CLOTHINGTECH
A new concept of clothing
Ready to wear

MBDesign
MASTER’S DEGREE IN ADVANCED STUDIES IN DESIGN-BARCELONA
CONTEMPORARY DESIGN (ETSAB)
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June 2019
Acknowledgments

and special thanks to my family, friends and tutors, for all the help and support given during the course of this project.
This thesis research deals with the topic of shopping which has become an important part of each individual’s life. Nowadays, this activity has changed remarkably. With the development of technology, we can buy without the need of going to a store. This is what it is called, online shopping. A revolutionary change that allows us to buy any item we desire, everywhere and at any time. As far as we are concerned, online shopping, is now the state-of-the-art in shopping. Thus, the main goal of this project is to propose a new way of performing shopping, specifically in the retail field making use of the technology we have at our disposal.

In this context, the idea is to create a new methodology and experience to shop in physical clothing stores, given that online customers enjoy a personalized experience with rapid price and product comparisons, plenty of information and often spot-on recommendations based on their purchase history and preferences. Given this background, all the mentioned concepts above are showed through study cases and followed by the design, that shows a new concept of clothing, enhancing the making of the product and restoring the lost in-store activity, from its beginning until the final result, involving the customer to be part of all the production steps.
ABSTRACTE

Aquesta investigació de tesi tracta el tema de les compres que actualment s’ha convertit en una part molt important de la vida de cada individu. Avui en dia, aquesta activitat ha canviat notablement. Amb el desenvolupament de la tecnologia, donat que a l’actualitat es pot realitzar qualsevol tipus de compra sense la necessitat de desplaçar-se a una botiga. Això és el que s’anomena la compra en línia. Un canvi revolucionari que ens permet adquirir els productes que desitgem, a tot arreu i en qualsevol moment. Com ja es de saber, les compres en línia i, especialment, la venda de roba, ara són el tema de l’actualitat. Així mateix, l’objectiu principal d’aquest projecte és proposar una nova forma de realitzar les compres, concretament en l’àmbit comercial tèxtil, fent ús de la tecnologia que tenim a la nostra disposició. En aquest context, el plantejament és crear una nova metodologia i experiència per comprar en botigues de roba físiques, atès que els clients en línia gaudeixen d’una experiència personalitzada amb comparacions ràpides de preus i productes, gran quantitat d’informació i sovint recomanacions puntuals basades en l’historial de compra i preferències. Donada aquesta prespectiva, tots els conceptes esmentats anteriorment es mostren a través de casos d’estudi i seguits del disseny, que mostra un nou concepte de roba, que millora la fabricació del producte i restaura l’activitat perduda a la botiga, des del seu inici fins al resultat final, implicant el client per formar part de tots els passos de producció.
Shopping
(noun) /ˈʃɔpɪŋ/

the action or activity of buying goods from shops.
goods bought from shops, especially food and household goods.
KEY WORDS

Textile, personalized, clothing, future, technology, DIY, customer experience, interior design, interaction, wearable, fashionable.
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INTRODUCTION
INTRODUCTION

The concept of shopping has evolved remarkably in the last years. In the past, people have to get their purchase from the stores/shops. With the advancement of technology, now we are able to do shopping via online without the need to go to a physical shop. Furthermore, online customers enjoy a rapid service and they also get product comparisons, plenty of information and often spot-on recommendations based on their purchase history and preferences. All those features reflect the easy way of shopping, making it more flexible and interactive.

Even so, online shopping has caused a lack of presence of customers in shops and stores. In some cases, people go to the shops to pick up their online orders done previously and not to have a look directly at the items exposed. Otherwise, some customers go to the shop just to see what is in there, they try on it, and they end up buying online as it is more comfortable and it can be done at any time. This point, reflects the need customers have to see what they are buying; real colour, texture, thickness, size, etc, all these characteristics are crucial when selecting our favourite piece.

Then, we can state that online shopping is completely useful and flexible yet it has disadvantages. This idea arises from a personal desire to create a store where we can find the ideal clothes, and after a great reflection about how our clothes are made and where. A space where we are able buy a piece of clothing about which we are totally convinced as today we often do not find what we are looking for in the emerging stores. Many people do not know how is the manufacturing process of the clothes we use, or under which conditions they are being produced. My proposal, watches over this side of great interest at the same time when plotting the subject. In both physical and virtual stores, we find the end result, fashion for everyone. But what is behind this fashion? After seeing a documentary on this topic, it is shown the clear value of the clothes we buy and how are the conditions of the process of manufacturing precisely.

1. See definition of shopping in section 2 and 2.1
2. See definition of online shopping in section 2.2
“The True Cost” 3 2015, is a Must See in the documentaries of this line as it shows the shocking reality behind the fabrication of clothing. This documentary aims to create awareness on the society about this field and makes the viewer to be part of the process to bring social solutions, sustainable change that takes into account human rights and workers’ rights. It helps us realize the precariousness that workers are forced to develop their tasks in, which sometimes ends up in a tragedy like the one that happened in Rana Plaza, Bangladesh, that left hundreds of dead. As a summary, this documentary shows the relationship between the consumer who wants to buy fashion at a low cost and the precarious conditions and the low wages of the workers who manufacture the products.

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Another reference always related to the world of clothing and fashion is a movie that has given me another reason to outline my project proposal. "The Man in the White Suit"\(^4\), 1951, tells the story of a young scientist, who, after several attempts, invented a revolutionary fabric with peculiar characteristics; neither stains nor it breaks. As soon as he becomes aware of this innovative invention, his final destiny will be reversed in a disappointed way. At that time, entrepreneurs in the British textile industry and their workers, intend to interrupt the production of this revolutionary fabric with the clear reason not to lose jobs or the closure of their companies.

