GHELFICRAFT

A PRODUCT SERVICE SYSTEM FOR CARDBOARD ARTIFACTS MAKING

A new way to reduce the resources and energy waste caused by online shopping returns.

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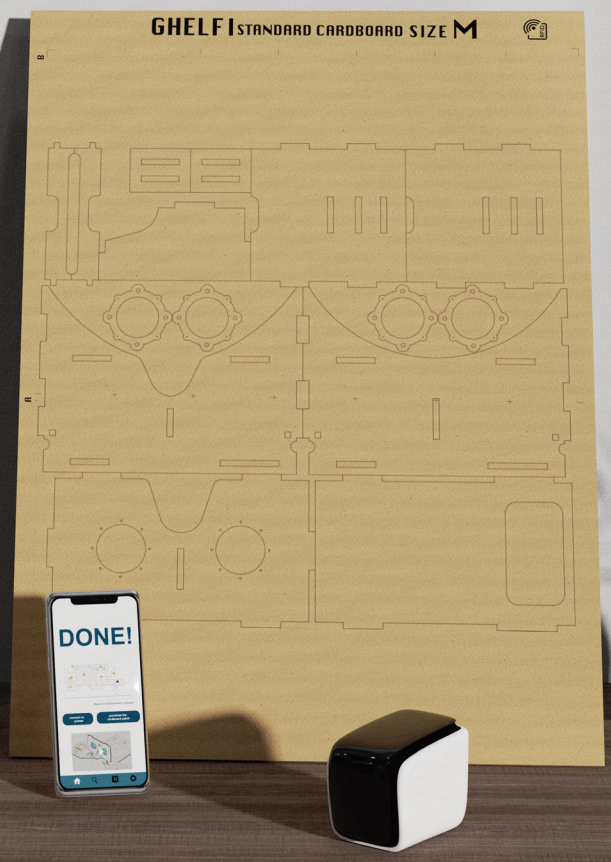

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ABSTRACT

Fig 0.1 - Shopping refunds

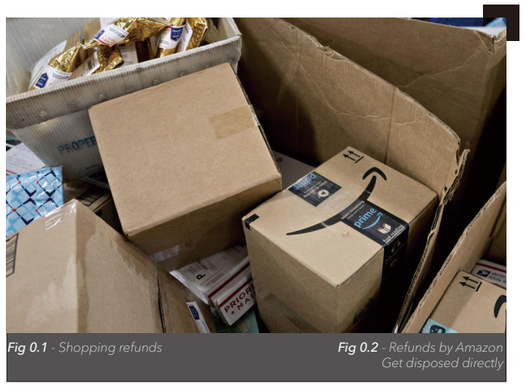

Fig 0.2 - Refunds by Amazon Get disposed directly

Today is a society under the consumption economy. The general improvement of people's life quality , makes people **pay more attention to the use experience** of products that will facilitate life while pursuing the quality of life. People buy products for **beautiful designs , useful features, or even great sales promotion activities** . At the same time, in order to protect the rights of all the consumers, within a certain period after purchasing the product, product can be **returned for no reasons** if the customer want to . The rights of consumers are protected, and the large consumption has also reinforced to the development of industrial production.

But in fact, misunderstanding users' needs will make the brand produce a lot of **product that can not solve the true problem of users.** Under the protection of promotion methods, **effects of celebrities** and **"no reason "refund policy**, consumers make a lot of **irrational purchase** without worrying about the risk. Through research, I have found that **most of the purchased products get returned**, and there were also many products that were purchased but after that the product get **used in rare frequency**, and most of these products would eventually become **garbage and industrial waste**. And the consume of **social resources and energy** in the process of manufacturing, transportation, and return will be **meaningless** .

However, the generation of industrial waste and the consumption of resources and energy **have not attracted the attention of most of consumers**, then become into an **invisible waste**. By **combining cardboard** to find a **method or direction** that can **reduce the above-mentioned waste and energy consumption**, this is the goal of the research direction and the brief of design project in this paper.

This paper will **rebuild the artifacts making process of cardboard products** and build a cardboard cultural **community** by combining the **product design** of a portable printers and standard cardboard and the **interactive design** of the cardboard product blueprint sharing platform. Through optimizing the process, users can start and finish the making process without difficulty and with very high enthusiasm and experience, thereby attracting more users to develop the habit of making cardboard products, and through the development of this habit , which can allow users to **try the product** they want to buy by using the cardboard product model **before purchasing the product** , by doing this to **strengthen their understanding of their own needs and product functions**, then **reduce** irrational consumption, returns and the occurrence of idle items. **And finally**, the purpose of reducing resource waste and energy consumption is achieved.

Keywords

Invisible waste
Irrational consumption
Bad effects of shopping returns
Cardboard culture
New role of cardboard
Retail revolution

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Sincere thanks to library staff in Politecnico di Milano who has kindly taken the time to assist me on lending books and suggesting on acquiring books from local books shops .

Also, this thesis would not be possible finished without the helps of my close friends who have always encouraged me to work hard.

INDICE

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.2 Product design - 1
Ghelfi Standard Cardboard

- .1 Scenarios
- .2 Exist solutions
- .3 Brief analysis
- .4 Concept
- .5 RFID technology
- .6 Sale pack

.3 Product design - 2
Portable Printer

- .1 Scenarios
- .2 Competitors selection
- .3 Product Positioning
- .4 Brief analysis
- .5 Personas
- .6 Inspiration
- .7 Concept
- .8 Usage
- .9 UI design
- .10 Refill
- .11 CMF design
- .12 Structure design
- .13 Storyboard
- .14 Product dimension

CHAPTER 5
CONCLUSIONS

.1 MATERIAL PRODUCTIZATION

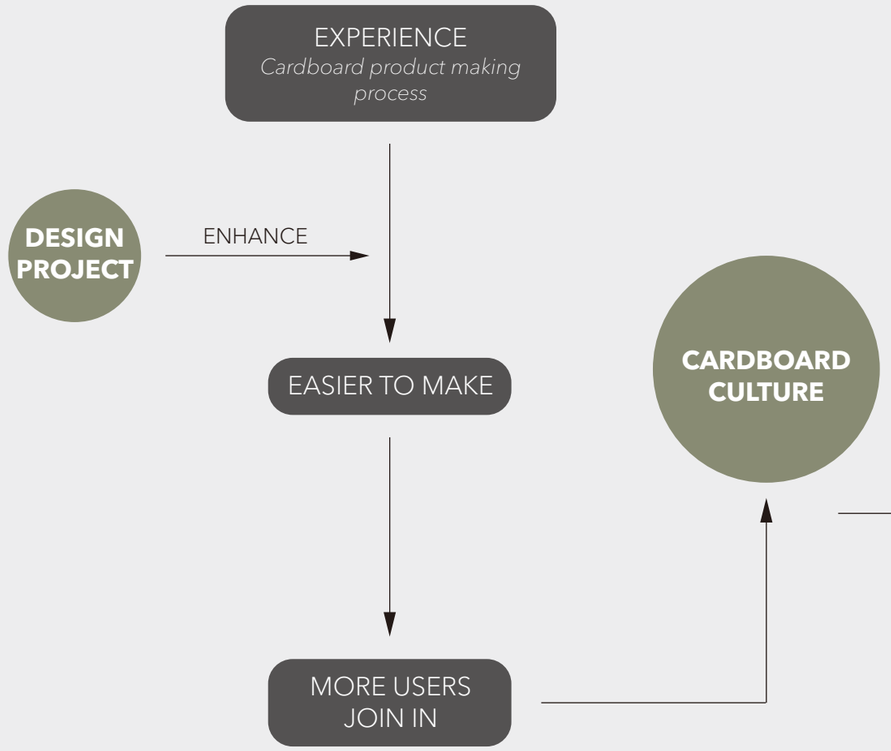
.2 CARDBOARD CULTURE AND RETAIL REVOLUTION

