

Analysing clothing consumption habits and their reductions - Final

by Julien Lanniaux-munoz

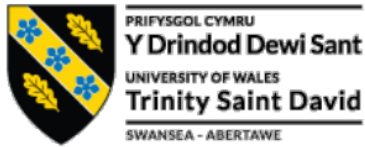
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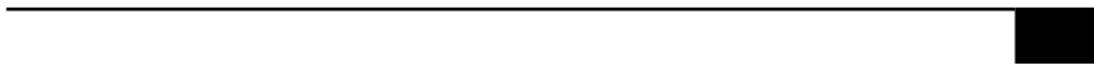
Analysing clothing consumption habits and their reductions

Dissertation (M6X01293)

BSc – Logistics and Supply Chain Management

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Declaration

I, Julien - LANNIAUX-MUNOZ, declare that I am the sole author of this dissertation; that all references cited have been consulted; that I have conducted all work of which this is a record, and that the finished work lies within the prescribed word limits

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1. Introduction

1.1. Background

Clothing consumption is increasing more and more around the world. Companies produced twice as much clothing in 2014 as in 2000 with an increase in sales going from 1 trillion US dollars in 2002 to 1.8 trillion in 2015. This increase is linked to the phenomenon called "Fast fashion" which represents a segment of the clothing industry (COBBING & VICAIRE, 2016). Indeed, while previously the collections followed the seasons, today the renewal is weekly with the delivery of new references each week to the biggest retailers. This segment is made up of low-quality garments which are mass produced without being renewed (STANTON, s.d.).

The development of the textile industry has been greatly increased thanks to the development of supply chains and the use of the Internet of Things. Companies like Zara, belonging to the world leading group Inditex, are using these new technologies to offer new clothing inspired by high fashion houses, in record time (Chu, 2014).

The role of the emergence of internet influencers should not be overlooked either. People are following them more and more on social networks by wanting to be like them. This represents an opportunity for brands to carry out daily advertising campaigns (Glucksman, 2017).

This overconsumption has environmental consequences. The clothes being accessible at a low cost, it is easy for consumers to renew their wardrobes in order to stay trendy. The French buy about 9 kg of clothing each year and donate 3 kg (ADEME, 2018).

However, companies are also participating in this large-scale waste with the destruction of unsold products. The Burberry company, in 2018, destroyed nearly 30 million euros of unsold clothing and 11 million euros of cosmetic products (ELLSON, 2018).

In order to support the environment it is therefore necessary to buy less but better-quality clothing.

The purpose of this dissertation is to analyze clothing consumption habits as well as propose a way to reduce it using the technology and especially Internet of Things (IoT). It also includes an analysis of the pros and cons of using such connectivity between businesses and customers.

1.2. Aims and objectives

The study aims to analyze the consumption habits in the clothing market and proposes a strategy to reduce them applying internet of things (IoT).

The following objectives should have to be achieved:

1. Describe the current state of art of the supply chain, the internet of things (IoT) as well as the clothing market
2. Identify and present the relationship between the supply chain, the internet of thing and the clothing market
3. Analyze the data collected using a survey to find out about consumer habits
4. Identify the advantages and disadvantages of using a supply chain connected to the customer ordering exclusively made-to-measure clothing.

1.3. Justification of the research

This dissertation will focus and study consumption habits within the clothing market and connected device technology, with the aim of identifying consumer behavior and probing them to define a possible evolution in manufacturing and consumption. Indeed, as explained in Chapter Two, consumption habits have evolved in parallel with industrial

developments which have made it possible to produce more goods more quickly for a lower cost.

1.4. Overview of the research

Chapter 2

The second chapter of the dissertation is devoted to carrying out a critical review in the form of a literature review. This makes it possible to present the three main axes of this work, which are the supply chain, connected objects as well as fashion.

Chapter 3

The third chapter is devoted to the identification of methods and approaches that can be used when writing research work.

Chapter 4

The fourth chapter is devoted to the analysis of the data collected using a questionnaire as well as a discussion to discuss the results of the analysis as well as possible changes in consumption.

Chapter 5

Finally, this last chapter will answer the different objectives of this dissertation as well as answer the research question. Limitations and further research ideas will also be included.

2. Literature review

2.1. Introduction

Arrived on the advice of a business consultant in the logistics field, I quickly found interest in the supply chain due to its transversal and strategic positioning within companies. In fact, contrary to the corporate vision that the world had 100 years ago, logistics is a major function today.

Particularly interested in new technologies and their uses, I find it very interesting to use them to increase productivity within the supply chain, with the development of the Internet of Things.

In addition, we are entering a new era of industry called 4.0 which corresponds to the interconnection of devices associated with automation.

Zara is the most striking example of this in the textile industry. Indeed, Inditex is the world's largest clothing retailer (Cockar, 2019), it develops and uses a lot of technologies that take advantage of the Internet of Things to best meet customer demand while reducing the parasitic costs that occur throughout the process since the demand for production until sale to the customer (Fernie & Grant, 2015).

The literature review, part of fundamental documentary research in the realization of the dissertation, makes it possible to take cognizance and analyze the existing work carried out in order to define a research problem.

This research work will therefore be organized in three parts which will guide the dissertation. First, we will study the history and development of Supply Chain Management to be able to provide an accurate definition and insights. Then we will provide a background of the Internet of Things and how it is changed since its inception. Finally, a Zara case study is presented in order to support the fashion logistics development.

2.2. Supply Chain Management

The supply chain theory and practice are fundamental for the topic that the dissertation will investigate. Therefore, it is necessary to present the conceptual approach in a distinct section in order to emphasize its definitions and specificities as well as the changes that supply chains have undergone since its existence.

2.2.1. History and development

We will first discuss the history of logistics and the supply chain to better understand the development of this concept.

First, there is the creation era which extends from ancient times, throughout history, to 1911 with research into improvements in the manual loading process (Taylor, 2017). Ford will continue to work with the implementation of mass production to achieve economies of scale with the manufacture of a single vehicle (Rausch, 2007). In 1950 a first appearance of the term postponement appears to explain that it is necessary to limit the risks by producing only at the last possible moment (Alderson, 1950). Concept used by Dell for the production of its custom chips at the request of the customer (Sehgal, 2010). The creation of the American Production and Inventory Control Society was created in 1957 to continue research into operations management (Wikipedia, s.d.). Jay Forrester then presented the Forrester Effect which resulted from uncertainty caused by a lack of communication between supply chain stakeholders (Forrester, 2013).

The first use of the term "Supply Chain Management" occurred in 1982 with Keith Oliver of Booz (Olivier, 1982). Two years later, the theory of contrasts appears which represents a new management approach based on a systemic approach which is interdisciplinary which wants to identify a potential constraint in the chain and eliminate it (Goldratt & Cox, 1984).

With globalization and globalization, there is an emergence of the use of 3PL (Third party Logistics) which echoes the outsourcing of companies (Ackerman & Wise, 1985). This

development is accompanied by the presentation of the term "Lean Management" which promotes the reduction of losses by producing as efficiently as possible (Krafcik, 1988).

At the beginning of the 1990s, the re-engineering process appeared which proposed reorganizing companies to move from vertical to horizontal organization (Hammer & Champy, 1993). At the same time, the concept of Efficient Consumer Response was born, which offers companies to work together by collaborating along the chain in order to better meet customer expectations (Wood, 1993). The creation of the Supply Chain Council now helps companies to improve in their supply chain using tools created by the council.

In order to facilitate the development of companies, the concept of "Supply Chain Financing" emerges which offers the possibility to customers to allow their suppliers to finance their debts with the help of a factoring company (Hartley-Urquhart, 2000). However today only represents 3% of the factoring market. With global warming becoming more prevalent, organizations want to focus on green logistics with the release of the first report "Green House Gas Protocol, carbon accounting tool for Supply chain".

In 2010, the concept of Supply Chain Management emerged. This concept is defined in 2016 as having to be fast, scalable, intelligent and connected (Hajibashi, 2016). This is consistent with companies embarking on Industry 4.0, a connected and autonomous industry (Dragan, et al., 2016).

2.2.2. Definition

The first definition associated with the concept of Supply Chain Management is attributed by Keith Olivier during an interview for Financial Time on June 4, 1982 "Supply chain management (SCM) is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption". (Kransdorff, 1982, p. 16)

This first definition although very complete will be rewritten according to the years and the points of view of different authors to get closer to the reality on the ground, which evolves over time.