The film exposes an intense social and politics satire of the society. These references are very helpful to focus better in the development of the project and trying to solve these shortcomings and negative points that have emerged during the topic’s approach.

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OBJECTIVE/ CONCLUSIONS

The objective of this proposal is to design a system to bring life to the in-store experience and implement a new way of doing shopping, besides, we can be able to customize our clothes, see and touch the material, and witness the process of production while our item is being printed. The aim is to create a different concept of shopping by the use of technological systems to originate interaction in the space. Creating an automated yet handmade store will help users to be more interactive and have a pleasant shopping experience. Furthermore, this idea will help customers to choose their favourite pieces and personalize them in real time. So, this work is made for commercial interiors, specially clothing stores.

The expected conclusion is to improve customer satisfaction and differentiate the in-store experience. Also, by involving the user to be part of the process of manufacture will make it more interesting and personalized.

Technology and Innovation
The use of new technologies to improve the functioning of the space, will make it more interactive and enhance the satisfaction and the user experience.

Project & Environment
The use of eco-friendly materials for the design taking into consideration the environment, such as recycled cardboard to create the interior of the space is going to be designed. In addition, the main objective of the proposal is to treat the reduction of waste originated from the manufacture of clothing.

Theory & Criticism
The challenge here is an attempt to change the idea of the actual shopping by implementing a new concept and speculating on how is going to be used in the future.
MAIN HYPOTHESIS

The goal is not just “modernization” but rethinking the concepts of selling and customer service to create a true 21st-century shopping experience, to originate a bond between offline and online shopping. In a networked store the experience is enhanced through customer recognition, information “pushed” to customers based on preferences or special aspects made in real-time. The innovation is that we will be able to go shopping in an easier way. Entering to the shop, personalizing our items and see how they are being produced, without the need to pay in the store. An automated sensor system with which we can control every movement and have it tracked through media sources. The expected conclusion is to improve customer satisfaction and differentiate the in-store experience. Also, by involving the user to be part of the process of manufacture will make it more interesting and personalized.
THE ELEMENT TO DESIGN

The element to design is a STAND /SHOW STORE to promote this new concept of shopping of clothes. Since online retail is now the state-of-the-art in shopping. Online customers have the access to rapid price, product comparisons and elections, but the idea of this project is to design the process of making a piece of clothes through technology, where users will have the freedom to use it and interact with it in a customized way. By implementing existing technology, like three-dimensional scanner, sensors system or 3d printers, the space will be more effective and functional.

Customization/ DIY  Election materials/ colors/ textures  Printing process

Fig 4/ Process of the design’s proposal
Own source
Firstly, my area of interest involved the topic of shopping in the present day and the main concern was focused on how to change this method to a next extend. In the course of the preliminary development of the topic, I opted to analyse the present situation, including its advantages and disadvantages, to obtain a clear conclusion about the shortcomings this field has. Thus, once I arrived to the principal problem or shortage, this was the starting point of the research about the shopping field and its aspects. These steps led me to analyse the technology and how can we use it to purchase in an efficient and innovative way. I approached this research from the field of technology and studying the activity of shopping in its various sides. Once, all these topics had been clarified, I followed the research with study cases with the aim to acquire specific information and knowledge that will sort out some aspects in the course of the project. Lastly the project is completed with the conclusions found along the process and the recommendations for possible future research.
INTRODUCTION

Fig. 5/ Research diagram
Own source
“Most people make the mistake of thinking design is what it looks like. People think it’s this veneer — that the designers are handed this box and told, ‘Make it look good!’ That’s not what we think design is. It’s not just what it looks like and feels like. Design is how it works.” (Steve Jobs)
2 RESEARCH ABOUT SHOPPING
This part contains the research about the shopping field generally and its various aspects in the theoretical framework where this work is based to provide the idea that is going to be developed along this project. Starting with the introduction of the topic, followed by the different typologies that shopping has until the present. The importance of the actual shopping activities will allow us to understand the proposed idea. In the course of this part we also find the study of the manufacturing process, the machinery used, the technology that makes this subject innovative and the materials related to the textile field, as well as the examples chosen as a reference to complete the study.
Shopping is a fundamental element in our daily routine. Almost everything in life requires shopping. But what does it mean? “Shopping is an activity in which a customer browses the available goods or services presented by one or more retailers with the potential intent to purchase a suitable selection of them” 5.

In the antiquity, there were places destined to the purchase and sale of goods in certain days and in specific places. This is how the purchase of basic commodities was made. Over time, merchants established themselves as a kind of fixed stops to carry out their work. In places like ancient Greece and ancient Rome. After this period, and with the modernization of society, the need to buy and sell was on the increase, which caused the establishment of stores or permanent stops throughout the year, making the purchase and sale one of the most frequent and repeated activity. This phenomenon is produced by the industrial revolution and the high demand for production. Consumption grows and the population begins to buy without a concrete need. Simply, to acquire a new product on the market without using it.

With the passing of time, the act of buying begins to gain strength and many aspects come into play, such as customer service, product quality, after-sales service, etc. The act of simple shopping provides an emotional experience in the user. We all feel thrilled after walking out of the store having just bought that product or item we wanted. “The successful shopper can feel like he has just conquered the world through the mere act of buying an item that is pleasing to him” 6.

Fig. 8/ Shopping of clothes
Source: https://unsplash.com/photos/Fzde_6ITJbw
2.1. IN-STORE SHOPPING

As it already exists today, there are two types of how to make a purchase; physically in the store or online. Since the main theme is about the clothing retail, in this section we will analyse the purchase in the store in a physical way being the traditional method and best known to this day. This aspect has many advantages that the online form cannot offer to its customers and that we will list below:

- The first aspect is the ability to try on the garments that we would like to buy, to check our size and see if this suit or shirt really favours us.