.3 DETAILS SAVE THE ENVIRONMENT

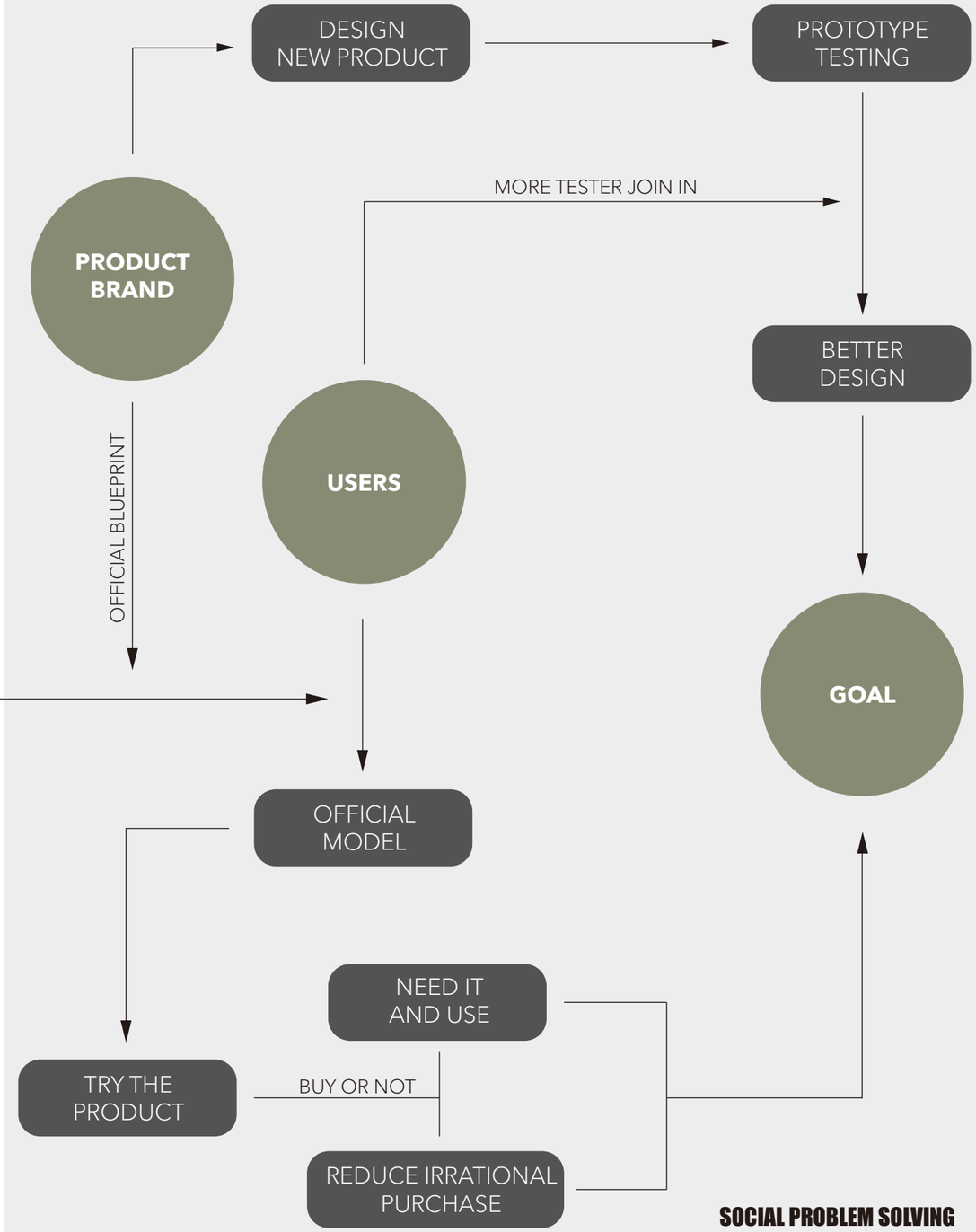
INTRODUCTION

The designs included in this paper will not directly solve the problem of wasted resources and energy caused by shopping returns and idle items in the macro-view , the macro problem will be solved by cardboard facture culture , and to cultivate this culture in major part of users , good experience of artifacts making will be needed , then here comes my designs for the specific brief.

PROJECT LOGIC



DESIGN PROBLEM SOLVING



SOCIAL PROBLEM SOLVING

Please allow me to explain the **logical architecture of this paper** and how the specific design project solves the problem step by step.

The product design of standard cardboard , portable printer and the interaction design of the blueprint sharing platform are to solve the problems that users will encounter in the process of cardboard products making.By solving the problems in the process, users can successfully complete the facture of cardboard products, and make most of users accept this behavior, thus forming a culture of handcraft facture cardboard product. When this culture is integrated into life, by making cardboard products model of the product they want to buy, users can experience the target product and understand the matching degree between their own needs and product functions, thereby reducing irrational consumption. Ultimately reduce shopping returns and idle items, reduce waste of resources and energy, and the generation of industrial waste.

In response to the above target, the following topic will the main parts of this paper : define the problem , search for the solution or direction , user research on solution founded and the specific design.

CHAPTER 1

In the first chapter, through my observation of the phenomenon of online shopping explosion , I found that products purchased online will face many returns or become idle items , and this phenomenon is common around the world. This will generate a lot of waste of resources and unnecessary consumption of energy, and the energy and resources used in the production process of the item itself will become meaningless . This kind of consumption and waste is invisible and has not got attention by consumers and users at present. Therefore, this is the macro problem that my paper will discus .

In response to this problem, the government and online shopping platforms have proposed some relevant solutions. Through the research on the starting point of these solutions, I have found a new direction, that is, before buying a product, if you can deeply understand your own needs and product functions, irrational consumption will be reduced, and then the return and idle items will be reduced .

CHAPTER 2

In the second chapter, I will analyze the products produced by GHELFI Ondulati S.P.A., as well as the production process of the company. Combined with the advantages of the cardboard material , the irreplaceable characteristics of cardboard in various materials and proposes to use the cardboard material to make the target product model, so that users can simply try the product before paying for online shopping. The method allows users to further understand their own needs and the functions that the product can provide, to solve the problems mentioned in the first chapter. However, the necessary condition for the realization of this new method of trial products is that most users should accept the behavior of making cardboard products and can complete the process quickly and without difficulty, forming a common habit. Therefore, the next part is to investigate the reasons why the behavior of cardboard products making has not been widely accepted , the difficulties hide in the process, and how to solve these difficulties.

CHAPTER 3

In the third chapter, I have done the quantitative analysis of the questionnaire and the qualitative analysis of user interview, summed up the reasons why the cardboard products making has not been popularized and summarize every phases of making process that most users did ,and the problems that users may encounter in each phases. The 3 major difficulties that are founded are :

1. *There isn't a specific platform for users to search for the blueprint that users wanted they need to do this through innumerable unrelated platforms ;*
2. *There is no reliable source of getting high quality and clean cardboard during facture process;*
3. *During the blueprint transfer process the scale and the dimension of the blueprint is hard to control.*

For the above 3 questions, I summarize the specific details of the support or services I need to provide to the user through design method .

CHAPTER 4

In the fourth chapter, I have done three specific design projects to rebuild the cardboard artifacts making process .

- *The interactive design , through this specific platform users can easily and quickly find high-quality blueprints they want.*
- *The product design of standard cardboard allows users to easily obtain high-quality and clean cardboard .*
- *the product design of portable printer allows users to reduce the technical issues of controlling the scale or the dimension of the blueprint during transfer phase.*

Through this paper, I have concluded 3 meaningful topics to discus in the future :"Material productization", "cardboard culture and retail revolution" and "reducing waste through details save the environments ".

And this is the whole logic of how this paper developed . I hope that through this paper, readers and users will get more interests of making cardboard artifacts and get noticed to the bad influence caused by shopping returns . From the consumer's point of view this can provide a new direction to improve the awareness of their own demand, reduce unnecessary irrational consumption save the money ,save the environment . In the product companies' point of view , this solution allows them to better understand the needs of users and reduce the production of useless products. Ultimately reduce the waste of resources and unnecessary consumption of energy in our society.

CHAPTER 1

Problem Finding

Resources and energy waste caused by the online shopping returns

1.0 Introduction

Nowadays , people have **more time and money** can be spent on **enhancing the quality of their life** , more and more products get purchased by the customers and produced by the companies . And under the **development of the internet**, **online shopping** get more attention by the customers .

But online shopping will cause another result , that is huge amount of **shopping returns** appear . And this will occupy a lot of social resource and waste energy . So how can we reduce them , and let more people notice the problem?

In this chapter, I will start the paper from **daily life observation** , and find the **main topic** that I will discus .Through the **analysis of the refund data** , I will summarize the **main reasons of refund** , and how can we reduce it . Then by studying the **solution exists** , find out **a new direction** that can be used to solve the problem , and what could the **cardboard** do in this topic.