Steven (1989) defined supply chain management as the means of coordinating orders with suppliers with needs to meet customer demands. This allows a reduction in inventory costs and therefore a non-investment in products that remain in stock (Steven, 1989). In 1994, (La Londe & Masters, 1994) defined the supply chain as being the grouping of companies involved in the movement of the product. Douglas et al. (1989) defined a supply chain as all the companies providing products and/or services.

At that time, the movement of products and information is only envisioned in one single direction, the disappointing sense. (Martin, 1992) is the first to communicate publicly on the need to set up reverse logistics, in order to limit waste and recover sales information to the end consumer.

These definitions converge to finally, today correspond to the first official definition given by Keith Oliver.

2.2.3. Main elements

Since the emergence of Supply Chain Management, a number of theories and principles have emerged. Despite different operations, all agree to agree on four central elements to obtain customer satisfaction. (Linton, 2015)

- Integration : It is a question here of having an organization, internal and external to the company in which each actor acts in perfect collaboration with the others by means of coordinated actions (Hau L. & Seungjin, 2001).

- Operation: Each company in the chain must continuously monitor and evaluate its processes in order to make up for the various shortcomings in efficiency and to improve (Cecil & Robert, 2008).
- Purchasing: The company must know how to buy the right quantities of products necessary for its proper functioning, in the fairest times. That is to say buy enough not to be out of stock and not to be in over-storage, which in both cases will charge the company (Barney, 2012).
- Distribution: To meet customer demand, you must have an efficient distribution network, in order to deliver on time to customers for the final consumer to have the product in stock (Chopra, 2003).

We can therefore define that these different elements are in line with the following definition « the art and the way of making a given product available at the right time, in the right place, at the lowest cost and with the best quality” (Aslog, s.d.)

2.3. Internet of things (IoT)

2.3.1. History

Appearing in 1982 in the United States, this new trend is the result of a trend towards standardization and automation of information and data processing (Friedemann & Christian, 2010). Although first performed manually, the use of the Internet and the creation of networks will allow the use of digital media.

This use of the internet will allow, with the emergence of globalization, to connect computers to each other as well as to servers, in order to send commands and also to have access to the data processed. This connection then extends to objects, which will be modified to evolve.

The term internet of objects was initially defined in 1999 by Kevin Ashton, who specifies the link between RFID technology and the Internet. He worked at that time as a brand manager at Procter & Gamble. He realized that a lipstick always appeared out of stock while it was still in stock. He therefore decided to attach RFID tags to the lipsticks to constantly monitor the stock evolution and therefore recommend it before the stock-out (Ashton, 2009).

In 2005, the United Nations first mentioned the Internet of Things in a report published by the International Telecommunications Union (Union, 2005), which explains that the Internet of Things is the result of the creation of a new dimension of communication and information. It is possible to be connected from any location at any time.

In 2011, the creation of the IPV6 standard led to the creation of new address ranges. The goal is to allow individual identification of products and devices on the global network. "We could assign an IPV6 Address to every atom on Earth and still have enough addresses left to do another 100+ earths" (Leibson, 2008). This is all the more important since the creation of the Nabaztag in 2005, this democratization of the connected object is no longer reserved only for companies but also for individuals in a private capacity (The Economist, 2006).

In 2015, an event called "The Global Standards Initiative on the Internet of Thing" takes place in Geneva with the aim of bringing together industry leaders to set up standards to facilitate the development and adoption of this technology. Following this event, a study commission called GROUP 20 was created to continue this standardization mission (International Telecommunication Union, s.d.).

2.3.2. Definition

There is currently no common definition on the Internet of Things (IoT). Although firstly defined by Kevin Ashton, different groups of researchers and practitioners have rewrote it based on their visions and use of this set of technology. However, they all keep a common

line of sight which stipulates two versions of the Web. The first corresponds to data created and analyzed by humans, while the new version, described as "Web 2.0", highlights data designed and analyzed by digital objects and entities in total autonomy.

The Internet of Things (IoT) is experiencing a great boom today which is characterized and launched in two ways. The personal plan in which individuals want to be able to connect their real estate and their vehicles in order to develop new uses that facilitate daily life (Chong, et al., 2011). At the same time, professionals are developing this set of new technologies to analyze and meet the demands of their customers, in all fields (physical and digital) with the aim of increasing productivity thanks to a connection for everyone and everywhere (Lee & Kyoochun, 2015).

The term internet of objects is made up of two words. The first word is internet, which is self-sufficient. The term Things which means physical device, that is to say devices having a technology that allows data processing and exchange (Yeates, 2015). Within the framework of the industry this defines all the physical elements which intervene in the supply chain of the product. Gusmeroli et al. (2009) discuss the human aspects in decision making as people make the final decision. Indeed, today we ourselves take part in the functioning of these technologies by analyzing and interacting with our environments.

The Internet of Things therefore echoes a global network that enables connection and communication between humans and machines.

However, if it is not possible to use a definition common to all organizations, it is however possible to rely on that given by the International Telecommunication Union in June 2012 which stipulates that a " as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies." (Union, s.d.)

".

We can therefore define this technology as being “a network of networks that allows, via standardized and unified electronic identification systems, and wireless devices, to directly and unambiguously identify digital entities and physical objects and so to be able to recover, store, transfer and process, without discontinuity between the physical and virtual worlds, the related data ” (Bureau, et al., 2008)

2.3.3. Technologies used

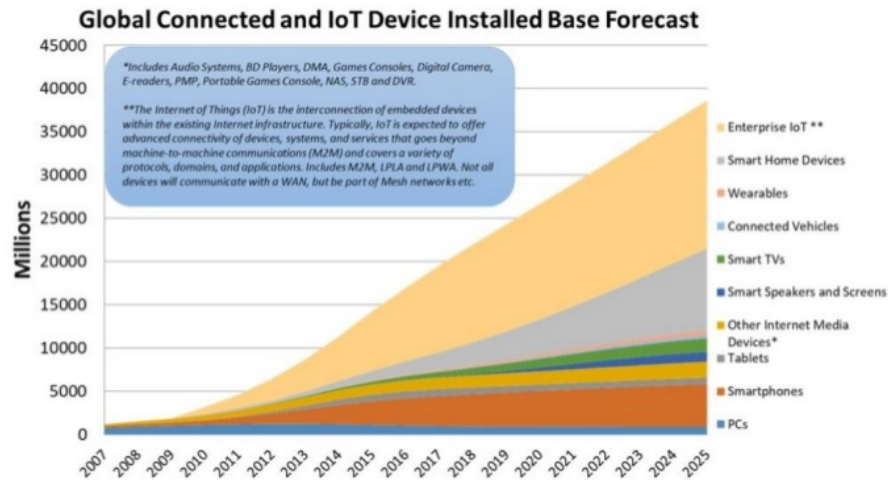


Figure 2.1 : Representation and estimation of the number of connected devices between 2007 and 2025 (Strategy Analytics, 2019)

The technologies encompassed by the Internet of Things (IoT) are dealt with in this section. Indeed, it is important to present the most used since half of the major business processes will have integrated these tools before the end of 2020 to reach at the end of the decade more than 25 billion smart and connected devices. If we add smartphones, it is possible to increase this number to 38 billion before the end of 2025.

The Internet of Things (IoT) include a large number of systems connected through digital interfaces and physical interfaces. It's complicated to list them all. However, Lee and Lee have defined the five most common technologies in the professional world (Lee, 2015)

Firstly, Radio-Frequency Identification (RFID) allows to store more information than the barcode. In addition, the reading is done remotely, which allows an automated group identification without visual.

There are three different types of tags. The passive tag, which is only activated when it enters the reader's field of inquiry, the semi-passive tag which is activated at given intervals to collect information and the active tag which is constantly activated and can thus communicate over longer distances. (Puglia & Mike Puglia Hoboken, 2007)

Then there is the Wireless Sensor Network which corresponds to a network of detectors responsible for monitoring and controlling information in order to ensure the proper functioning of certain devices and the stability of certain places according to recorded prerequisites. (Lewis, 2004)

Middleware enables exchanges between different business applications (Bishop & Kame, 2003).

