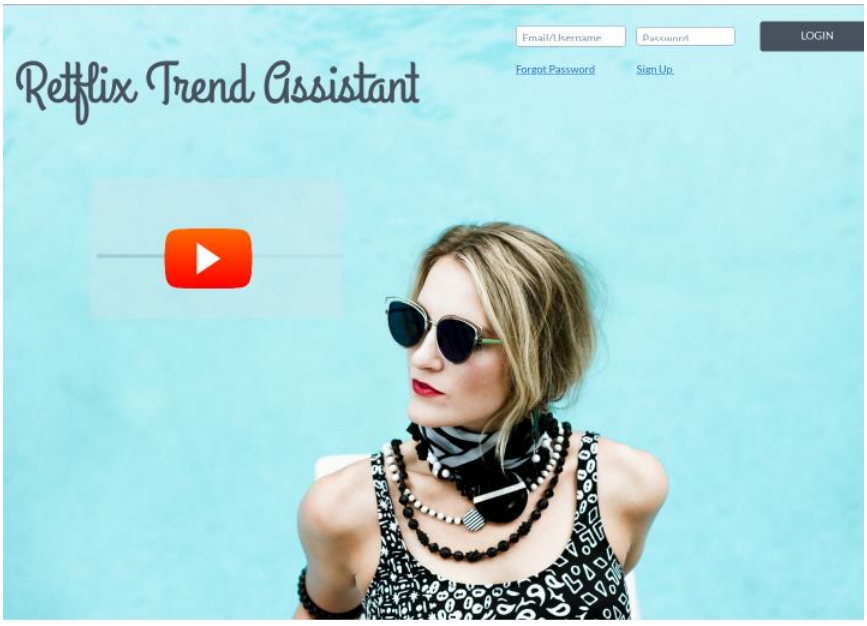
1. What is your role and responsibilities in the company?
2. How is the existing buying process in the company?
3. What are the challenges faced in the buying process of your company?
4. What is the frequency of purchasing the stock in your company?
5. Do you use any tools or software in the overall buying process?

Appendix 3: Prototype

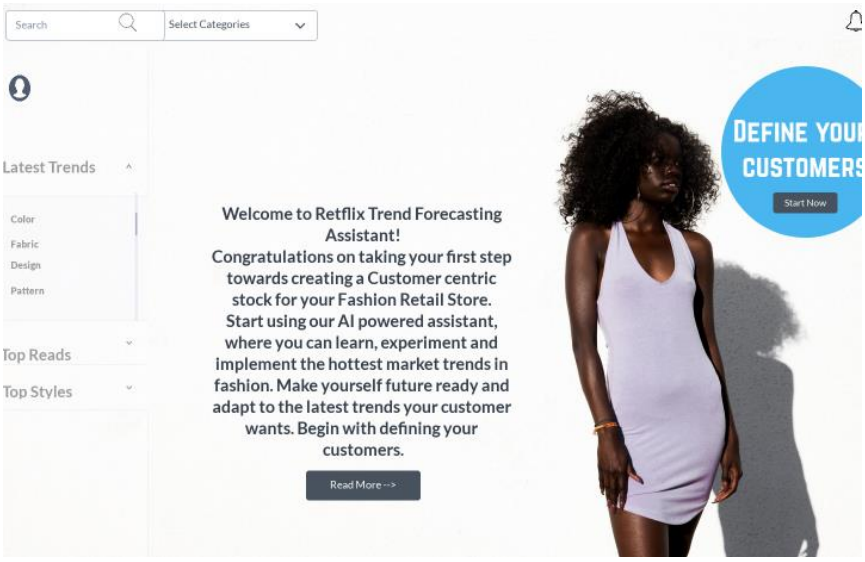
The functional prototype of the suggested solution can be accessed using the following link: https://marvelapp.com/acajd4h

How to use the prototype:

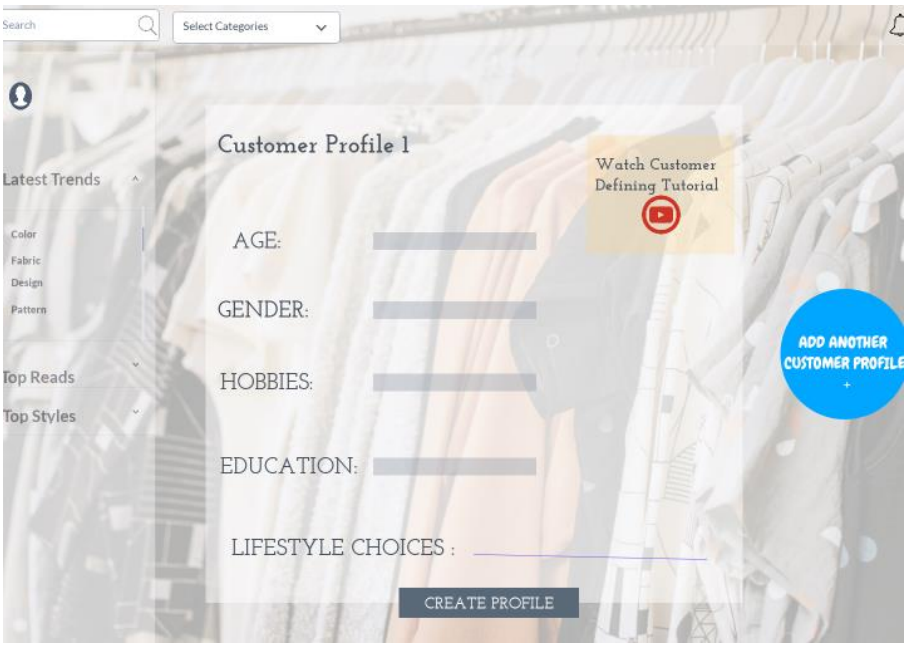
1. Click on the above-mentioned link.
2. Click on the Login button without entering any details.



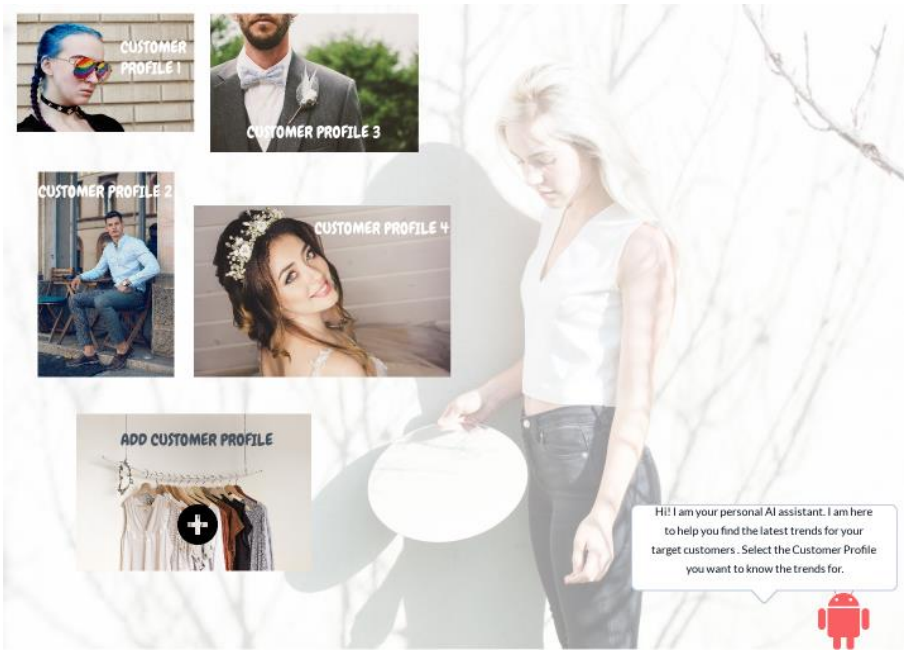
3. On the Next Page, define your customers by clicking on the Start Now button.