1.1
The 3 pillars of the online shopping explosion

Fig 1.1 - Various products in the supermarket

Fig 1.2 - Industrial production

1.1.1
Industrial production

The use of tools marks the birth of human . Since the origin of human civilization, most of the items and products in human daily life have been hand-made by workers. The products reflect more diversity and customization. Every product will be Meet requirements according to different usage scenarios. But it also means that the entire process from design to production of each product is very slow and single, which makes it difficult to make a huge breakthrough in the output and variety of handmade products.

In the 18th century, the production of the British workshop industry could no longer meet the needs of the market, which put forward the requirements of technological reform for the workshop industry.Britain established a constitutional monarchy earlier, and the bourgeoisie’s rule in the United Kingdom was increasingly strengthened. The United Kingdom also basically completed the agricultural revolution in the 17th and 18th centuries; the lack of British labor determines that the wages of British workers are higher than those in continental European countries. Put more energy into the research and development of production technology, the experience accumulated in manual labor in the workshop and the progress of production technology, as well as the support and rewards of the bourgeois government for inventions and creations, promoted the invention and improvement of the steam engine, and pushed mankind to a new level "steampunk era".

From the 1860s to the mid-19th century, humans began to enter the age of steam.

In England, in order to draw water from the mines and turn the wheels of new machinery, a new source of power was desperately needed. The result was a series of inventions and improvements, culminating in the development of a steam engine suitable for mass production. Among the new inventions, Richard Arkwright's hydro-spinning machine (1796), James Hargreaves's multi-spindle spinning machine (1770) and Samuel Crompton's spinner The Spinning Machine (1779).In England, in order to draw water from the mines and turn the wheels of new machinery, a new source of power was desperately needed. The result was a series of inventions and improvements, culminating in the development of a steam engine suitable for mass production. Among the new inventions, Richard Arkwright's hydro-spinning machine (1796), James Hargreaves's multi-spindle spinning machine (1770) and Samuel Crompton's spinner The Spinning Machine (1779).In metallurgy, for example, Bessemer steelmaking, Siemens Martin steelmaking and Gilchrist's Thomas steelmaking; the use of electricity and the invention of the internal combustion engine, and the invention of radio communications have been transformed; most One striking example can be found in coal derivatives, which include hundreds of dyes and a host of other by-products such as chemicals, high explosives, and neroli.

The second phase of the Industrial Revolution was also characterized by the development of mass-production technologies.

1.1.2
Industrial design

After the first industrial revolution, many industrialized products were put into the market, but because the factory only emphasized scale and catechization at that time, and only paid attention to production and sales, many rough and crude industrial products flooded. Therefore, under the slogan of "combining art and technology", aesthetics is applied to the practice of technology, because technology can meet the material needs of human beings, and art is more to meet the emotional needs of human beings. This has played an important enlightening role in industrial design and even modern design, and the industrial design at this time is the so-called "traditional industrial design". Traditional industrial design mainly takes product design as the core, which is very similar to the concept of narrow industrial design in most literatures. So to this day product design and industrial design are indistinguishable.

It was not until the Bauhaus period that a systematic and reasonable way of exploring a harmonious unification of technology and art was explored. A modern industrial design framework is established, which enriches the connotation of industrial design, and allows industrial design to pay more attention to the rationality of the product itself and the position of people themselves (that is, users) in product design.

Fig 1.3 - Bauhaus University and its modern industrial design style

Fig 1.4 - Allestimento di L. Gargantini per la Fiera di Bolzano, 1957. Foto di Paolo Monti

However, since the development of industrial design, it is no longer a simple "technology + art", especially with the development of computer and Internet technology, the scope of industrial design has been expanded, and the connotation and extension of industrial design have also been changed. The design objects of industrial design have also become more diverse, including software, services, processes, etc., which have surpassed the traditional physical products. The field of industrial design is no longer limited to the design of form and function, but also the innovation of services and systems, and pays more attention to the emotional communication and user experience between products and users.

It can be foreseen that with the development of the times, industrial design will inevitably break away from pure appearance design and expand its scope. Some experts even believe that "the design and planning of any concrete or abstract, large or small object in industrial society" can be called industrial design.

1.1.3
Internet platform and shipping

The emergence of online shopping as it is known today developed with the emergence of the Internet. Initially, this platform only functioned as an advertising tool for companies, providing information about their products. It quickly moved on from this simple utility to actual online shopping transaction due to the development of interactive Web pages and secure transmissions. Specifically, the growth of the Internet as a secure shopping channel has developed since 1994, with the first sales of Sting's album Ten Summoner's Tales. Wine, chocolates, and flowers soon followed and were among the pioneering retail categories which fueled the growth of online shopping. Researchers found that having products that are appropriate for e-commerce was a key indicator of Internet success. Many of these products did well as they are generic products which shoppers did not need to touch and feel in order to buy. But also importantly, in the early days, there were few shoppers online and they were from a narrow segment: affluent, male, 30+.

Fig 1.5 - Amazon , 1st online shopping platform in the world

Fig 1.6 - Digital technology makes the shipping faster than ever

Online shopping has come a long way since those early days and – in the UK – accounts for significant percentage (depending on product category as percentages can vary). Statistics show that in 2012, Asia-Pacific increased their international sales over 30% giving them over $433 billion in revenue. That is a $69 billion difference between the U.S. revenue of $364.66 billion. It is estimated that Asia-Pacific will increase by another 30% in the year 2013 putting them ahead by more than one-third of all global ecommerce sales.[needs update] The largest online shopping day in the world is Singles Day, with sales just in Alibaba's sites at US$9.3 billion in 2014

1.2
Problems caused by online shopping

Due to the development and rational application of industrial production technology, the design and development of new human-oriented product forms of industrial design, and Internet shopping, a brand-new shopping method and channel brought to consumers, consumers have exploded in the variety of commodities in the market. Under the background of the local environment, it is more convenient to shop anytime and anywhere, which further promotes the rapid development of the entire consumer goods industry and the improvement of rules. However, due to the protection of online shopping return and exchange rules and the variety of products, consumers have irrational consumption caused by wrong judgments about the value and function of the product itself, and this consumption will directly lead to returns and idle goods. problems, which in turn lead to a series of waste of resources and energy.

1.2.1 Shopping Refunds

With the gradual improvement of the rules of online shopping, the rules on the return and exchange of goods centered on protecting the interests of consumers have gradually become clear. Excessive return and exchange costs. These regulations really help consumers not have to worry too much about the troubles they will encounter when shopping online, but in fact, these protection mechanisms have also led to some problems, such as unreasonable and unreasonable excessive returns. .

We will focus on the online shopping of the clothing industry for analysis. Trying on clothes is always the most important part of buying clothes. Users can try on clothes to know whether the clothes meet their needs and whether they are suitable for them. Therefore, it is difficult for users to buy clothes through online shopping. Learn about the dress by trying it on. However, by taking advantage of the return policy, users will realize that ordering multiple sizes online and trying them on at home is a very smart choice. An estimated one-third to one-half of all clothing sold in the U.S. came online in the past year.

***Fig 1.7** - Package the product that we want to return*

Before the pandemic, online shopping was a convenient alternative to going to the mall. With the outbreak of the epidemic, online shopping has also become the safest way to stock up. Digital sales rose 71% in the second quarter of 2020 and 55% in the third quarter, as people started shopping online, even for many items that are easier to buy in person, like jeans or produce. You may not be able to return lettuce to the grocery store, but by now most of us are pretty familiar with online retailers' return policies for other products.

The surge in online sales has magnified a problem with e-commerce: returns. In 2020, nearly two-thirds of shoppers bought multiples of the same item with the intention of returning some of them.

While the average return rate in brick-and-mortar stores is still in the single digits, the average return rate online is between 15% and 30%, and the return rate for apparel is even higher. Many retailers now offer free shipping, returns and frequent discounts, driving more purchases and returns. Last year, U.S. retailers took back more than $100 billion in online purchases. Free returns can help shoppers get what they want, but it has a serious impact on the environment.All of these things that customers don’t want accumulate over time, and some end up on the used-goods market, some get dismantled for valuable parts, and some end up in incinerators or landfills. But doing so seems harmful and inefficient. After all, all the trucks, trailers, freighters, and container ships are running just to handle returns due to customers changing their minds or misleading product presentations, not to mention the waste of the product itself, and the cost of making a product that will never be used Consumed and generated waste.