The penultimate point corresponds to cloud computing which is a technology that allows companies to use dematerialized platforms with access to different resources such as storage, computers or software from anywhere. This decentralization allows companies not to store equipment and information on the Internet, which can save cost (Jula, et al., 2014)

Finally, the use of good software interfaces for users. Indeed, to be well used this set of technology must have a clear and intuitive interface which facilitates their use with programs that clearly detect problems.

2.3.4. Internet of things and supply chains

Today we can see the good integration of information systems within companies, which play a major role. The different authors working on the subject have identified different contributions.

Initially, the democratization of the Internet allows the creation of new communication channels which go beyond the simple transaction and meet new needs (Handfield, 1997). This use of IT has also created new markets (A & E.W.T, 2004) Indeed, companies want to update themselves in order to become as efficient as possible, so it is necessary to call on specialists in the fields, companies specializing in the implementation of these integrations.

In addition, it is possible to note that many companies are starting to canvass to constantly keep up to date on these new technologies with many benefits (Radjou, 2013). Indeed, these tools increase productivity and reduce time. This coordination also allows the chain to adapt to the market and customer demands more quickly.

2.4. Fashion Logistics

2.4.1. Role in society

The fashion industry has evolved over time and around the world. In the case of clothing, which will guide our file, we note different reports. At first, clothing was intended to protect bodies from different environments. People wore animal skins to protect themselves from the cold. The more society has evolved, the more clothing has climbed the ladder of the Maslow pyramid (Gilligan, 2018).

Indeed, clothing is a second skin for the person and a social mark. That is to say, it indicates in which social category the carrier is located. It makes it possible to show a certain success, since the first judgment of society will be made on the first visible thing, namely clothing. It is therefore a question of responding to the codes of society to gain acceptance (Barnard, 2002).

2.4.2. Rise of fashion

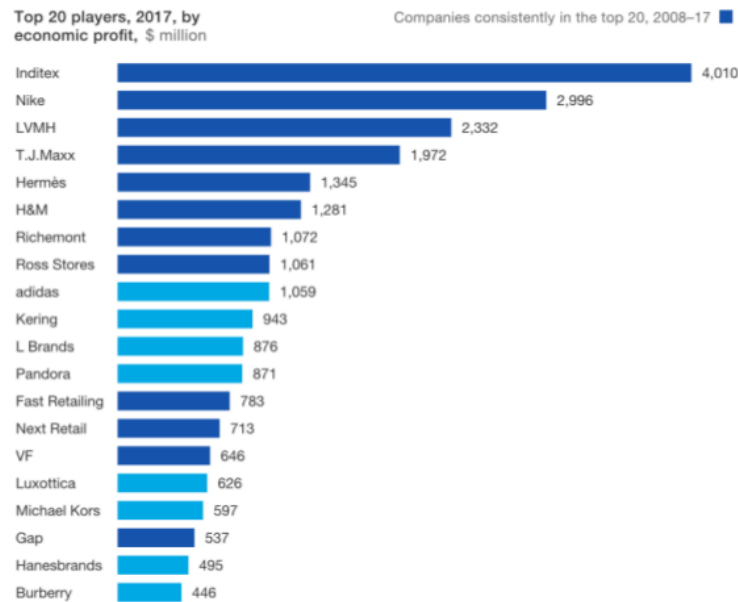


Figure 1.2 : Twenty companies - the 'super winners' - dominate value creation in fashion (Imran, et al., 2018)

Beyond these ideas, we note that fashion represents today a real economic interest. Resellers must therefore sell clothing to make a profit. The 20 companies that made the most profit in the fashion industry in 2017 achieved 24,661 million profit dollars.

More and more companies, like Zara, are adopting a system of continual updating of stocks in order to satisfy their customers. That is to say, they offer new items every week that are imagined in several ways. The company initially has in-house stylists who design the clothes according to trends or customer requests. Indeed, they can suggest outings to the company, which will be taken into account if several customers request it. The second corresponds to an inspiration from releases from luxury houses. Zara has stylists responsible for offering clothes resembling luxury clothes, and therefore overpriced, to sell

them at much lower prices. This market held by Zara is the source of enthusiasm on the part of customers (Hanbury, 2018).

Indeed, thanks to the retailer, they have the possibility of increasing their personal image by wearing clothes similar to those of the wealthy for lower costs. This need to look like a person is all the more emphasized since stars are sponsored by brands to become influencers to promote products and encourage people to buy them (Glucksman, 2017).

However, this need creates another among wealthy people who want to differentiate themselves from the rest of the world to put themselves forward, mark their differences. Luxury houses then offer new products, and we then enter an endless circle, in which there is no longer any seasonality, and an overconsumption with 300,000 tons of clothing thrown away each year, just in the UK (Barney, 2018).

2.4.3. Supply chain response

This overconsumption of clothing is also encouraged by online sales. Today half of the sales are made from the websites of brands and resellers. Customers no longer have to travel and can order from anywhere thanks to new technologies. Brands had to adopt new internal systems to meet growing customer demand, adding the need to be able to quickly adapt production for product changes (Fernie & Grant, 2015).

Companies have therefore developed systems based on lean management, using the Internet of Things at each stage of the supply chain. The case of Zara is all the more interesting because the company is a pioneer in this system of interconnection and process automation (Chu, 2014).

At each stage of the supply chain, the systems are interconnected thanks to the combination of RFID chips and the information system internal to each store and linked to the general system. This therefore makes it possible to launch orders automatically to avoid out of stock since the internal stock is updated in real time. In addition, during sales,

the system feeds back information to study sales and trends to constantly offer products expected by customers (Yip & Huang, 2016).

2.5. Summary

Through this literature review, it was possible to define the major aspects that will contribute to this research project and the results will be reported in the dissertation. Indeed, the documentary research work was oriented on the basis of three key aspects. The first aspect has been Supply Chain Management, presented through its history and development, and then defining this concept, which arose out of the need to improve logistics flows. Then it was necessary to study the Internet of Things, which allows the interconnection of systems, from its first use during the Second World War until today to define it and associate it with the notion of Supply Chain Management. Finally, the subject taking place within fashion Logistics. The presentation of the functioning of the Zara company is doubly interesting thanks to its advance in the use of new technologies to increase and diversify its product offer, but also since it is one of the brands of the largest manufacturer and clothing retailer Inditex. . However, as information in this area is scarce, it will be important to collect and analyze new data for answering the research questions and related problems of this dissertation.

3. Methodology

3.1. Introduction

After having defined a knowledge base and having presented the subject during the literature review, it is important to proceed with writing the methodology. This is the section in which the different philosophies to be adopted will be discussed and thus establish the best way to carry out the study to seek and respond to the stated problem.

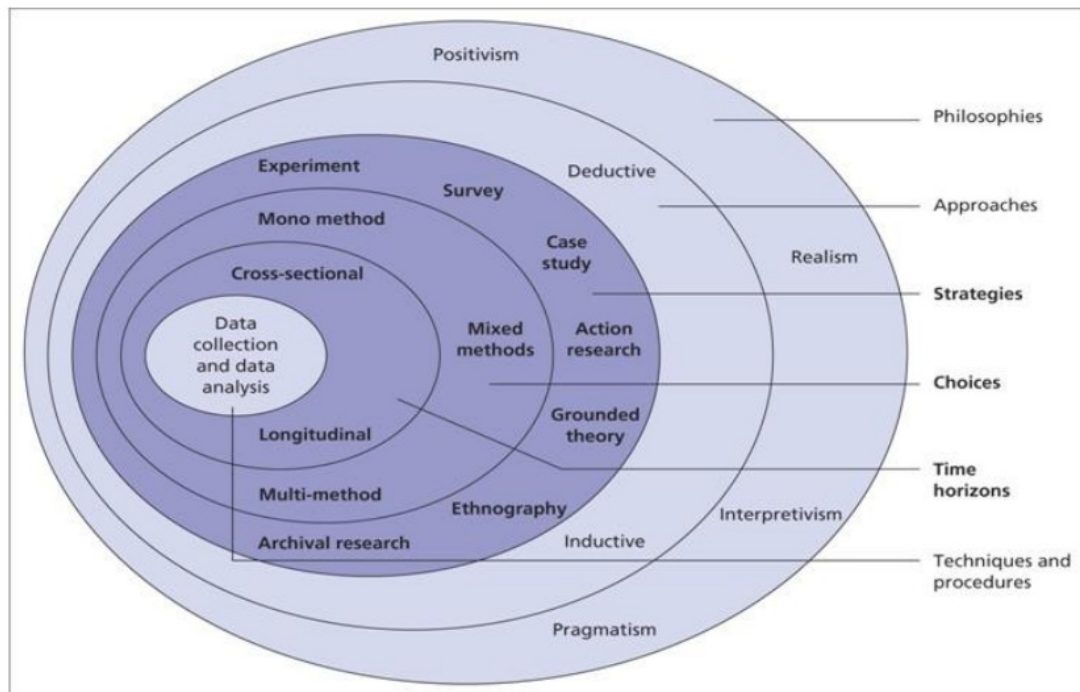


Figure 3.1: Research onion (Saunders, et al., 2006)

The chapter includes the different layers based on Saunders Research onion, namely the research philosophy to adopt, the approach, the strategy for identifying the tools available for collecting data, the choice of methods and the timeframe for time and finally techniques and procedures.