- The chance to experience the quality of the product. Touching the textures of the clothes at first hand, if it is thick or thin, soft or rough, those characteristics provide a real image of what we want to acquire.

- The same goes for footwear and sportswear. The best way to know if some shoes really are comfortable is to prove them. To make sure that we will have a beneficial performance during our workout, we ought to fit on the sporting equipment in advanced to get the best results.

- The immediate access to the products. This aspect is of great importance since once we have chosen what we want, we can pay and take it with no need to wait for it.

- The exposition of products allows the customer to have a wider variety of items that may be of her or his interest.

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Fig. 9/ Shopping: physically in a store
Source: https://unsplash.com/photos/q3o_BMteFMD
2.2. ONLINE SHOPPING

Although shopping at stores has its advantages, online shopping also has its positive points. We are currently living in a world where the speed of the actions is very relevant, and thanks to the technology we have at our disposal, we are able to buy everything we want via online, without having to go to a physical store. This type of purchase also has its advantages that will be mentioned continuously 8:

- Shopping online, provides us to safe time and transportation until the physical store.

- There is no schedule for online shops. They are never closed.

- It is the most comfortable way to buy from the sofa in your home and with pyjamas.

- Buying online offers us the convenience of buying without queuing or spending time waiting to try the clothes. In addition, there are no crowd.

- After ordering your products, you may receive them at home, which makes it more comfortable and flexible.

- Online shopping sometimes offers us more discounts rather than the prices in the physical stores.

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Fig. 10/ Shopping via online
Source: https://unsplash.com/photos/gp8BLyaTaA0
As outlined previously, the two ways of buying have their positive and valid aspects. Recently, in our society, the predominance of online purchases is increasing, being in the spotlight. The fact that each individual has a mobile device causes this phenomenon to be available to everyone since there are very affordable options for sale. Being the most used form of purchase and sale, it offers convenience and flexibility to make both national and international purchases. It should be noted that even so, the online purchase has its shortcoming, such as the fact of not being able to test the clothes, nor know how is the touch of the textures or the real color, adding that we cannot take the products we have bought instantly as we have to wait for them for being delivered.

All these negative points make this method not 100% efficient, and has caused physical stores to have lost much prominence.

In the course of this analyses, the online purchase takes a center stage, leaving aside the physical store. This feature is what I intend to promote through this proposal. Focusing the attention on the store and return its value that has been lost over time.

The idea seeks to create a mix between technology and the traditional method of buying and selling. As a kind of DIY that the customer creates and produces it until the last step.
2.3. PROCESS OF MANUFACTURING

The process of making a piece of clothing consists on several stages until obtaining the final result. The main element to make any piece of clothing, is the fabric. The latter requires a long and continuous process through machines where the main product is the thread that can be of different thicknesses, textures and colors. To better understand how this process works, I visited the Technical Industrial School of Terrassa (Fig. 11), specifically to the textile department, to see at first hand the methods of fabric production, for their subsequent use in the making of clothes.
The first step in this production chain begins with the filament making through a machine as shown in the previous images (Fig. 11,12,13,14,15). This large machine (more than 5 meters long), is responsible for creating the fabric that requires coils of threads placed at one of its end which are linked to create the desired fabric. The preparation of the pieces is no longer done manually as it had been done in the antiquity, now it is an industrial process, always with the supervision of employers who work to ensure that all the steps are functioning correctly. This process streamlines the production of clothing quantities, compared with the ancient handmade manufacture (Fig. 16), where the elaboration of a garment could take days, as all the steps where handmade and required a high level of precision to obtain the best item.

![Fig. 16/ Convencional pedal Loom](https://deantano.cl/producto/telar-a-pedales-2/)

Source: https://deantano.cl/producto/telar-a-pedales-2/
Once the fabric is obtained, a pattern is made with the measurements of the piece, and then the fabric cuts are followed, and the union of these cuts are made to have the article of clothing. The next step is the placement of the accessories, if necessary, and this section would already be finished, giving way to the washing of the clothes to obtain the final result. Then the article passes a series of quality tests and if all aspects are valid, the next step is labeling and packaging the product for its subsequent final delivery (Fig. 17).

This process is the most common in the manufacture of garments, but there are other internal modifications in the steps depending on each company and also on the operating system of each device or machine.
2.4. MACHINERY

There are many machines that manufacture clothes in different ways and with various characteristics and benefits. In this chapter, I will expose some types of machines I consider are important for the approach of the proposal being revolutionary and efficient when producing the garments with smart textile solutions, taking into account the environmental impact that supposes each one of the different methods.

Fig. 18/ A woman sewing, Nepal
Source: https://unsplash.com/photos/1Q9yqAAYzGA
SHIMA SEIKI

SHIMA SEIKI is a company dedicated to the manufacture of clothes through technological machinery. His latest invention has been Wholegarment, a new revolutionary device which produces knitwear in one entire piece, directly in the machine. In contrast, normally to make a piece of clothes, it is necessary to manufacture it in parts; the back, the sleeves and the front part, which subsequently are sewn together to complete the garment.

The Wholegarment, requires a prior programming through technological computers linked with the machine to start the production once all the points have been configured. It also does not require seams, which means a skip post-production labor. In addition, this aspect means that it is not time-consuming, adding that it does not generate a lot of waste since the piece goes out completely from the machine. Even though, some designs, depending on the composition may require stitching to join all the parts of the item.