Bracketing is the industry term for a “buy now, choose later” approach to online shopping. It’s buying an article of clothing in two sizes because you’re not sure which one will fit or buying all three colors of an item to see which looks best in person. Bracketing is good for retailers and consumers. Retailers know that generous return policies give customers confidence to purchase items online. Consumers eliminate the risk in purchasing an item they’ve never seen before.

***Fig 1.8** - Products that we dont use , even they are as new.*

1.2.2
Leave unused product

In addition to the waste of resources and energy in the entire process of returning items, the product is idle due to the fact that customers do not meet their own needs for the products they purchased, but at the same time, due to various reasons, consumers decide to leave the products and do not return them. It's actually a waste. Now due to the epidemic, many patients and their personal belongings need to be disinfected or even destroyed as medical waste due to exposure to the virus when they are still usable.

I summarize the above phenomena as follows: after the product is designed and produced, the function of the product itself is not damaged, but due to mismatched demand or some other objective factors, the product needs to be idle or destroyed, so that the product cannot play its own value phenomenon. is another big source of waste and resource consumption.

This situation will not only invalidate the resources and energy consumed in the production and transportation of products, but also lead to false increases in product sales, which will lead to product manufacturers to increase production and even the entire product production industry will not fail The product reflection and in-depth research and development, let the entire industry fall into a dangerous vicious circle.

1.3
Bad effects caused by the shopping returns

1.3.1
Co2 emission

We are all aware that returns cause additional carbon emissions from shipping. In the U.S., returns generate more than 15 million tons of carbon dioxide emissions annually—more than 3 million cars. But most people think of returns as just resale, the same way an item discarded in a dressing room or left in a shopping cart is put back on sale in a store. Unfortunately, this is not always true.

To understand the environmental impact of online clothing returns, we need to understand the environmental hazards of the production and shipping of new clothing.

First, let's turn our attention to the phenomenon of returns. The return process itself is a very complicated process, from transportation back to the warehouse, repackaging, restocking, storage, resale and finally re-delivery. Every step requires the support of social resources and energy.

Yet in up to 30% of online purchases that are returned, some aspects of the returns process are not well documented. The Internet Society Foundation recently awarded a grant to the Energy and Environmental Impacts of the Digital Economy Project for a life-cycle study on the environmental impact of product returns.

While there is limited information on the packaging of returned items, damage during return shipping and unpacking inspections prior to resale can increase the likelihood that resale items will be shipped in new packaging. Overall, only about 54% of packaging is recycled.

Manufacturers estimate that a large percentage of their products go to waste. Therefore, they intentionally produce more than expected to sell in order to ensure that there is an adequate supply of any size or model. Quantifying the amount of waste related to intentional overproduction is nearly impossible.

Even without comprehensive data, it is clear that the environmental impact of online returns is enormous. Every year, $5 billion in returned merchandise ends up in U.S. landfills, and less than half of those returns are resold at full price. Even just throwing away items is less costly than repackaging, repackaging, storing, reselling and reshipping. Amazon (responsible for about 40% of online sales in the U.S.) sells a lot of returned inventory to e-commerce clearing sites; it's hard to keep track of these items. But there is evidence that many liquidated goods end up in landfills anyway.

1.3.2
Resource and energy waste

The phenomenon of returning returns is even more serious in China's online shopping platforms. In order to promote consumers' consumption, China's online shopping platforms have held discount activities similar to Black Friday and the "Double 11" shopping festival.

. According to the reporter of "Securities Daily", during the "Double 11" period, Taobao's return rate was over 20%, JD.com was about 10%, and live e-commerce was even as high as 60%. This year's "Double 11", the transaction volume of the entire network was 965.12 billion yuan, a year-on-year increase of 12.22%. A JD.com customer service told reporters that judging from the situation of "Double 11" this year, the return rate is about 10%. A person close to Taobao revealed that "this year's 'Double 11' full platform return rate is at least 20%." In 2018, Alibaba announced a return rate of only 6%.

According to a supplier source, from the perspective of specific categories, the return rate of apparel products is relatively high, reaching more than 40%. Electronic and digital products are generally not within the scope of seven-day unreasonable returns after unpacking, but they are more likely to have disputes due to quality problems, resulting in returns, and the return rate is also above 15%.took advantage of the opportunity of "Double 11" and the dividends of live broadcast e-commerce to achieve a surge in sales. In the past two years, more than 150 listed companies have competed to enter the game, but the return rate remains high.

According to the source, the return rate of live e-commerce was as high as 60% during the "Double 11" this year, and the clothing category was the highest. “Impulse shopping, pictures not matching the description, wrong size, quality issues, wrong delivery, price differences are all reasons for returns.

The increase in the return volume of e-commerce platforms has also increased the demand for packaging, express delivery, and insurance claims, which invisibly increases platform costs and causes waste.

"Returns seem to be just superficial returns of goods, but actually reflect their own and competitors' purchases and operations, which are usually kept secret. Merchants can use this data to adjust inventory and logistics costs. In the entire e-commerce industry chain On the other hand, the return rate is closely related to the interests of raw material suppliers, platform providers, logistics companies, insurers, etc.”

At the same time, the return rate also increases the cost of the express delivery industry, leading to an increase in the dispute rate. It is understood that on the eve of "Double 11", some express delivery companies also temporarily increased prices due to factors such as large volumes, weather, and the epidemic. A regional person in charge of a courier company said: "When returning goods, due to inadequate packaging, damage is likely to occur. The high return rate directly affects the company's transportation costs and damage costs, which can easily lead to disputes.“

1.3.3
Vicious circle of production

The chaos behind the high return rate in the fierce competition, the vicious circle of declining profits forces e-commerce companies to lower their prices, but too low prices will lead to poor quality of some products, resulting in a high return rate, which in turn will increase the cost of e-commerce operators , forming a vicious circle.

At the same time, there is a lot of swiping returns. During the event, some merchants swiped orders in order to boost sales and explosions, gaining traffic and false orders, which is also a waste of logistics resources. Recently, the false propaganda of live broadcast e-commerce has caused a large number of returns, which also highlights this series of problems.

Li Chengdong, an e-commerce investor and former JD.com e-commerce strategy analyst, believes: "A high return rate will have a direct impact on the store. The higher the refund rate, the lower the store's ranking, and the lower the weight will be. Eligibility for 'Double 11' has an impact. Sellers should choose high-quality products and provide good service to effectively reduce the refund rate."

The increase in the return volume of e-commerce platforms has also increased the demand for packaging, express delivery, and insurance claims, which invisibly increases platform costs and causes waste.

"Returns seem to be just superficial returns of goods, but actually reflect their own and competitors' purchases and operations, which are usually kept secret, and merchants can use this data to adjust inventory and logistics costs. In the entire e-commerce industry chain The return rate is closely related to the interests of raw material suppliers, platform providers, logistics companies, insurers, etc.," an operator of an e-commerce store told reporters.

At the same time, the return of goods also increases the cost of the express delivery industry, which leads to an increase in the dispute rate. It is understood that on the eve of "Double 11", some express delivery companies also temporarily increased prices due to factors such as large volumes, weather, and the epidemic. A regional person in charge of a courier company said: "When returning goods, the packaging is not in place, which is prone to damage. The high return rate directly affects the company's transportation costs and damage costs, which can easily lead to disputes."

"The high return rate drives the development of the express delivery industry and the insurance industry. However, the logistics caused by wrong purchases, wrong issuance, and billing will result in a waste of social resources. The carbon emissions generated by these returns should be solved at the source. Platforms and merchants Both consumers and consumers should operate with caution and be low-carbon and environmentally friendly,” said Hu Qimu, chief researcher of China Steel Economic Research Institute.

1.4
Reasons of shopping refunds

Through the previous performance analysis and data analysis, we can probably summarize the reasons for the phenomenon of returns and idle items. I classify them into three major reasons: subjective reasons for consumers, reasons for products themselves, and reasons for business operations.

1.4.1
Consumer subjective reasons

In this large category, there are two factors impulse shopping

Under the influence of various marketing methods and discount activities, products are endowed with other auxiliary values, such as star effect, or discount activities within a certain period of time. We will not overly consider what the product itself can bring us. Reason for buying

Don't know your own needs

Consumers themselves do not think deeply about their needs and problems they encounter, and they make hasty purchases before they know their real needs. In this way, there is a high probability that there is no problem in buying the product itself. It is not a minefield product, but the product is worthless because of the mismatch between what the product can provide and what the user needs, which in turn triggers the user's return behavior

Fig 1.9 - The quality of the product is unuseble , different from what they have said.