The onion is a method used by researchers to guide their research and how they will collect their data. The onion is used from the outside to the inside using a peeling system. When a layer is used, this is necessary to peel the onion to discover a new layer until reaching the center.

This allows the researcher to examine the different options available and thus establish the choice of the methodology to be applied to achieve the objectives (Saunders, et al., 2006).

3.2. Research philosophy

An important part of understanding the principles and reasoning used to conduct a study, philosophical research establishes the way in which the data of a studied phenomenon must be collected and analyzed. Four philosophy are more popular than the others and presented in Figure 1: Positivism, achieves, interpretivism and pragmatism.

3.2.1. Positivism

Term originating in the 19th century in the book "The Course in Positive Philosophy and A General View of Positivism" positivism is presented by Auguste Comte as an approach to society based on scientific facts through statistics and experiments (Comte, 2009). It is also defined by Dudovsky as a philosophy that has a factual view of the knowledge that is acquired through observations and measurements and data acquisition. Research is generally observable and quantifiable since the role of researchers is limited to taking data and interpretation carried out in an objective manner so as not to distort the results (Dudovskiy, s.d.).

3.2.2. Realism

It is possible to define realism as "he views that entities exist independently of being perceived, or independently of our theories about them" (Phillips, 1987).

That is to acknowledge that the research is approached in a scientific way. However, this philosophy is made up of two subgroups of thoughts.

3.2.2.1. Direct

Described simply by "What you see is what you get" is also called naive realism. Indeed, this version of realism is based on human senses and therefore does not take into account external elements. The world is then considered to be unchangeable and is based on a single study entity, be it an organization, a group or even a single person (Bonjour, 2004).

3.2.2.2. Critical

Contrary to its naive declination, the critical vision of this philosophy takes into account the fact that humans can perceive the real world differently from what they really are. This is why this research philosophy encourages the realization of studies at several levels on several entities (NOVIKOV & NOVIKOV, 2013).

3.2.3. Interpretivism

A philosophy often opposed to positivism, interpretation does not seek to collect data with quantitative and scientific methods.

In fact, the researchers will not rely on raw data but will interpret the data according to the context and each person's perception. This philosophy is generally supported by qualitative and humanist data. This philosophy is based on the fact that there is not just one but rather a multitude of realities which are perceived differently by each of its actors. Access to reality, and therefore to knowledge, passes through social constructions and is not objectively determined (CARSON, et al., 2001).

The objective is therefore to interpret the meanings of human behavior rather than to generalize the causes and their effects (Neuman, 2000; (HUDSON & OZANNE, 1988).

3.2.4. Pragmatism

Pragmatism is a philosophy that concepts are only relevant if they support action. This philosophy recognizes, however, that there are multiple realities and that it is impossible to represent the world from a single point of view (Saunders, et al., 2006).

3.3. Research approach

This section will explain the two different approaches that can be used as presented in the Figure 3.2

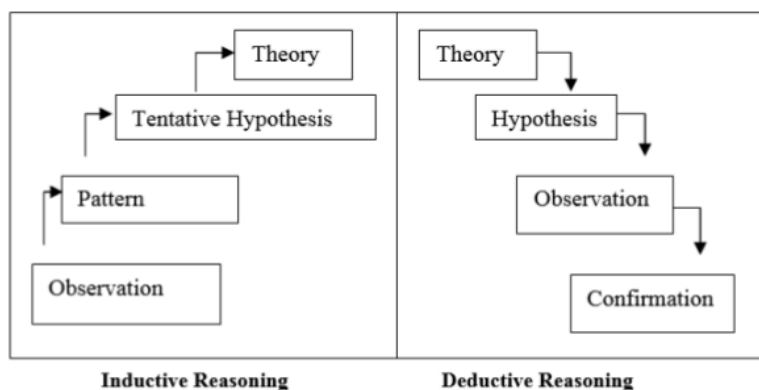


Figure 3.2: Deductive and Inductive Reasoning (TROCHIM & DONNELLY, 2001)

3.3.1. Deductive approach

When a researcher wants to work using a deductive method he wants to start from a theory. This allows him to formulate hypotheses which he must subsequently test, to ensure confirmation or rejection of his hypothesis. Following this he is able to compare the results to his initial theory to confirm or reject it. Also called "Top-Down", the work therefore begins from the most general to the most specific. (BURNEY & Saleem, 2008)

3.3.2. Inductive approach

Unlike the deductive approach, the research will be conducted to formulate a theory based on the tests and observations made during the research phases. It is therefore an approach based on learning through experience. Also called "Bottom up", this approach begins with a precise observation to lead to generalizations and therefore theories (LODICO, et al., 2010).

The inductive approach seems the most appropriate for the realization of this dissertation. Indeed, in this way the work makes it possible to start from a basic observation, from

observations to then be able to theorize about the effects, advantages and limitations brought by the use of these new technologies for the reduction of clothing consumption.

3.4. Research strategy

The research strategy represents the means and principles used by the researcher to collect data and thus respond to the study. It is further defined by Saunders as the "general plan of how the researcher will be answering the research questions"

3.4.1. Experiment

The strategy of research experimentally can be used in all fields of research but needs to be based on a small number of factors. Indeed, it allows the researcher to create a research process allowing to compare the results obtained compared to those expected (Saunders, et al., 2006).

3.4.2. Survey

Mainly used in quantitative research, the questionnaires allow a representative sample of the population to be questioned to obtain numerous reliable data. It is a financially cost-effective method and enables accurate data to be obtained in a short time (BELL, et al., 2018)

Indeed, the use of electronic questionnaires allows a wide distribution of the questionnaire as well as the representation of the results in the form of statistics and lists which simplifies the analysis of the data.

3.4.3. Case study

The practical cases are investigations of phenomena targeting people or places. It is a study of real facts that allows us to collect data on a specific situation (YIN, 2017).

3.4.4. Action research

The research action strategy corresponds to the research carried out by researchers to improve their way of working and their approach to a specific problem. That is to say that the researcher searches for meaning in the data collected to identify repeating patterns and thus classify the data into different categories (ALLARD-POESI & PERRET, 2003).

3.4.5. Grounded theory

An inductive research strategy, the anchored theory aims; to build theories on data and field situations gathered by the researcher, and not on the basis of predetermined hypotheses. He creates categories and theories from ideas, concepts and elements that are repeated as he researches (CLARKE, 2005).

3.4.6. Ethnography

The ethnographic strategy represents the study of a certain group of the population established according to their culture, their way of life or their social environment. This helps to better understand their opinions and habits (HAMMERSLEY, 2007).

This allows companies to better understand their employees or customers to meet their expectations.

3.4.7. Archival research

The archive search strategy corresponds to the use of previously published data. It is therefore documentary research and is often represented in the form of a literature review. This makes it possible to establish the knowledge acquired through already existing research on the subject of study (VENTRESCA & MOHR, 2017).

3.5. Methodology choice

The choice of methodology makes it possible to define how to collect information and process it. There are three ways to organize your methodology.

The first called the mono method allows you to focus on using a single method to complete your dissertation. The second method called Multi method allows you to organize your research in several categories to use several techniques. However, in this case the techniques must all correspond to the same approach, whether qualitative or quantitative. Finally, there is the possibility of crossing methods. This means that it is possible to use several approaches to organize your research, whether qualitative or quantitative (Saunders, et al., 2006).

In order to best present the work done for the writing of this dissertation, it is interesting to use the mono method. Indeed, the data collection is carried out with a questionnaire.