This company, supports a large variety of products, such as gloves, socks, leggings, braces, hats, scarves, neckties, bags, purses, wallets and other complements ⁹.

Fig. 19/ Wholegarment technical features
Source: https://www.shimaseiki.com

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SHIMA SEIKI has its own 3D design system named SDS ONE APEX series that incorporates a simulation of designs software. It also programs the knitting machines and patterns CAD. It contains a high quality range in the definition of virtual samples and designs.

Their Design System has evolved considerably since they launched the first digital system in 2007. Currently, the goal is to promote and create and advanced technology to develop a more creative industry.\(^\text{10}\).
The applications of the Wholegarment knitting are numerous, such as; Sports/Outdoors, Industrial, Safety, Wearable, Medical, Interior, Childrenswear, Accessories \(^1\).

KNITERATE

Kniterate, is a knitting machine that works digitally with the use of a punch card along with CAD systems which generates printed patterns, and some editions of this device are able to be connected to the PCs to read any pattern directly. It works mainly with a kind of Photoshop software that reads the patterns through an SD card that contains the model 12. The aim of this invention is to reach customers who want to personalize their items locally and democratize the clothing industry. This fact, was not possible due to the large dimensions of the industrial knitting machines and also due to the high price that costs. This machine, had been redesigned to fit in our space, as its width is about 914.4 mm maximum, and to knit our items in a more simplified process within a few minutes without wasting a lot of material during the process of production.

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The new fashion revolution and tendency is already having a powerful impact on our society. Apart from the industrial machines that we have mentioned previously which can make the fabric and the garment, nowadays this process can be printed in 3D and with quite competitive time frames. 3D printing technology has reached the world of fashion and clothing. In the very near future we can print our ready-to-wear clothes to use it.

This technology has the potential to reduce waste, labour force, but in addition, modernizes the form to produce clothing. But, how it works?

These printers, instead of using ink cartridges, use a plastic filament that falls from layer to layer to create the structure of the texture of the piece. The inconvenience they may have is that they are small machines and then large pieces cannot be printed, but can be attached from multiple 3D printed parts.

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1. Design the 3D model digitally and adjust all the configuration and dimensions.
2. Printing process, after the election of the colour of the material and its texture.
3. Final result. Separate and eliminate any excess of materials.

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3D PRINTED CLOTHING

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2.5. MATERIALS AND FABRICS

Bearing in mind that the most revolutionary machines in the textile world are those that weaves the entire piece at once, and then we have 3D printers through which are able to print any garment we desire. Thus, this episode focuses on analyzing the materials that these types of machines use to make the garment.

Fig. 27/ Thread of different colors
Source: https://unsplash.com/photos/IB6wK3jPvNA
The Wholegarment machine and Kniterate use basically knit fabrics with its different versions to make clothes. The knit fabric is made up of a thread that binds each other to form a fabric which is a flexible and an elastic material. The fact that it is formed by loops makes the textures to be wider or narrower thus creating different textures, dimensions and shapes with the same material. The advantage it has is the good finish on both sides, outside and inside. The main elements that make up the knit fabric are silk, linen, cotton, wool, viscose, rayon among others, although most synthetic components are often added to achieve various results and durability\textsuperscript{14}.

There are two different ways to produce this knit fabrics, vertically and horizontally: warp and weft Knitting. The first one consists on threading with separated needles creating a vertical knitted direction. Weft knitting works with a single thread that forms the piece in an horizontal way. In the following chart, it is exposed the numerous types of knit fabrics ans its applications (Fig. 28).

<table>
<thead>
<tr>
<th>Horizontal knitting</th>
<th>Jersey</th>
<th>Interlock</th>
<th>Rib</th>
<th>Purl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dresses, skirts, tops, underwear</td>
<td>Leggings, fitting dresses, shirts</td>
<td>Cardigans, neckbands, cuffs</td>
<td>Outwear, sweaters</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vertical knitting</th>
<th>Raschel</th>
<th>Tricot</th>
<th>Milanese Knit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dresses, coats, underwear, blouses</td>
<td>Lining, sleepwear, swimwear</td>
<td>Sweater, cardigans, scarfs</td>
<td></td>
</tr>
</tbody>
</table>

ADVANTAGES OF KNIT FABRICS

- Knit fabrics does not lose its shape and color, it is resistant and durable.

- This material is so versatile, which allows companies to use in numerous applications. Besides, thanks to its different thicknesses the items could be for winter or summer season.

- It has high level of flexibility and it can stretch in all directions, adapting to everyone’s shape.

- Comfort is one of the most important feature that knit wear has. Its textures can offer breathability and lighness being adaptable to hot and cold weather.

Despite having more positive points, knit fabrics also contain some disadvantages that will be mentioned below:*

- The complication of knitting this type of tissues makes it difficult to work with. It requires a lot of precision and carefulness.

- This type of fabric is prone to peeling or forming balls. When it is 100% fabric of a single composition, it causes pilling, but when it contains other synthetic additives, it gives it more resistance and retains this phenomenon.

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Fig. 29/ Low gauge knitting
Source: https://www.shimaseiki.com/wholegarment/

Fig. 30/ Half-cardigan stitch yield
Source: https://www.shimaseiki.com/wholegarment/

Fig. 31/ Integral knits without seams
Source: https://www.shimaseiki.com/wholegarment/

Fig. 32/ Dimensional structure patterns
Source: https://www.shimaseiki.com/wholegarment/

Fig. 33/ Knitting-in decorative elements
Source: https://www.shimaseiki.com/wholegarment/

Fig. 34/ Deeper necklines
Source: https://www.shimaseiki.com/wholegarment/
When speaking of 3D printing, this act is directly associated with synthetic materials with quite different characteristics of woven fabrics which were formed in a two dimensional form. In the beginning and with the popularization of 3D printers, plastic materials were used; PLA or ABS, which are polymers, mostly used when printing in 3D thanks to its wide range of colors that can be offered and also because they are rigid materials that cannot be deformed. For these aspects, printing any object or device, make them a very functional and simple material, but to print a piece of clothing, it is not quite comfortable because the result obtained would not be suitable with the flexibility of a piece of clothes.