1.4.2
The reason for the product itself

False advertising of product information

Driven by social media, many new product categories that are attached to virtual platforms such as social media are emerging in today's market. Most of the cost of such products is spent on brand marketing strategies and deployment, as well as the visual design of the outer packaging. Falsely increasing the value of the product through excessive packaging of the product will not only make consumers misjudge the function of the product, but also increase the consumer's expectation. When the expectation is not satisfied, the phenomenon of returning the product Inevitably. At the same time, there is a large number of returns by brushing orders. During the event, some merchants swiped orders to boost sales and explosions, gaining traffic and fake orders, which is also a waste of logistics resources.

Product quality problem

In a market with a wide variety of daily necessities, merchants continue to launch new products to compete for the market, and in the fierce competition, price wars force merchants to lower prices, but too low prices will lead to poor quality of some products, thus Bringing a high return rate, which will increase the cost of e-commerce operators, forming a vicious circle.

Fig 1.10 - Packaging get damaged during shipping.

1.4.3
Shipping process operation reason

Logistics delivery and transportation factors

Even today when digital delivery technology is very mature, when we shop online, we still receive products of sizes and models that do not match the order, or even completely different products. In this case, the phenomenon of returns is completely irrelevant. Problems related to users and the product itself are entirely caused by problems with the process. And because many express companies may experience package damage and package loss during the entire transportation process, these are the reasons for further other cargo transportation tasks.

The above is what I have concluded based on the collection and analysis of the previous data and information, the main reasons for the phenomenon of return, and I will follow up on these reasons to carry out the research direction of possible solutions to the problem.

1.5
Exist solutions

The waste of products and the excessive consumption of social resources and energy due to returns are slowly being paid attention to by the society and the government. Because this impact on the environment and the loss of energy is completely unnecessary, and can also be reduced and eliminated through some methods.
These methods can be based on our consumers themselves, as well as through the platform or even some government regulations and some services to develop norms and behavior habits.

1.5.1
From the customers POV

Rethink and be patient before buying

In fact, before purchasing a product, we have carefully selected and compared the product to decide whether to buy the product. However, in many cases, due to some unexpected activities or influences, we ignore some of the original plans for product purchase. lead to impulse spending. In fact, we only need to reconsider before clicking the buy button, the function of the product, our needs and whether it is an immediate need and other factors that we have thought about before, this will actually reduce a large part of impulsive consumption.

Try used products and ask others about their experience

Most people will immediately understand the real value of this product and what kind of services it can provide us after actually using the product. This is consultation and information that cannot be obtained through business promotion, and this information can often be obtained by using It is obtained from the people who have used it. Many people will idle the product after using it and understand the product. These products have no wear and tear in terms of function and appearance, and users also understand the real information of the product. Purchasing in our hands can not only gain an in-depth understanding of the advantages and disadvantages of products, but also reduce our purchase costs and reduce the loss of resources caused by idle items.

In-depth exploration of your own needs and the degree of matching with product functions

In fact, every consumer knows what their needs are in their minds, and what kind of products they hope to find, but in fact, it is difficult for consumers to directly present such needs directly on specific products. The function has only a general outline feature, and it will be very difficult to compare it with the same type of products. Therefore, allowing consumers to deeply understand their needs and understand the nuances of similar products has become an important factor in rational consumption. As for how to match your own needs with product functions, you need to have a more comprehensive understanding of the product, and after trialing different products, re-examine and summarize your own needs, so that you can make a rational decision.

Fig 1.11 - Think before buying

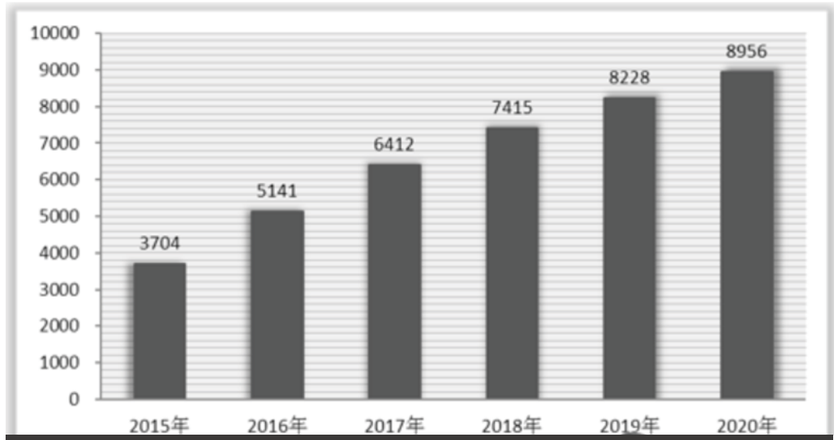


Fig 1.12 - Global used platform transaction volume from 2015 to 2020

1.5.2
Government policy

The government did not have strict requirements for unified treatment of chargers for consumer electronic products before, but in recent years, because electronic products have different charging accessories and cannot be used universally, each consumer may have two to three There are different charging accessories, one-to-one corresponding to each product, which produces a huge amount of electronic waste.

In response to this phenomenon, EU lawmakers have reached an agreement that will force all future smartphones sold in the EU - including Apple's iPhone - to be equipped with a universal USB-C port for wired charging by fall 2024. The rule will also apply to other electronic devices including tablets, digital cameras, headsets, portable game consoles and e-readers.

The introduction of a "universal charger" is an attempt by the EU to both reduce e-waste and make life easier for consumers. Lawmakers hope that in a future, phones and similar gadgets won't need a charger in the box because buyers already have the right accessories at home. The EU estimates that the legislation could save consumers 250 million euros a year in "unnecessary charger purchases" and about 11,000 tonnes of e-waste a year.

The agreement will have the biggest impact on Apple, the only major smartphone maker still using a proprietary port instead of USB-C. In 2021, Apple will sell 241 million iPhones worldwide, of which about 56 million will be sold in Europe.

Others argue that forcing the switch to USB-C would create e-waste rather than reduce it, as it would make the existing Apple accessory ecosystem redundant.

1.5.3
Used product trade platform

With the continuous enrichment of the global commodity market, the acceleration of the update and iteration of various products, the continuous deepening of the concept of environmentally friendly second-hand consumption, and the rapid development of the global e-commerce market for second-hand idle items. Statistics show that in 2019, the scale of the global second-hand idle goods e-commerce market reached US$822.8 billion, and the scale of the second-hand idle goods e-commerce market in 2020 increased to 895.6 billion US dollars.

Among them, the online trading platform of “Xianyu” second-hand products in the Chinese market has developed very rapidly. According to data, in 2019, transactions on the Xianyu platform reached 189.4 billion yuan, with an average daily merchandise release of about 2 million pieces and an average daily merchandise transaction volume of more than 100 million yuan. 10,000 pieces, is the leading comprehensive idle goods trading platform in China. Alibaba's 2020 fiscal year financial report shows that Xianyu has more than 1 billion items on the shelves, and the transaction volume has exceeded 200 billion yuan.

The report "Research on the Optimal Utilization Model of Idle Resources in the Digital Age" found that Xianyu's low-threshold transaction methods, rich and diverse transaction modes, and Alibaba's ecological advantages meet most of users' needs in terms of buying and selling idle resources. Compared with other second-hand e-commerce trading platforms, Xianyu focuses on providing users with services such as trading venues, specific transactions, and product quality inspection and logistics. On the whole, the resource and environmental benefits, economic benefits and social benefits generated by the Xianyu platform are remarkable.

The reuse of idle items is an effective tool for saving resources. According to estimates, in 2019, Xianyu trading reduced carbon emissions by 24.912 million tons, equivalent to 11% of industrial carbon dioxide emissions in Zhejiang Province in 2017; Xianyu users obtained Ant Forest energy through recycling, and planted 458,000 Haloxylon About 9161 mu of land desertification problem; Xianyu saves 1.32 billion cubic meters of water resources, about the water volume of 91 West Lakes.

The reuse of idle items is also an idle "gold mine" for families. At present, the per capita annual income of users selling idle goods on the Xianyu platform exceeds 4,000 yuan, which is equivalent to earning a "thirteen salary". In 2019, users can save 3,725 yuan per 10,000 yuan in sales by purchasing goods or services through Xianyu.