3.6. Time horizon

It is necessary to define a time horizon when a data research work is implemented. The study can be carried out longitudinally or cross-sectionally.

Cross-sectional study, also called one-shot, is used in the case of the observation of a particular phenomenon at a particular period of time. This way of orienting the research does not allow us to analyze potential developments but allows us to question a large panel (MANINDER, 2016).

Longitudinal study allows to study a particular phenomenon several times over a longer period of time. This allows to know the evolution of the subjects and phenomenon over time but requires a time of study which is spread over a long period of time (CARUANA, et al., 2015).

The cross-sectional study seems the most appropriate for the writing of this dissertation. Indeed, despite the impossibility of studying a phenomenon over a long period of time to know its evolution, it corresponds perfectly to the period of time allocated to research. The questionnaire is therefore oriented towards the way of thinking and consuming the respondents at the same time and not over the past years.

3.7. Techniques and procedures

Data is considered to be one of the vital elements for businesses and the key to their success.

3.7.1. Data collection

Divided into two parts, data collection is a process through which the researcher searches for data to analyze in order to answer the problem and his research questions.

Secondary data correspond to already existing and accessible data, i.e. published data. They can be found in books, academic papers and many other media. Due to the abundance of information, it is necessary to establish selection criteria so that the data best correspond to the problem studied.

This data is interesting for researchers since it saves time and money which can be attributed to the analysis and testing of this data.

When a researcher does not find data allowing to carry out his research, he must proceed to the collection of primary data. This is data collected for the first time. However, it is primary data that requires a much greater investment of time and money than secondary data (RABIANSKI, 2003).

3.7.1.1. Questionnaire

The questionnaire consisted of two open questions as well as 20 closed questions. These 20 questions proposed choices of answers making it possible to efficiently collect demographic information on consumption habits as well as possible ways of reducing them.

3.7.1.2. Questions

The first two questions are demographic and identify the age and gender of the respondent. This allows the analysis to be carried out according to its criteria in order to identify a possible trend between these criteria and the answers to the following questions.

Questions numbered 3 to 10 identify the consumption habits of the sample. Questions 3 to 4 define the way of purchasing clothes. Questions 4 to 6 interrogate the respondent about the quantities, frequencies and the type of clothes purchased.

Questions numbered 11 to 15 gauge the respondent through different consumption evolution hypotheses. Questions 11 to 13 investigate the hypothesis of an increase in the clothing budget, and questions 14 and 15 on the reduction of consumption.

Questions 16 and 17 identify the positioning of respondents towards unused clothing.

Finally, questions 18 to 21 investigate the use of connected objects. Questions 18 and 19 deal with knowledge and possession of this technology and questions 20 and 21 with regard to the transmission of personal data to connected devices and to services connected to it.

3.7.2. Data analyze

Data analysis makes it possible to transform a large amount of collected data into structured and more understandable data. They can be analyzed qualitatively or quantitatively.

The quantitative analysis is carried out from numerical data which are in the form of graphs or statistics which can be collected by questionnaires, in the case of our analysis. This makes it possible to order and reconcile them in order to confirm or refute the hypotheses and theories stated. However, it is necessary to remain cautious on the assertions made during the study because the quantified data opens the way to many interpretations (Dudovskiy, s.d.).

Qualitative analyzes are when they are based on non-numeric data from sources such as articles and interviews.

This analysis can be organized into five categories: content Analysis, narrative Analysis, framework analysis, discourse analysis and grounded theory (MILES & HUBERMAN, 1994).

Generally, data analysis is carried out with the chi-square method and the using software "IBM Statistical Package for Social Sciences (IBM SPSS). The chi square used is that of independence. It allows to confirm or deny the presence of a statistical link between two variables. This link is interpreted by the value P resulting from the test.

The null hypothesis, H_0 , is rejected when $p \leq 0.05$ and therefore induces the validation of the alternative hypothesis H_1 (Statistics Solutions, s.d.).

3.7.3. Research ethics

Unlike morality which defines general laws or principles, ethics is a personal will to act according to one's virtues to make the best decision in a given situation. Indeed, morality ignores nuance while ethics allows discussion and paradoxes. "What is the best decision in this case? "

Ethics is something important in any work and therefore in the realization of this dissertation. The ethics of research is therefore defined according to the will of the

researcher and indicates that he will carry out his work in a manner which he considers appropriate (RESNIK, 2015).

The researcher can indicate the use of a code of ethics in order to present his methods of data collection. This allows him to gain the trust of the individuals and organizations from which he wishes to collect data.

Therefore, during the submission of the questionnaire to the respondents it was stipulated that the data will be recorded anonymously with the sole purpose of being analyzed for the writing of this dissertation.

3.7.4. Viability

Validity corresponds to the quality of measurement of a tool to measure the study phenomenon.

Furthermore, this validity can be broken down into two groups which are internal and external. The first corresponds to the way in which the data correspond to the reality on the ground and the second corresponds to the possibility of carrying out the same studies in different environments. Validity comes in the five formats of Face Validity, Constructed Validity, Criterion Related Validity, Formative Validity, Sampling Validity (Research Methodology, s.d.).

3.7.5. Reliability

Composed of three groups, reliability corresponds to obtaining the same result when the same tool is reused several times. That is to say, it helps to know if the results obtained on different occasions are reliable (Research, s.d.).

4. Analysis and discussion

4.1. Introduction

This chapter is divided into two parts. The first, devoted to data analysis, is written by studying the results of a survey carried out with the aim of obtaining information on consumption habits within the clothing market and probing consumers about possible changes in consumption. The second part of the chapter will summarize the information acquired during the analysis and literature thus address the possible developments in production and consumption.

4.1.1. Sampling

The questionnaire was made accessible to everyone on the Facebook social network in order to reach a larger number of people. A total of 120 responses were collected thanks to the different shares made.

Respondents are French and English, with no possibility of distinction.

All the questionnaires collected can be used since an option on the software used makes it possible to block validation if a question has not been answered.

4.1.2. Gender

As the social network Facebook is widely used by women and men, it was important to include a question to identify the gender of the respondent. Indeed, according to collective mores, women and men do not consume in the same way. It is therefore important to check this.

Row Labels	Percent	Frequency
Female /		
Féminin	56,67%	68
Male / Masculin	43,33%	52
Grand Total	100,00%	120

Table 4.1: Distribution by gender of the sample

On the 120 responses collected, 68 surveys were answered by women and 52 surveys were answered by men. Despite a non-equality, it still allows for a large respondent base.

4.1.3. Age

People of all ages have a different relationship with consumption and new technologies depending on the time and the environment in which they evolved, it is necessary to have a wide range.

Row Labels	Frequency	Percent
Under 18 years of age / Moins de 18 ans	4	3,33%
18-30 years of age / Entre 18 et 30 ans	84	70,00%
41-55 years of age / Entre 41 et 55 ans	16	13,33%
56+ years of age / 56 ans et plus	16	13,33%
Grand Total	120	100,00%

Table 4.2: Distribution by age of the sample

4.1.4. Chi-square test for age (Q2) and place of clothing purchase (Q3)

H0 – The is no significant difference between age and place of clothing purchase

H1 – The is a significant difference between and place of clothing purchase

The test indicates the following result: $X = 42.176a$, $df=6$, $p=0.000$

This means that there is a significant statistical difference between

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

Respondents under the age of 18 buy their clothes online and in stores. However, none of them favors one place of purchase over the other.

People in the 18 to 30 age group buy 61.90% in both types of businesses. However, 14.29% of them buy exclusively on the internet and 23.81% of them buy only in stores.

People in the 41 to 55 age group buy 25% exclusively in physical stores. The remaining 75% buy in physical stores but also in online stores.

Finally, people aged 56 and over buy only in physical stores.

4.1.5. Chi-square test for the age (Q2) and purchase of several sizes of the same product (Q3bis)

H0 – There is no significant difference between age and purchase of several sizes of the same product

H1 – There is a significant difference between age and purchase of several sizes of the same product

The test indicates the following result: $X=17.486a$, $df=3$, $p=0.001$

This means that there is a significant statistical difference between gender and frequency of purchase of new clothing

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated

Among the sample of the population questioned, nobody orders several garments at the same time to try them and to return those which are not with their size.

4.1.6. Frequency of purchasing new clothing (Q4)

The frequency of purchasing new clothing is significantly different between men and women.