The main challenge was to add more flexibility to this materials to print wearable items by inserting more stretch to them and altering its internal geometry. With the advancement of technology, many experiments are being done to create a 3d fabric with flexibility. The question is to put together small pieces to achieve a more stretched fabric without breaking. From here Filaflex arises, an elastic filament, strong, very flexible and with varied chromatic range, but also it has other positive point in favor:

- 700% elongation to break.
- Easy placement in the 3D printer machine.
- Compatible with almost all the 3D printers.
- It is a 3 mm thick filament which makes it more malleable and flexible.
- High level of strength and elasticity.

---

The variety of objects that can be printed in 3d is very broad. From small objects to large pieces. Following the line of the project, the accessories are a part that complements our clothes. That is why many objects, such as watches, bracelets, necklaces, bags, footwear, can also be printed in 3d in conjunction with our outfits.

Fig. 37/ 3d printed handbag
Source: XYZ Bag - https://www.xyzbag.com

Fig. 38/ 3d printed bracelet
Source: Nervous System - https://n-e-r-v-o-u-s.com

Fig. 39/ 3d printed sandals
Source: Danit Peleg - https://danitpeleg.com

Fig. 40/ Adidas 3d printed midsoles
Source: https://www.adidas.com/
2.6. STUDY CASES

AMAZON GO

Amazon Go, is a new concept of store where there is no checkout using the most advanced technology in the field of shopping\(^\text{17}\). It works through a mobile application. By using the Amazon Go app we will be able to enter the store after scanning our code, then we can take our go. The functioning is completely different from what we are used to do when we go to a shop. There are no cashiers, we can just find maintenance staff, you just have to grab any product you desire and go out, so you will never have to queue in line, this is called “Just walk out technology”, a simplifying method that makes shopping easier and interactive. This new concept of buying, offers a new experience to consumers, while it reduces the waiting time that we can pass within a store. Once you are done shopping, you can exit the store. Afterwards, you will receive a receipt with the charge of the purchase through the Amazon Go app.

This study case has been selected for the idea it contains behind the brand. Although it has other matters which can be debated such as sustainability and waste production both in production and packaging (Pag. 52).

Nespresso, was firstly launched in 1986 in three countries (Switzerland, Italy and Japan), proceeding with its expansion in other parts of the globe. The philosophy of Nespresso is unique, it does not sell a drink, but a lifestyle.

The sum of both factors makes its customers willing to pay a little more for a cup of coffee\textsuperscript{18}.

The signature has created a different way of buying coffee, since we can find coffee in any supermarket. But the concept of experimenting with this product goes beyond the simple coffee and its flavour. The customer feels the necessity to go to the store to experience the coffee senses.

\textbf{Fig. 43/ Nespresso logo}
Source: https://www.nespresso.com

\textbf{Fig. 44/ Nespresso ice coffee}
Source: https://www.nespresso.com

3D SHOPPING ASSISTANTS

Referring to stores with virtual 3d assistants, this case study is the first 1-clothing store appeared in South Korea. This shop belongs to the store chain, Shinsegge. Is the first store of its kind in the world. The aim is to enhance customer choices and increase sales where the customer does not need to go to pick up the clothes in the store. The process of its operation is intuitive and simple. After entering the shop, you go in a room where a three-dimensional scanner scans your body in detail. Then, using this information, the system creates a personalized 3d avatar for you. Once you exit the room, you will be able to see your avatar in a large screen. By scanning the RFID tag of any item you desire to try on, automatically it will appear on your avatar. This system allows customers to select among a large variety of clothes. When a purchase is made and the shopper scanned, all this information is encrypted and stored in a virtual card which can be used to buy clothes through mobile phones and computers.

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INTERACTIVE SCREENS

Adidas launched a digital area in the Harrods shopping center in London, as a claim for the store. It is controlled through tactile interactive screens which provide product details and locate ranges in store. The aspect of interaction offers agility and action in the space. The innovative tools developed by software companies are being used to offer the fashion industry a new manner of higher-quality visualizations, adding a wider range of user experience possibilities. Numerous brands, as Nike or Hugo Boss are now making use of 3D photorealistic to visualize and ensure how a garment will look like on a fixture.

Fig. 47/ Nespresso logo

Fig. 48/ Hugo Boss logo
Source: https://www.hugoboss.com

Fig. 49/ Nespresso logo
Source: https://www.nike.com/es

2.7. TECHNOLOGY

JUST WALK OUT TECHNOLOGY

As mentioned in the previous section, the leading technology that has revolutionized the world of shopping within the store is the “just walk out technology” (Study case of Amazon Go pag.46), it facilitates the operation of a business and makes it more interactive. Just walk out Technology detects automatically the movement of the stored products inside the shop, and keep them back to the shelves keeping its track in a virtual cart. After finishing the selection of the products and grabbing them you could go out the store. Immediately you will receive a receipt of the purchase through a mobile application. This technology offers the possibility of checkout-free with no need to pay in-store. It works in accordance to Computer vision, Sensor fusion and deep learning RFID. The last aspect, brings the possibility of simplifying shopper’s experience in the store and allowing to function with no lines, no check out.