Re-employment of idle items is an effective way to promote employment and consolidate the achievements of poverty alleviation. In 2019, Xianyu created a total of about 383,200 employment opportunities. In addition, nearly 690,000 farmers used the Xianyu platform to sell agricultural products, completing 7.06 million sales.

Aja Barber, environmental activist and author of Consumed: The Need for Collective Change, said: "Buying secondhand is ultimately a win for the environment, because not only do you avoid stuff that ends up in landfills, but you also reduce your impact on creating new Product demand. Product.

"That's more than enough for everyone on the planet - now is the time to put it to good use."

1.6
Summary

Through the analysis of the phenomenon of return, I have concluded that the reason for the return may come from the consumer's **lack of understanding of their own needs** or the irrational consumption caused by the promotion activities and the temptation of realistic discounts , or the quality of the product is not the same as what the sellers said , or damaged packages during transportation or issued a different model or size from the consumer's order.

In response to these reasons, the government and online shopping platforms have also made some **service , policy and innovations** at this stage to solve these problems.

But I found that these solutions or the creation of new services are all focus on the **phase of after products are sold**, so the return may not be reduced , so I will pay more attention to the **phase before the product get shipped** . Which is helping consumers better understand their needs and reduce the occurrence of returns from the root causeis , this is the best solution and direction to solve the return problem.

In the next chapter, I will try to find out, through the research and analysis of the **characteristics of cardboard** and cardboard products, how to let consumers know and try the product in online shopping through a brand-new method, to deeply **understand the characteristics of the product and their own needs.**

CHAPTER 2

Solution Finding

Cardboard makes the new opportunity

2.1
Ghelfi Ondulati S.P.A.

Fig 2.1 *- Ghelfi S.P.A. factory zone*

Ghelfi Ondulati S.P.A. is a company specializing in the design and production of paper and cardboard packaging and customized cardboard products for the food industry. The company offers many types of cardboard material packaging, and the production of cardboard and cardboard products has always maintained a high standard of quality and professionalism. According to the different characteristics and limitations of the main products of different projects, the company conducts one-to-one design and customization of the production process to ensure that the packaging can maintain the shape and freshness of the contents to the greatest extent. Since the company's main service target at the start-up stage is apple manufacturers, this lays the foundation for the company's main product development direction. At present, up to 80% of the company's turnover comes from fruit and vegetable packaging products, but the product's The scope of influence has already covered most of the market in Italy and Europe.

And save, continuously improve the end customer's buying experience. And the company also attaches great importance to printing in the production process of cardboard and cardboard products, so it has introduced very advanced digital printing technology to realize the possibility of rapid digital printing in large quantities. The company's efforts to change according to the above development process have prompted the company to produce cardboard and cardboard products that meet the characteristics of ensuring high quality in the material itself, and at the same time have customized structural design, and a variety of surface digital printing, combined with The innovative digital technology further guarantees the unique needs of the products inside the packaging, so that the brand has formed a unique competitiveness and product differentiation.

2.2
Product portfolio

With nice and captivating shapes, boxes are characterized by high-performance structures. Offering varying degrees of security, they accompany goods – even the most delicate and perishable – to the distribution center or directly to the point of sale. All the products are printed with the latest printing technologies to provide better creative solutions to your every packaging and transportation need. The company always keeps in mind the processing and production phases (end packaging, storage in warehouses and/or in refrigerated rooms, transport via refrigerated trucks or by ship for expeditions overseas), continuously ensuring complete integration into your processes, proposing original and effective solutions to optimize every single phase of production and to render the process automated thanks to cutting-edge machinery and innovative patents. According to different appearances and usage scenarios, the company's main products can be divided into four major categories.

Vaschette ,Trays,Standard box and Exhibitors.

2.2.1 Trays

The products of this category are the star products of the company. They are mainly used for the open packaging of agricultural products such as fruits and vegetables. The main feature of the packaging of this category is the open-top design, which ensures the ventilation of the internal agricultural products. At the same time, the tenon-and-mortise structure at the surrounding pillar structure allows multiple packages to be arranged in the vertical direction and remains stable.

According to the needs of different customers and the types of agricultural products, the company has developed and designed a variety of different appearances and holds multiple appearance patents. When facing new customers, it not only allows customers to have a variety of existing excellent solutions to choose from, but also allows customers to customize.

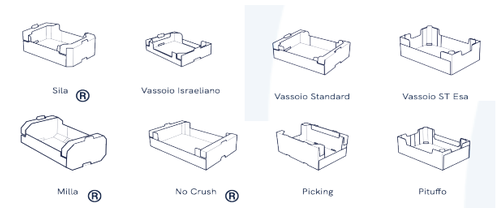


Fig 2.2 - Trays products shown on the web site

Fig 2.3 - Vaschette products shown on the web site

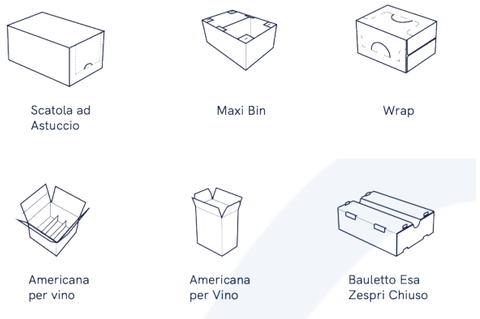


Fig 2.4 - Standard box products shown on the web site

2.2.2 Vaschette

This type of packaging can be understood as a reduced version of trays, because the product is also open in appearance to facilitate the circulation of air. The difference lies in the types of internal products that are packaged. This packaging is mainly aimed at products with smaller size and less net content. By adding some other decorative and functional parts, the vashette can be applied to a variety of products. Fruits and vegetables and other foods. While ensuring the freshness of the food itself, a colorful visual experience can also be achieved through open holes and customized digital printing.

2.2.3 Standard box

This type of product is a very distinctive category in the company's product line. It includes the most basic simple structure carton packaging for standard transportation, as well as composite carton packaging combined with trays. Standard cartons are suitable for product storage, transportation and protection due to their simplicity of use and structural stability. It is suitable for all product areas to meet the most common packaging and logistics needs with reduced investment and limited unit costs. Through special automatic forming, printing and die-cutting lines, the packages are palletized and shipped to customers in "flat" mode. The carton packaging of composite elements provides customers with other functions under the premise of satisfying the functions of basic transportation and protection. For example, during the special sale period of commodities, many products will be sold in the whole box, considering the subsequent use of consumers. Experience, this kind of packaging allows users to easily take items and at the same time ensure that items are stored for a long time.

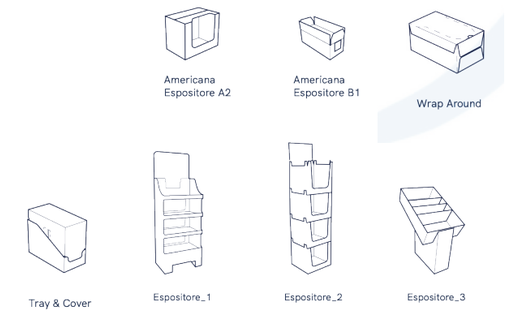


Fig 2.5 - Exhibitor products shown on the web site

2.2.4 Exhibitor

This category of products is designed to meet the needs of users to display products in a short period of time. The products can be quickly assembled by users to form product units that display products at the user's point of sale. Combined with customized digital printing, it can achieve very high performance. Good visual and informational function. It also includes some composite products that combine the function of transport packaging. By simply disassembling and reassembling the packaging, the transport packaging can be turned into a display stand for displaying goods without any effort.

2.2.5 Patented and innovative technologies

Ghelfi Ondulati boasts a series of patents for new forms of packaging rendered available to its customers. Some of these patents have been developed to achieve ambitious environmental sustainability objectives through a significant reduction in the raw materials used.

The Geasy family of standard cardboard boxes that transform into shelf displays to become Shelf-ready Packaging; the Esa no-crush system created by combining a pair of corner reinforcements with a traditional tray that guarantees high-performance and low-cost resistance; the Sila container, a fruit tray that ensures perfect ventilation between the palletised packages; the Maxi Bin in corrugated cardboard, as an alternative to wooden and cardboard bins; Epi-Pal, a pallet in corrugated cardboard; Esa packaging with reduced environmental impact; and, the Milla container with a unique octagonal form.

Thanks to the skill of our teams, various patents have been awarded over the years, able to give our products the best qualities. The most important amongst our patents is the ESA, exported all over the world and guaranteeing savings in raw materials as well as high compression strength.