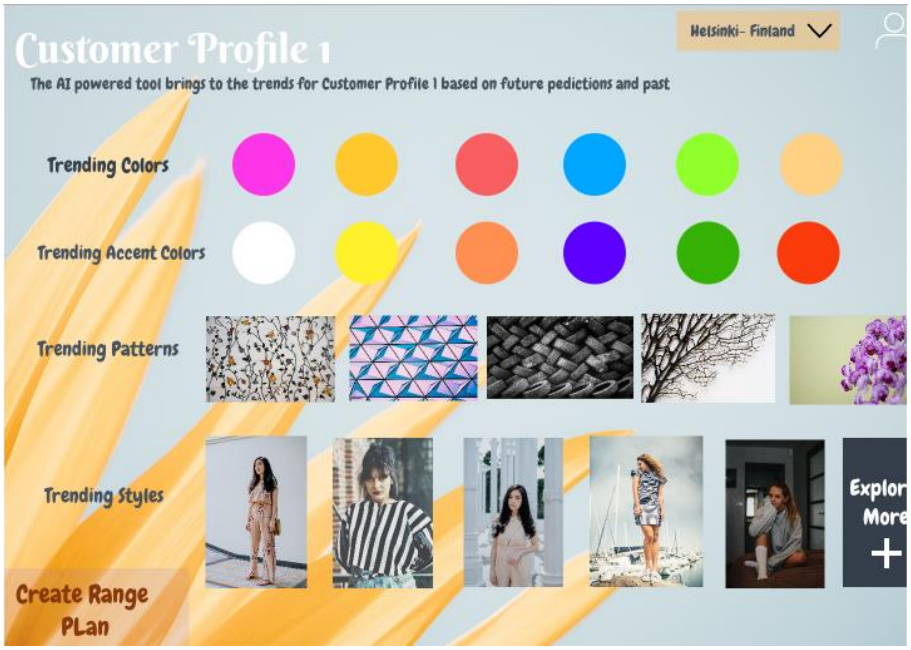
4. On the Next page, without entering any details scroll at the bottom of the page and click on Create Profile



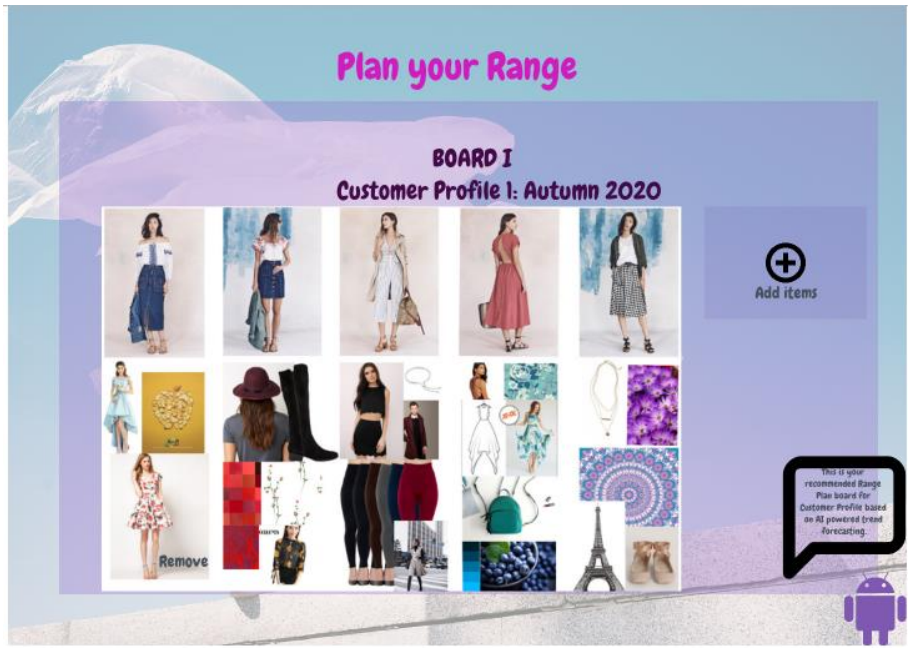
5. Click on Customer Profile 1.



6. Scroll at the bottom of the page and click on Create Range Plan



7. Recommended Range Plan is created.



8. Picture credit: Behance: Fashion Design Semester 2 Tropical Collection (Rabideau 2018)