Men buy new clothes between 1 to 15 times a year with an average of 4.56.

These are the 18 to 30 years who purchase the most purchases.

Women buy new clothes between 1 to 52 times a year with an average of 11.25. Again, this is the group of 18 to 30 years who buy the most clothes.

It was not possible to use the chi-square method to analyze this question since the respondents had to answer for themselves and not choose from a selection.

4.1.7. Chi-square test for gender (Q1) and number of items purchased each year (Q5)

H0 – There is no significant difference between gender and number of items purchased each year

H1 – There is a significant difference between gender and number of items purchased each year

The test indicates the following result: $X=34.674$, $df=4$, $p=0.000$

This means that there is a significant statistical difference between gender and number of items purchased each year

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

Indeed, it is possible to note that out of the 52 men questioned, 40 of them buy between 1 and 10 new clothes per year. In comparison, of the 68 women surveyed, 40 of them buy between 10 and more than 20 new clothes a year.

4.1.8. Chi-square test for the genre (Q1) and type of market in which the clothing was purchased (Q6)

H0 – There is no significant difference between gender and type of market in which the clothing was purchased

H1 – There is a significant difference between gender and type of market in which the clothing was purchased

The test indicates the following result: $X=18.460$, $df=2$, $p=0.00$

This means that there is a significant statistical difference between gender and type of market in which the clothing was purchased

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

The result of using a crosstab indicates that 84.62% of the men surveyed only buy clothes in new condition. Unlike men, the women surveyed are more divided with 52.94% of them buying new clothes but also second-hand. However, no one, whatever their gender, exclusively buys second-hand clothing.

4.1.9. Chi-square test for gender (Q1) and knowledge of the existence of tailor-made services (Q7)

H0 – There is no significant difference between gender and knowledge of the existence of tailor-made services

H1 – There is a significant difference between gender and knowledge of the existence of tailor-made services

The test indicates the following result: $\chi^2=13.883$, $df=2$, $p=0.001$

This means that there is a significant statistical difference between gender and knowledge of the existence of tailor-made services

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

This is due to the almost perfect opposition of responses from women and men on this question. Women answered at 64.71% that they knew about tailor-made services while men answered at 61.51% that they did not know about the existence of tailor-made services.

4.1.10. Chi-square test for gender (Q1) and the purchase of tailor-made clothing (Q8)

H0 – There is no significant difference between gender and the purchase of tailor-made clothing

H1 – There is a significant difference between gender and the purchase of tailor-made clothing

The test indicates the following result: $X=6.555$ $df=2$ $p=0.038$

This means that there is a significant statistical difference between gender and the purchase of tailor-made clothing

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

In this case it is necessary to mitigate the result. Indeed, the population sample studied answered no to the question, except for 4 women who buy tailor-made products.

4.1.11. Chi-square test for gender (Q1) and annual budget for new clothes (Q9)

H0 – There is no significant difference between gender and annual budget for new clothes

H1 – There is a significant difference between gender and annual budget for new clothes

The test indicates the following result: $X=16.388a$, $df=5$, $p=0.006$

This means that there is a significant statistical difference between gender and annual budget for new clothes

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

Among the people polled, men allocate a clothing budget mainly established between 100 and 200 £, at 38.46%, and between 300 and 400 £, at 30.77%. The rest of the people are

distributed evenly over the remaining proposals. Like men, a majority of women allocate a clothing budget of between £ 100 and £ 200, at 30.29%. However, the other responses range from 11% to 17%.

4.1.12. Reasons for buying new clothes (Q10)

This is a question not analyzed with the chi-square method since the respondents had to write their answers themselves.

It is still possible to identify common reasons for purchasing between respondents. The majority of the women replied that they bought new clothes for fun and had a wardrobe corresponding to current fashion codes. Men also buy clothes to update their closets, but without highlighting the pleasure of shopping or buying new clothes.

4.1.13. Chi-square test for age (Q2) and purchase of better quality but more expensive clothing (Q11)

H0 – There is no significant difference between age and purchase of better quality but more expensive clothing

H1 – There is a significant difference between age and purchase of better quality but more expensive clothing

The test indicates the following result: $X=7.193a$, $df=6$, $p=0.303$

This means that there is a significant statistical difference between age and purchase of better quality but more expensive clothing

It is therefore possible to affirm that the hypothesis H0 is validated.

The data from this question make it possible to highlight that among the people surveyed, the youngest (100%) are the most inclined to agree to pay more for their clothes for better product quality. People between the ages of 18 and 30 support this idea at 61.90% and 19.05% of them have no opinion yet. People between the ages of 41 and 55 agree with

this idea at 50% and 20% of them have no opinion on the subject. Finally, people aged 56 and over adhere to this idea at 25%. However, no one in this age group gives a negative answer

4.1.14. Chi-square test for gender (Q1) and purchase of more environmentally friendly but more expensive clothing (Q12)

H0 – There is no significant difference between gender and purchase of more environmentally friendly but more expensive clothing

H1 – There is a significant difference between and purchase of more environmentally friendly but more expensive clothing

The test indicates the following result: $X=9.706a$, $df=2$, $p=0.008$

This means that there is a significant statistical difference between gender and purchase of more environmentally friendly but more expensive clothing

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

It is possible to observe from the quantitative data in the crosstab that 64.71% of women are in favor of buying more environmentally friendly clothing, while 23.53% of them do not comment. For men, the observation is more nuanced and the opinions are distributed fairly in the three categories. Indeed, 38.46% of them are in favor of this idea while 30.77% do not comment.

4.1.15. Chi-square test for age(Q2) and purchase of tailor-made but more expensive clothing (Q13)

H0 – There is no significant difference between age and purchase of tailor-made but more expensive clothing

H1 – There is a significant difference between age and purchase of tailor-made but more expensive clothing

The test indicates the following result: $X=21.225$, $df=6$, $p=0.002$

This means that there is a significant statistical difference between age and purchase of tailor-made but more expensive clothing

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

The sample of those under 18 are ready to buy tailor-made clothes despite the higher prices than basic clothes. However, they are the only ones with a majority of 100%. Indeed, the group between 18 and 30 years old are against this idea at 57.14% and favorable at only 28.57%. The group between 41 and 55 years of age is 75% unfavorable while the remaining 25% do not comment. Finally, people aged 56 and over are 50% favorable and 50% unfavorable.

4.1.16. Chi-square test for gender (Q1) and reduction of consumption of clothing for the environment (Q14)

H0 – There is no significant difference between gender and reduction of consumption of clothing for the environment

H1 – There is a significant difference between gender and reduction of consumption of clothing for the environment

The test indicates the following result: $X=5.352$, $df=2$, $p=0.069$

This means that there is no significant statistical difference between gender and reduction of consumption of clothing for the environment

It is therefore possible to affirm that the hypothesis H0 is validated.

Indeed, men and women answered similarly. Men are in favor of reducing their clothing consumption to 64.71% while 11.76% of them are resistant to this idea. Women are at 76.92% favorable and at 15.38% unfavorable.

4.1.17. Chi-square test for age (Q2) and reduction of clothing consumption in favor of purchasing tailor-made clothing (Q15)

H0 – There is no significant difference between age and reduction of clothing consumption in favor of purchasing tailor-made clothing

H1 – There is a significant difference between age and reduction of clothing consumption in favor of purchasing tailor-made clothing

The test indicates the following result: $X=26.603a$, $df=6$, $p=0.000$

This means that there is a significant statistical difference between age and reduction of clothing consumption in favor of purchasing tailor-made clothing

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

The idea of reducing consumption by purchasing custom clothing is welcomed 100% by people under the age of 18. The characters aged 18 to 30 are at 66.67% against this idea and only 23.81% seem interested. A turnaround is felt with people aged 41 to 55 who are at 75% in favor of this principle and 25% who are against it. Finally, people aged 56 and over are in complete opposition to the previous group with 75% of people who disagree and 25% of people who agree with this idea.

4.1.18. Chi-square test for age (Q2) and possession of unused clothing (Q16)

H0 – There is no significant difference between age and possession of unused clothing

H1 – There is a significant difference between age and possession of unused clothing

The test indicates the following result: $X=6.282a$, $df=3$, $p=0.099$

This means that there is no significant statistical difference between age and possession of unused clothing

It is therefore possible to affirm that the hypothesis H_0 is validated.