2.3
Production process

The company is very professional in the distribution and control of the production process of cardboard and cardboard products, and will customize the process and produce according to different needs. In each step, the most modern and professional machines are used, which not only realizes the requirements of fast and high-quality completion of tasks, but also meets the production needs of random diversity of different products. Next, we will understand each production link through the use of different technologies and machines in the overall process, and further understand the presentation form of each processing step of cardboard products.

2.3.1
The corrugator

In the process of turning paper into cardboard, the first step is to use a corrugator to combine various papers through cutting, bending and gluing processes. During this period, the computing power of digital technology is used to complete different sizes of cardboard Perform cutting and combining tasks. In order to meet the needs of Industry 4.0, the company specially introduced BHS technology to form the latest generation of production lines.

Multi-level automation and innovative parameter self-learning systems minimize the set-up times and the need for human intervention, whilst also minimizing waste generation. Any product defects are detected online by an ultrasonic control system, called ZDS (Zero Defect System). Such imperfections are automatically discarded, minimizing product waste and guaranteeing the end customer a product that complies with the utmost modern quality standards. In perfect synergy with the pre-print department, a sophisticated image detection system ensures the perfect centering of the cut in respect of the printing, meaning that product customization reaches a new and elevated level.

Fig 2.6 - Production process - 1 - the corrugator

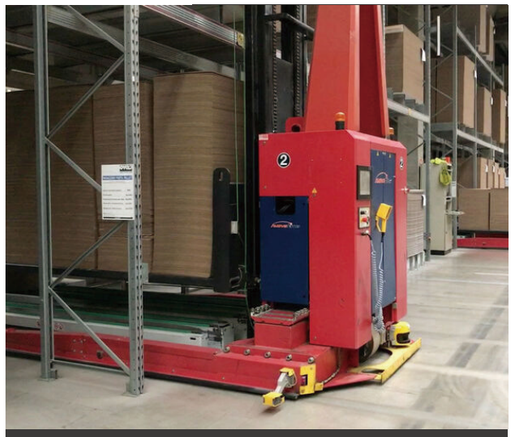


Fig 2.7 - Production process - 2 - semi-finished product warehouse

Fig 2.8 - Production process - 3- HP PAGEWIDE T1100S PRESS

2.3.2 Semi-finished product warehouse

Before being processing in the cardboard box factory, the corrugated cardboard panels are stored in the semi-finished warehouse. It is here that the cardboard cools and “matures”, involving the evaporation of the water contained within and the polymerisation of any resins.

Robotic transport system and laser guided vehicles

The system works as an intermediate buffer between the box factory and corrugator, able to unload the cardboard from the corrugator to then render it available for transformation when required, all in a totally automatic manner. Automatic warehouse has 3 laser-guided trolleys

2.3.3 The digital printer

When the produced cardboard or cardboard products need surface treatment or digital printing, the third step will be to enter the professional digital printer to print the surface pattern or text. In “Post-print” printing, flexor printing machines are normally used, availing of water-based inks to stamp engravings on very soft polymers (known as “clichés”). Each cliché transfers a certain color to the cardboard sheet. The cliché is kept inked by a mesh roller (an anilox) and transfers its image to the sheet of cardboard for “stamping”. For quality printing results, the line of the anilox must be coordinated with the type of media on which to print (paper and wave) and with the image to be represented.

Fig 2.9 - he digital printer

The latest generation flexographic printing machine, with 7 printing groups, is equipped with a Registron system to automatically maintain the registration between the printing groups. A flexographic printing machine with 6 printing groups. Over time, our Master flex has been retrofitted with all available options, to maintain performance but above all so as to offer a product of the highest quality to every customer.

HP Pagewide T1100S printer is a high-speed, large-size simplex color coil inkjet printer for corrugated cardboard packaging.

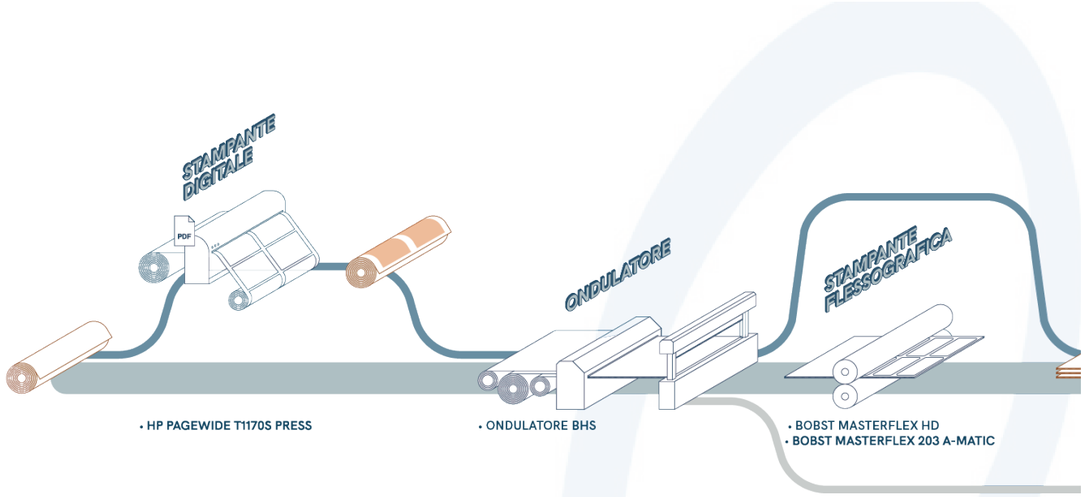
- Use of a cover from 80 to 400 g/m²
- HP A50 water-pigmented inks, suitable for the food industry
- 183 m/min. line speed to reach 300
- Native resolution of 1200 DPI
- 4 colors + BA, totaling 7
- Coil width up to 2,800 mm

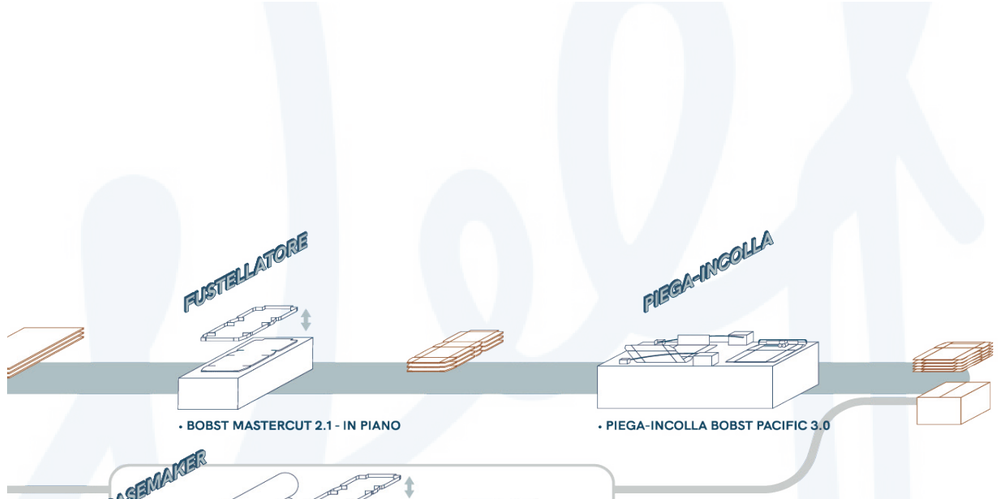
2.3.4 The die-cutter

The die is the matrix on which the blades and cables are mounted to reproduce the packaging, starting from the printed sheet. There are rotary and flat die cutters. The former are faster and more productive, whilst the latter are more dimensionally precise. A rubber component in the rotary die-cutter takes care of any die-cutting scrap, whilst a specific tool handles clean up in the flat die-cutter.

Bobst Master cut 2.1

A flat die cutting machine of the latest generation, it is equipped with the Power Register system for automatic re-registration during die-cutting. With this system, the machine is able to guarantee the perfect registration of the die-cutting due to automatically making corrections based on marks printed on the sheet.





2.3.5
The casemaker

It produces standard cardboard boxes, starting from a sheet of unprinted cardboard passed through a single machine, composed of several simplified printing units, a die-cutting unit, a slotter and a folding machine.
Casemaker Martin FFG 924 NT

Casemaker bearing 6 printing groups, equipped for HD flexographic printing, having the latest generation systems for the automatic retention of the registration between the press groups.