Fig. 50/ Simple Diagram Showing How RFID Works

This technological advance will be desired as the shopper or customer will save their time skipping the dreadful checkout fase by entering, grabbing the products and going out rapidly. To complete this experience it is used the sensor fusion technology, specially RFID tags, which are under the same rank of automatic identification and data collection, very alike to barcodes although it is not necessary to be near of the scan reader of each article. This invention is changing the convinience of stores, and ameliorating the shopping experience in terms of saving time during the purchase process. Thus, the shop will function with autonomy, which means that there will be no dependents, but we will find maintenance staff.

In addition, over time, more companies will implement the same technology for the various benefits that offers to the consumers.

Sensor fusion, is one of the aspects among the functionality of this technology. The fusion of sensors consolidates the sensory data or the information obtained from different parts with the aim to be more precise and less vulnerable when it is used separately from the other parts. It requires sensors to sense the objects adding all the other factors that collaborate with the entire set, such as, RFID tags, RFID reader of signals and barcodes, cameras to take images of the items in the store, and technical staff to deal with the electronic devices and programming steps.

Fig 51/ Functioning of “Just walk out technology” in Amazon Go store
Source: https://www.slideshare.net
2.8. CONCLUSIONS

During the course of this chapter, the most relevant aspects of this research were considered and explained. The set of all the parts that make up this collection of information, gives the possibility of delimiting what will be the design of the project. From the garments, it is possible to develop different techniques to the characteristics that the space must have to shape the whole set and make it more innovative. And technology is one of the indispensable elements for the proper functioning of a business. As in today’s world, without technology it is hard to imagine our daily life. It plays a vital role. “Just walk out technology” (Pag.50, 51), is a clear example of innovation in the field of stores and shops in general and its has various applications.

After the analysis of the examples and

On the other hand, it is necessary to mention that one of the main aspects and necessary to have at the time of choosing the machinery that will produce the garments, is the generation of waste. With the conventional machines, there is always a wasted part of material in the manufacturing process, reason of why the search has focused on the 3 devices mentioned above (Pag. 35-39). Where waste of material is minimal and therefore, the residue can be controlled optimally.

When it comes to the production concept, it is also necessary to outline that one of the referrals explained previously, specifically the Nespresso case, as a brand philosophy is totally interesting, but it has generated a concept of production that generates waste continuously, since to make the capsules and their appliances, there is a great waste of material which causes a negative impact on the environment.

With the progress of the research, it has been taken into consideration how a store or business operates from the perspective of the concept and the innovation in the approach of the subject.

With the set of these parts, it is intended to conceptualize the idea as a new way of buying, applying the technology “Just walk out technology” to create an interaction and offer a unique experience for the consumer; a futuristic vision of shopping that could be spread all over the globe. By implementing a new form of making clothes, completely different from the conventional way, we will be able to download and print our clothes freely in a matter of years. Introducing this new shopping experience will certainly change the world of retail for the better eradicating social differences and democratizing this sector.
After this stage and to specify the aspects of the design that will be carried out, it is necessary to define what items will be offered to customers as a starting point, so that they can be customized and then printed or knitted. To give a full range of products, we will use a Shima Seiki (Pag.35) and Kniterate machine (Pag. 38) to produce garments, and a 3D printer in order to print all accessories and footwear items. This way there is a coverage of all needs and demands.

![Variety of articles proposed for printing and knitting](image)

Men and women clothes

Men and women footwear

Men and women accessories
3 CONTEXT.
LINKING THE IDEA TO REALITY
This episode shows the contextualization of the project. To delve into this proposal, it has been necessary to find an emblematic place to locate the design. Thus, it has been chosen the Rec.0 experimental stores, since firstly it deals with the subject of clothes and secondly, it is a very important event in the province of Barcelona where it transforms a neighborhood of a city in a very characteristic way.

In this chapter, it will be exposed what it is REC.0 Experimental Stores, and what activities are carried out during the days of its functioning. To know at first hand how the atmosphere and the organization of this event is, I have personally assisted to it, to know the participating brands and signatures and how they are distributed throughout the neighborhood.

Image cover: Map of Igualada, Barcelona
Source: http://maps.stamen.com
3.1. REC.0 EXPERIMENTAL STORES

Rec.0 Experimental Stores is a multicultural event celebrated twice a year. Its location is in Igualada, in the province of Barcelona. It takes place in an old industrial district of the city, Rec 22. The event consists on transforming old factories and tanneries into pop up stores where numerous brands sell their stocked products with very competitive prices. Rec.0 Experimental Stores, has its beginnings in November 2009, the date when it was founded by a group of six people with the aim to spread this activity among the fashion industry. Since its launch, this pop up festival has become a clear reference in Catalonia.

The peculiar characteristic of Rec.0 is that each edition is not the same as the previous one, there are always new features. Each year, new brands are added to the list of participants.

A different circuit is created for each edition where during its course and for 4 consecutive days, many places can be discovered and buy fashion brands of prestigious label at very special prices. Once this event is over, the district returns to its normal activity.

A part from showing up the various brands, Rec.0 is also a cultural meeting between the visitors and the artists. Thus, Rec.0 holds a Rec Street Food, whit 32 food trucks, additionally, Music Rec Festival offers several concerts in two scenarios including poetry reading, screening and other exhibitions.