The answers to this question are very similar but increasingly declining depending on the age group. All people under the age of 18 have unused clothing. People between the ages of 18 and 30 own at 76.19% unused clothing, people aged 41 to 55 own at 75% unused clothing and people aged 56 and over own at 50% unused clothing.

4.1.19. Chi-square test for gender (Q1) and unused clothing (Q17)

H_0 – There is no significant difference between gender and unused clothing

H_1 – There is a significant difference between gender and unused clothing

The test indicates the following result: $X=27.133a$, $df=5$, $p=0.000$

This means that there is a significant statistical difference between gender and unused clothing

It is therefore possible to affirm that the hypothesis H_0 is rejected and that the alternative hypothesis H_1 is validated.

The results indicate that the majority of women and men donate their clothes at 62.50% and 53.85% respectively. The difference is made with women who sell at 31.25% while men only at 7.69%. Nevertheless, they compensate for this by storing them at 23.08% against 6.25% for women. The remaining percentages for men are evenly distributed across the remaining categories.

4.1.20. Chi-square test for age (Q2) and knowledge of the existence of connected objects (Q18)

H0 – There is no significant difference between age and knowledge of the existence of connected objects

H1 – There is a significant difference between age and knowledge of the existence of connected objects

The test indicates the following result: $X=10.561$, $df=3$, $p=0.014$

This means that there is a significant statistical difference between age and knowledge of the existence of connected objects

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

Following the observation of the results appearing in the cross tables it is possible to note that people of all ages know the connected devices with the exception of 4.76% for people between 18 and 30 years as well as 25% of people 56 years and older.

4.1.21. Chi-square test for gender (Q1) and possession of connected objects (Q19)

H0 – There is no significant difference between gender and possession of connected objects

H1 – There is a significant difference between gender and possession of connected objects

The test indicates the following result: $X=18.772$, $df=1$, $p=0.000$

This means that there is a significant statistical difference between gender and possession of connected objects

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

According to the data, women and men responded in completely opposite ways. Indeed, women do not own a connected device at 70.59% while men have at 69.23%.

4.1.22. Chi-square test for gender (Q1) and communication of personal measurements to a connected device (Q20)

H0 – There is no significant difference between gender and communication of personal measurements to a connected device

H1 – There is a significant difference between gender and communication of personal measurements to a connected device

The test indicates the following result: $X=9.425a$, $df=2$, $p=0.009$

This means that there is a significant statistical difference between gender and communication of personal measurements to a connected device

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

The data collected indicate that men are more likely to transmit their measurements to a connected object than women with 84.62% and 58.82% respectively of positive responses. Men are also less hesitant on the subject with only 7.69% of responses without opinion against 23.53% for women.

4.1.23. Chi-square test for age(Q2) and communication between the connected device and the services of a clothing factory (Q21)

H0 – There is no significant difference between age and communication between the connected device and the services of a clothing factory

H1 – There is a significant difference between age and communication between the connected device and the services of a clothing factory

The test indicates the following result: $X=33.641a$, $df=6$, $p=0.000$

This means that there is a significant statistical difference between age and communication between the connected device and the services of a clothing factory

It is therefore possible to affirm that the hypothesis H0 is rejected and that the alternative hypothesis H1 is validated.

According to the data collected, young people under the age of 18 are very 100% in favor of communicating their measurements to a factory using a connected device. On the other hand, people between 18 and 30 years old are more mixed with only 61.90% favorable opinions and 14.23% hesitations. However, the group made up of people between 41 and 55 is not against the use of this type of method, with 75% of favorable opinions and 25% of mixed opinions. Despite this, people 56 and older are reluctant to use this technology, with 75% and 25% of respondents in this group hesitant.

4.2. Discussion

This section allows to discuss the results of research concerning clothing consumption and the possibilities of changes in consumption and production. This discussion builds on research in literature as well as on the analysis presented in this chapter.

It is first possible to make an observation on clothing consumption. Manufacturers and merchants sell new clothes on a weekly basis. This makes it possible to meet a demand from customers who wish to be fashion. Indeed, fashion is changing more and more quickly and no longer works on a seasonal pattern. Manufacturers are inspired by high-fashion house clothing and offer similar clothing at a much lower price. The society being based on appearance, customers want to resemble their physical and clothing ideals which they follow on different media, in particular Instagram which is a social network specialized in the publication of photos.

However, this overconsumption of affordable clothing produces turnover. Clothes that are no longer fashionable are given away or thrown in the trash. This phenomenon is so important that it represents 624,000 tons of textiles which represents an average of 9.5 kg per inhabitant in France (ADEME, 2018).

This consumption is accentuated with people practicing shopping regularly for pleasure, at a low price. Indeed, during the analysis of the survey, it was revealed that 27.3% of those surveyed, buy new clothes more than 10 times in the years. In addition, 46.3% of respondents buy more than 10 items of clothing per year. However, this figure is in contrast as 36.6% of people also buy clothes on the second-hand market.

Two ideas emerge when we think about reducing clothing waste. There is the recycling of clothes as well as the purchase of better quality and tailor-made clothes. The first solution, although very interesting for direct reduction of waste, represents an additional problem from an ecological point of view. Businesses will need to process the clothing, recycle it, and then reuse the material to sew new clothing. This reduces the number of garments thrown away, but increases the pollution associated with the processing and manufacturing of new garments. The idea of ordering more expensive but better quality and tailor-made clothes seems a good idea. Indeed, the clothes would have a longer life, would be perfectly adapted to the morphology of the customer and would be made at his request only.

It may be noted that the younger the people, the more willing they are to pay more for better quality clothing. The older the respondent, the less they agree to pay more. However, men are more opposed to paying more for more environmentally friendly clothing. Only 38.46% of them seem favorable, while women are 64.71%. The young female audience would be more inclined to buy more expensive clothes for a better quality of manufacture if they are more environmentally friendly.

Tailor-made clothes are mainly known by women at 64.71% against 61.51% of men who do not know them. Despite this, only 4 women buy tailor-made clothes. 53.3% of those surveyed are against buying made-to-measure clothes for a higher price. However, this is a figure to be nuanced since it is young active people (between 18 and 30 years old) who disagree with this idea at 66.67% and people aged 56 and over at 75% disagree with this idea. It is possible to explain the disagreement of young active people by the fact that they are the biggest consumers of clothes to stay fashion.

According to the results, it would be interesting to attract a first male audience to make purchases in this way since 84.62% of them buy their clothes only new and 69.23% have connected devices. In addition, 84.62% of them would favor the use of a connected device to measure and transmit their measurements. They would therefore be more inclined to test this kind of process.

Despite all of these environmental benefits, it will be necessary for companies to restructure and adopt new methods of manufacturing and adjusting sales forecasts. This last point is crucial since businesses operate on a just-in-time basis. Indeed, it will no longer be possible to produce clothing in large quantities before the presentation of the product, since it is the customer who will indicate that he wishes to order a copy adapted to his measurements. It will also be crucial for businesses to have security protocols in place to ensure that malicious people do not request the production of numerous items. Indeed, it will be important to ask the question of returns to after-sales service. There are national and interstate laws allowing the customer to return a product, within a specified period, if he has not satisfied it. It will be necessary to find a way to recycle or reuse the returned products since they will be adapted to the morphology of the customers.

5. Conclusion

During performing the research and writing the dissertation, a link was established between over-consumption of clothing and the many production evolutions in the field of industry thanks to improvements in the supply chain. This dissertation is written to meet certain research objectives as well as a study question that must be answered following the analysis of the results.

The first research objective was to present the evolutions of the supply chain, the Internet of things as well as the clothing market. These developments have been discussed through the literature review in order to present the histories as well as the main elements

making up each of its themes. In addition, a link between each of the three concepts has been created.

The second objective was to present the relationship between the three concepts treated in this dissertation. The increase in overproduction, and therefore overconsumption, is linked to developments in terms of supply chain and the Internet of Things. The technologies that make up the Internet of Things are not only virtual but also material. Indeed, the emergence of Industry 4.0 is linked to the increase in the frequency of use of RFID chips which allow writing and reading information without contact between entities. This industry 4.0 is developing in parallel with the adoption of many connected products in private homes.