Fig. 55/ Pop-Up stores circuit 2019
Source: https://www.rec0.com/es/
Fig. 56/ Rec logo
Own source

Fig. 57/ Rec kids zone
Own source

Fig. 58/ Signage Rec stores
Own source

Fig. 59/ Influx of visitors
Own source

Fig. 60/ Signage Rec stores
Own source

Fig. 61/ Signage Rec stores
Own source
3.2. OTHER ACTIVITIES

REC MUSIC FESTIVAL

Rec.0 Music Festival, is one of the activities celebrated during this event. It programmes around twenty concerts in two stages distributed along the neighborhood.23

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Rec Food Street, it is having an increasing demand lately. It has more than 32 food trucks located throughout the Rec district.

Fig. 67/ Signage Rec stores
Own source

Fig. 68/ Signage Rec stores
Own source

Fig. 69/ Signage Rec stores
Own source

Fig. 70/ Signage Rec stores
Own source

24 Rec music festival [Online] Available at: https://www.rec0.com/es/rec-0-et-projecte/
2019, [Accessed 4 May 2019].
During my visit to the Rec, in its latest edition, a large number of visitors to this event have been observed to enjoy a vintage and pop atmosphere while delighting various snacks as they move through the food trucks and accompanied with live music. Through the circuit (Pag.58), we find clothing stores of some reputable brands that sell their products at fairly affordable prices. Also, shops intended for the sale of items for home and besides, some establishments that sell children clothing. Therefore, it can be said that it is a very complete event, where everyone has a place to fit in.

After this synthesis, the user is not a specific profile, rather it is a general public that goes to consume, and could be classified as a large volume consumption, therefore, it is an event open to people of all ages and preferences.
This chapter presents the design of the proposal starting with the ideas and examples of other models as a reference to proceede with the following points. As we are already dealing with the textile theme, it has been deemed convenient to work with flexible and curved forms taking into account the structure of the thread reels, which denote movement and lightness. The design building proposed can be located both in the interior of trade fairs or outdoors and it would also be flexible and adaptable to any event and location. It is also treated the subject of materialization of the design, focusing on the use of cardboard for its qualities using the concept of economic and medioambiental sustainability. Design sketches and drafts are shown to explain the whole process. It has been designed the interface of the mobile application through which the customer will be able to personalize their items. In addition, an advertisement has been created in the form of an outdoor cartel to publish this new concept. Finally, the packaging is in the form of a cardboard tube, the main element in the interior of the space, thus it gives continuity and coherence to the whole set.
4.1. REFERENCES/STUDY CASES

Fig. 71/ Outside Scenario mounted with plastic boxes at Rec event. Source: https://www.rec0.com/es

Fig. 72/ Exterior assembly made out of containers at Rec event. Source: https://www.rec0.com/es

Fig. 73/ Exterior clothing container exhibitor at Rec event. Source: https://www.rec0.com/es

Fig. 74/ Outdoor stand of clothes at Rec event 2019. Own source

Fig. 75/ Levi’s Stand for customized Jeans in Rec event 2019. Own source

Fig. 76/ Outdoor stand of clothes at Rec event. Source: https://www.rec0.com/es
These references use the curved forms applied in interiors of stores with the combination of light, the result is yet more defined as shown in the Van Cleef & Arpels exhibition in Singapore (Fig. 77). In this case, the curves are made from yarns hanging from the ceiling.  

The second images is a store in Japan, made out of cardboard tubes that composes separated zones inside the same space. The tubes had been reused from waste. (Fig. 78).  

Behind this project lies the idea of creating a striking space that does not have to forcibly have a great investment for its execution.
#Organic Shapes #Threads #Coils of strings #Textile #Mesh #Grid

Fig. 79/ Threads
Source: https://unsplash.com/photos/3pBHB-bmGno

Fig. 80/ Coils of strings
Source: https://unsplash.com/photos/aGz5hkren64

Fig. 81/ Wire coils
Source: https://unsplash.com/photos/PpHZmraAqHA4

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Source: https://unsplash.com/photos/PpHZmraAqHA4
4.2. THE DESIGN (PLANS)

Fig 84/ First sketches
Own Source
THE DESIGN

Fig. 85/ First sketches
Own Source
THE DESIGN

Fig. 86/ Draft of design
Own Source

- Private area (staff only)
- Public and open area
- Shop window area
1. Entrance of the store/stand
2. Code Scanner zone
3. Visualization of different models on customers avatars area
4. Knitting and 3D printer machines area
5. Waiting area
6. Take away zone
7. Private area for staff. Coffee corner. Storage space
8. Washing and dryer machines. Ironing support. Clothes and complements storage. WC for staff
9. Exit of the store/stand
THE DESIGN

Fig. 88/ Elevation AA' 1/100
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Fig. 89/ Elevation BB' 1/100
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Fig. 90/ Elevation CC' 1/100
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Fig. 91/ Isometric view 1/150
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Fig. 93/ Customization and augmented visualization space view
Own Source
THE DESIGN

Fig. 94/ Printing and knitting area
Own Source

Fig. 95/ Waiting area
Own Source
Fig. 96/ Pick up or take away zone
Own Source

Fig. 97/ Private area for staff. Coffee corner. Storage space
Own Source
THE DESIGN

Fig. 98/ Washing and dryer machines and ironing support. Clothes and complements storage. WC for staff.
Own Source
4.2.1. MATERIALS

The main central elements are proposed to be made out of cardboard tubes, to give flexibility and curved spaces. This material is sustainable, economic and light. The idea was initially inspired by the projects of Shigeru Ban (Fig.100), where cardboard is the protagonist of the majority of his designs, thanks to its qualities such as easy assembly and disassembly, lightness, flexibility and environmental sustainability.

Fig. 99 / Corrugated Cardboard
Source: https://www.hardypackaging.co.nz

Fig. 100 / Cardboard Cathedral Christchurch, New Zealand 2013, Shigeru Ban
Source: http://www.shigerubanarchitects.com

Fig. 99 / Cardboard
Fig. 101 / Cardboard tubes structures of the design
Own source

1 Code Scanner zone
3 Knitting and 3d printer machines area
2 Visualization of different models on customers avatars area
4 Take away zone

THE DESIGN
4.2.2. VIABILITY

Viability, especially economic, is the condition that evaluates the convenience and functionality of a project or idea. In this proposal, the viability represents other definitions that make this idea valid and functional. As described throughout this project, the element to be designed is a stand/store type building, which could work and be applied to reality thanks to a series of points that will be shown next.

The first point is the agility that would involve mounting and dismantling in the stage of execution, as it is used the material of cardboard in the form of tubes, thanks to its qualities of being sustainable and also for the economical and affordable part.

The second point is the internal operation of the business and in this case it is proposed to use the method of sponsorship of 3D printing and knitting machines as well as the technology that will operate the entire store set.

This could be optimized over time and once the operation is more evolved.

Regarding social viability, in this case it would be an immediate validation, since social consumption is treated with the concept of producing democratically and responsibly. The impact of these points could be between mid and long term, since it is a new way of focusing the production of clothes and accessories and it is necessary for society to know and understand it gradually.

In the construction phase, it requires an initial investment, and so in the internal operation, it would be necessary to establish ties with the pioneering companies in the textile industry as well as the 3D printing industry. Consequently, it can be stated that the project presents quite real characteristics that could be implemented various places and that it develops a correct and evolving functioning.
4.2.3. APP INTERFACE

Fig 102/ App interface
Own source
4.4. CORPORATE IMAGE

In this section, the corporate image is considered as a means of disseminating this new idea and making it known in society. In order to carry out this design, it has been sought to search images that represent a different way of dressing, to attract more attention and offer a vision for what is not usual. Hence the inspiration for the designs of Iris Van Harpen 27, who is a Dutch fashion designer, renowned worldwide for her talent and creativity, as well as being a pioneer in the world of 3D printing for fashion with various technical constructions of the piece. Her designs go beyond a simple piece of cloth, express art, movement, surrealism and reflect a creativity that everyone can interpret in their own way. To carry out the poster design, I have been based on the choice of some images that convey a sensation, movement and uniqueness.

A New Concept of Clothing

ClothingTech®
Ready to wear

Copyright © 2019 ClothingTech
@clothingtech

Fig. 103/ Advertising poster, proposal 1
Own source
A New Concept of Clothing

ClothingTech®
Ready to wear

Copyright © 2019 ClothingTech
@clothingtech

Fig. 104/ Advertising poster, proposal 2
Own source
A New Concept of Clothing

ClothingTech®
Ready to wear

Fig. 105/ Advertising poster, proposal 3
Own source
THE DESIGN
Fig. 109/ Photomontage outdoor advertising
Own source
The main focus in this part is to create a unification between the interior space and the packaging. For this reason, once the customer already obtains the purchase, it will be given to consumer in a cardboard tube, which can be an indicative element of the signature, besides it is also a reusable and sustainable item. The objective is to propose a homogeneous set between all the aspects of the project and the final result of the product. These tubes are proposed to be of different sizes and heights depending on the piece of clothing.
CONCLUSIONS
In order to carry out and develop the final work of the Master on Contemporary Design, a previous reflection and research was needed to know the shortcomings it has the topic proposed and what novelties could be provided to it to create a significant impact. Currently, there are already methods through which the customer can make a purchase rapidly. But, as from the beginning of this project the main objective was to create a new way of buying, different from the already existing online or in-store methods, in the course of the preliminary development of the topic, I opted to analyse the present situation, including both the pros and cons to define the deficiencies. Thus, once I arrived to the central shortage, the goal was not just to modernize, but to rethink about the concepts of selling and customer service to create a true 21st-century shopping experience, linking between offline and online shopping in a networked store the experience is enhanced through customer recognition, and information based on preferences or special aspects made in real-time. Based on all the previous aspects, the idea seeks to create a mix between technology and the traditional method of buying and selling. As a kind of DIY that the customer creates and produces it until the last step. The research also has been based on social and sustainable features to give an alternative to society in this field. From the technological and innovative side it is intended to implement the “Just walk out technology” to make an interactive space and enhance the satisfaction of the user. Now, with the 5.0 industry, we have numerous tools such as the connection with the icloud to store our customized items, the possibility to share opinions and models with the community, and the self-fabrication of clothes and complements. On the other hand, in the project and environment line, it is considered the use of ecofriendly materials such as cardboard that can subsequently be reused to lessen the waste. This point is linked to the choice of machines that can work efficiently and innovatively inside the store. In the part of the theory and criticism, the challenge was to implement this new concept of clothing through the speculation an analysis of the social situation, as well as cooperating in the extinction of social differentiation that some countries live due to the economical and social aspects and where many manufacturing factories of clothes are seated.
Overall, I can state that after the exposed information throughout this document, the first hypothesis and the main objective have been fulfilled to offer a new concept of clothing that looks after the social, economic and environmental aspects. A new experience that will certainly change the world of retail to the better and democratizing this field in the near future. It creates a survey of current trends in fashion and clothing, adding an optimization of production and marketing processes. It shows a model of proximity store where all the steps are exposed.

Another point to add is that this model of building, stand or model store, could serve as a promotion of the business and one could search other events in other places to make it known and participate in more activities of this sector. Along this master thesis, it had been dealt with the subject of social difference which generates unresolved points since it could be deepened more and analyze other aspects not only those directly related to the world of clothing and in another context with different programs. This subject could be an academic debate related to the social and contemporary design.
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