The third objective is to analyze the data collected following a survey to find out about consumer habits. This analysis carried out in Chapter 4, devoted to the analysis, makes it possible to highlight the fact that according to the profiles (age and gender), people have different consumption habits. The most interesting things are that younger customers are the most environmentally conscious and would agree to reduce their consumption in order to preserve it. (Consumption of 18-30). It has also been shown that women buy more clothes more often than men for fun, while men spend more money on fewer times mainly to replace clothes that no longer fit fashion codes. These same men are using more connected devices and are more likely to send their measurements to factories, using a connected device, to order tailor-made clothing.

The fourth objective was to identify the advantages and disadvantages of using a supply chain connected to the customer ordering exclusively made-to-measure clothing. Although favorable for the client who wants clothing that is perfectly adjusted to their size, it will matter their clothing budget. However, people who agree to use such a service will have better quality clothes that will last longer. The establishment and use of such a process will require a complete restructuring of the clothing manufacturers' supply chain since they will no longer be able to produce on the common size chain but will have to produce tailor-made clothes. This will also require new IT security systems and protocols

since customers could be connected to productions. However, there are manufacturers specializing in online customization, which uses an interface and allows only an indirect connection to the machines, with the need for human action to start production.

These objectives answer the following question:

What are the consumption habits in the clothing market and how to reduce them thanks to the Internet of Things?

It is possible to reduce this overconsumption by reducing purchases of “disposable” clothing in order to favor better quality but more expensive clothing. In addition, customers could benefit from garments perfectly tailored to their morphology. The use of a connected device will allow customers to calculate and transmit their measurements to the manufacturing plants of their favorite brands when ordering clothes.

However, it should be stressed that it is very unlikely that such a process will be implemented on a large scale today. Indeed, the leaders in the clothing sector are among the most profitable companies thanks to this overconsumption. In addition, the leaders are constantly investing in the research and implementation of increasingly rapid and efficient processes for making new products in the chain. The active with the most clothing budget, the group of (18 - 30), take shopping as a pleasure and do not want to pay more for better quality clothes. People want to correspond to fashion standards, which requires regularly renewing their wardrobe.

Research being carried out with the use of social sciences, certain limits inevitably appear. The public questioned is a sample of 120 French and British people. Data were collected in an interval of 3 weeks. It would be interesting to do a similar survey by surveying a larger sample of people to make sure the results are similar. It could also be interesting to carry out the same surveys in different countries in order to obtain data differentiated according to nationalities, since the differences in cultures could lead to different answers.

Finally, it could be interesting to survey companies in order to determine their visions for the years to come as well as their current vision on the state of clothing consumption.

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Appendix: Questionnaire

Clothing consumption / Consommation des vêtements

Dear Participants,

Third year student of the Bachelor in Logistics & Supply Chain Management at the University of Wales Trinity St David, I am writing a dissertation on the consumption of clothing and the opening to reduced consumption using tailor-made and integration of connected objects.

I suggest that you complete this questionnaire on your consumption habits to allow me to work on the subject from the point of view of consumers.

All the information obtained from this questionnaire will be treated confidentially, used for academic purposes only, and not be disclosed to any third party.

Many thanks for your assistance and feel free to share the survey!

Julien LANNIAUX-MUNOZ

Chers participants,

Étudiant en troisième année du Bachelor en « Logistics & Supply Chain Management » à University of Wales Trinity St David au Royaume Uni, j'écris une dissertation sur la consommation des vêtements et l'ouverture à la réduction de cette consommation en utilisant le sur-mesure et l'intégration des objets connectés.

Je vous propose de remplir ce questionnaire sur vos habitudes de consommation pour me permettre de travailler sur le sujet du point de vue des consommateurs. Toutes les informations obtenues à partir de ce questionnaire seront traitées de manière confidentielle, utilisées à des fins académiques uniquement et ne seront divulguées à aucun tiers.

Merci beaucoup pour votre aide et n'hésitez pas à partager l'enquête !

Julien LANNIAUX-MUNOZ

Respondent / Répondant

1. 1. Gender of Respondent / Sexe du répondant

Une seule réponse possible.

- ☐ Female / Féminin
☐ Male / Masculin
☐ Prefer not to say / Préfère ne pas répondre

2. 2. Age of Respondent / Âge du répondant

Une seule réponse possible.

- ☐ Under 18 years of age / Moins de 18 ans
☐ 18-30 years of age / Entre 18 et 30 ans
☐ 31-40 years of age / Entre 31 et 40 ans
☐ 41-55 years of age / Entre 41 et 55 ans
☐ 56+ years of age / 56 ans et plus

Consumption / Consommation

3. 3. Where do you buy your clothes? / Où achetez-vous vos vêtements ?

Une seule réponse possible.

- ☐ Store / En magasin
☐ Internet / Sur Internet
☐ Both / Les deux

4. 3 bis. If you buy your clothes on the internet, do you buy several copies of the same clothes to try them on and keep only the one that suits you and send the others back? / Si vous achetez vos vêtements sur internet, achetez-vous plusieurs exemplaires des mêmes vêtements pour les essayer et ne garder que celui qui vous convient et renvoyer les autres ?

Une seule réponse possible.

☐ Yes / Oui

☐ No / Non

5. 4. How many times a year do you buy new clothes? / Combien de fois par an achetez-vous des nouveaux vêtements ?

6. 5. How many clothes do you buy per year? / Combien de vêtements achetez-vous par an ?

Une seule réponse possible.

☐ 0

☐ 1-5

☐ 6-10

☐ 10-15

☐ 15-20

☐ 20+

7. 6. Do you buy used or new clothes? / Achetez-vous des vêtements neufs ou d'occasion ?

Une seule réponse possible.

☐ New / Neufs

☐ Old / D'occasion

☐ Both / Les deux

8. 7. Do you know the tailor-made clothing services? / Connaissez-vous les services de vêtements sur mesure ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non

9. 8. Do you buy tailor-made clothing? / Achetez-vous des vêtements sur mesure ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non

10. 9. What is your budget for buying clothes a year? / Quel est votre budget vestimentaire annuel ?

Une seule réponse possible.

- ☐ Under £100 / Moins de 100€
☐ £100 - £199 / Entre 100€ et 199€
☐ £200 - £299 / Entre 200€ et 299€
☐ £300 - £399 / Entre 300€ et 399€
☐ £400 - £499 / Entre 400€ et 499€
☐ £500+ / 500€ et plus

11. 10. Why do you buy new clothes? / Pourquoi achetez-vous de nouveaux vêtements ?

Hypothesis / Hypothèses

12. 11. Would you be willing to pay more for better quality clothes? / Seriez-vous prêt à payer plus cher pour des vêtements de meilleure qualité ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

13. 12. Would you be willing to pay more for environmentally friendly clothing? / Seriez-vous prêt à payer plus cher pour des vêtements respectueux de l'environnement ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

14. 13. Would you be willing to Taylor-made clothing for a higher price? / Seriez-vous prêt à acheter des vêtements sur mesure à un prix plus élevé ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

15. 14. Would you be willing to reduce your consumption of clothing for the environment? / Seriez-vous prêt à réduire votre consommation de vêtements pour l'environnement ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

16. 15. Would you be willing to reduce your clothing consumption to buy Taylor-made clothing? / Seriez-vous prêt à réduire votre consommation de vêtements pour acheter des vêtements sur mesure ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

Unused clothes / Vêtements inutilisés

17. 16. Do you have unused clothing? / Avez-vous des vêtements inutilisés ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non

18. 17. What do you do with unused clothing? Que faites-vous des vêtements inutilisés ?

Une seule réponse possible.

- ☐ Throws / Jeter
☐ Donations / Donations
☐ Resale / Revente
☐ Storage / Stockage
☐ Autre : _____

Connected objects / Objets connectés

19. 18. Do you know the connected objects? (Personal assistants / watches / lights...)
/ Connaissez-vous les objets connectés ? (Assistants personnels / montres / lumières...)

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non

20. 19. Do you have any? / En possédez-vous ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non

21. 20. Would you be ready to communicate your physical measurements to a device connected to the internet? / Seriez-vous prêt à communiquer vos mesures physiques à un appareil connecté à Internet ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

22. 21. If yes, would you be willing to allow this connected device to transmit your exact measurements to an online clothing sales service? / Si oui, seriez-vous prêt à autoriser cet appareil connecté à transmettre vos mesures exactes à un service de vente de vêtements en ligne ?

Une seule réponse possible.

- ☐ Yes / Oui
☐ No / Non
☐ Do not know / Ne sais pas

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