Fig 2.10 *- Production process - 5 - the case maker*

2.3.6
The fold-gluer

This device can glue even complex boxes that have already been printed and die-cut.
Fold-paste Bobst pacific 3.0

BOBST folder-gluer, specific for corrugated cardboard, with a maximum folding speed of 250 m/min. Equipped with poly joiner for the realization of boxes composed of several die-cuts.

Fig 2.11 *- Production process - 6- the fold-gluer*

2.4
Communication

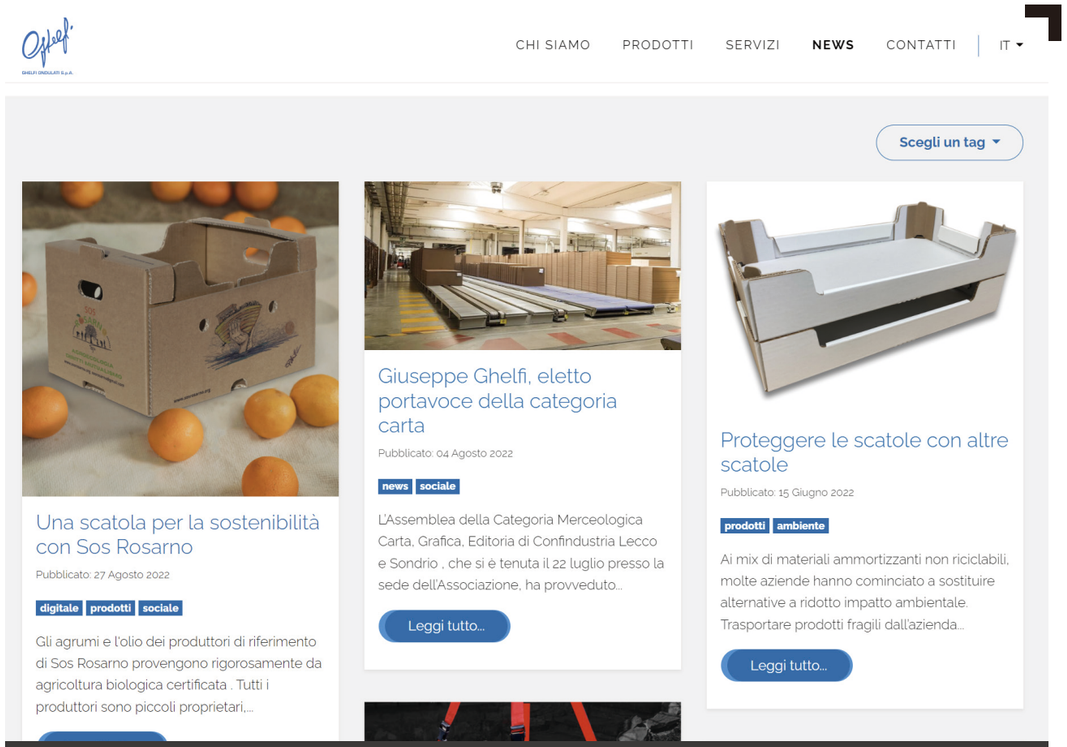
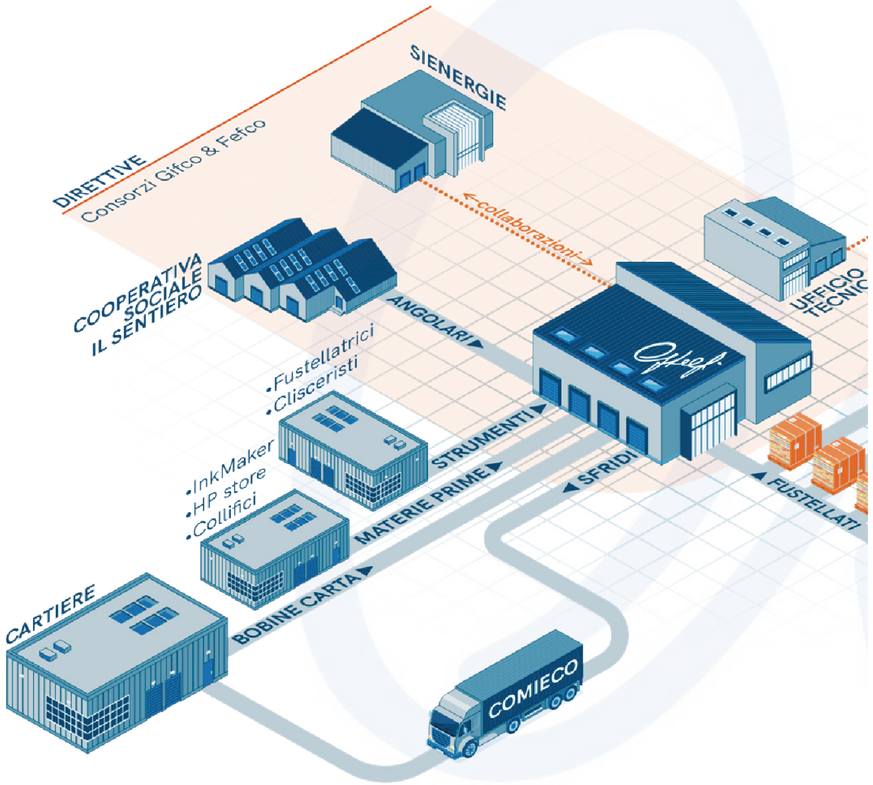


Fig 2.12 - official website

At this stage of society, the operation of a company is no longer carried out alone. In the entire production process, the company needs to work with other business partners to reasonably allocate and utilize technology and resources. In the fields of raw material purchase, waste recycling and technical contribution, it is difficult for a company to do it alone. The coverage of the entire production process is only ten minutes. We will build a system map to fully explore how the company conducts information, materials and capital flows with other companies in the entire process of material preparation, distribution and final product use.

Trying to find the points where it can be optimized, or to strengthen the company's attributes with technologies and new production concepts used by other partners.

And we will also analyze how the company communicates with customers on the Internet, the frequency of social media usage and the state of utilization. Through this use of social media, we can also discover the advantages and disadvantages of the company in its own brand promotion and new opportunities that may develop.



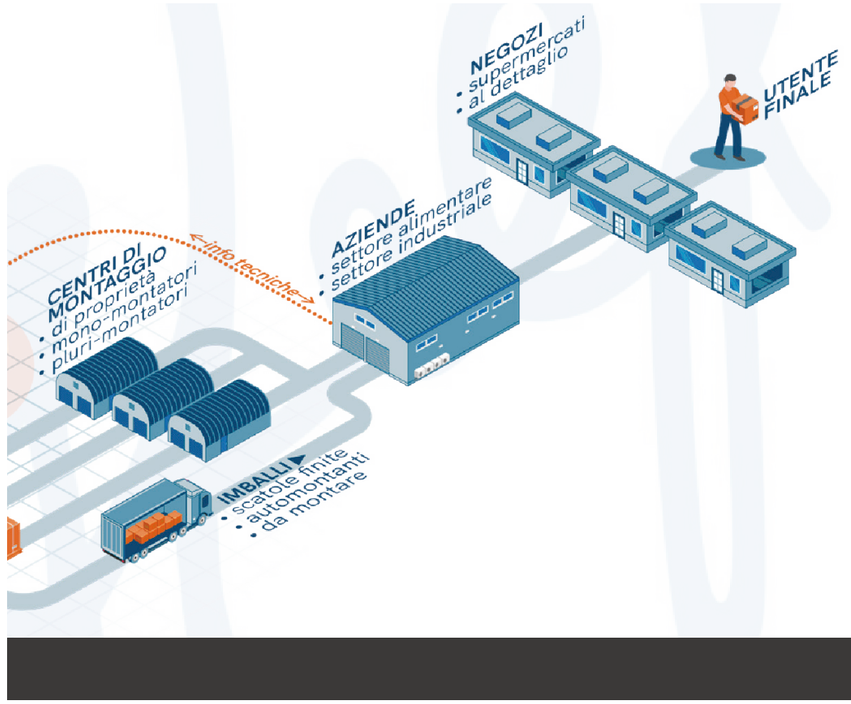


Fig 2.13 - System map

2.4.1
System map

System map is an icon that analyzes the entire process in service design and intuitively represents the flow of materials, information and funds between each stakeholder. In order to more intuitively understand the operation of the company in the entire process of cardboard and cardboard products from material preparation to production to distribution, my team and I made a system map.

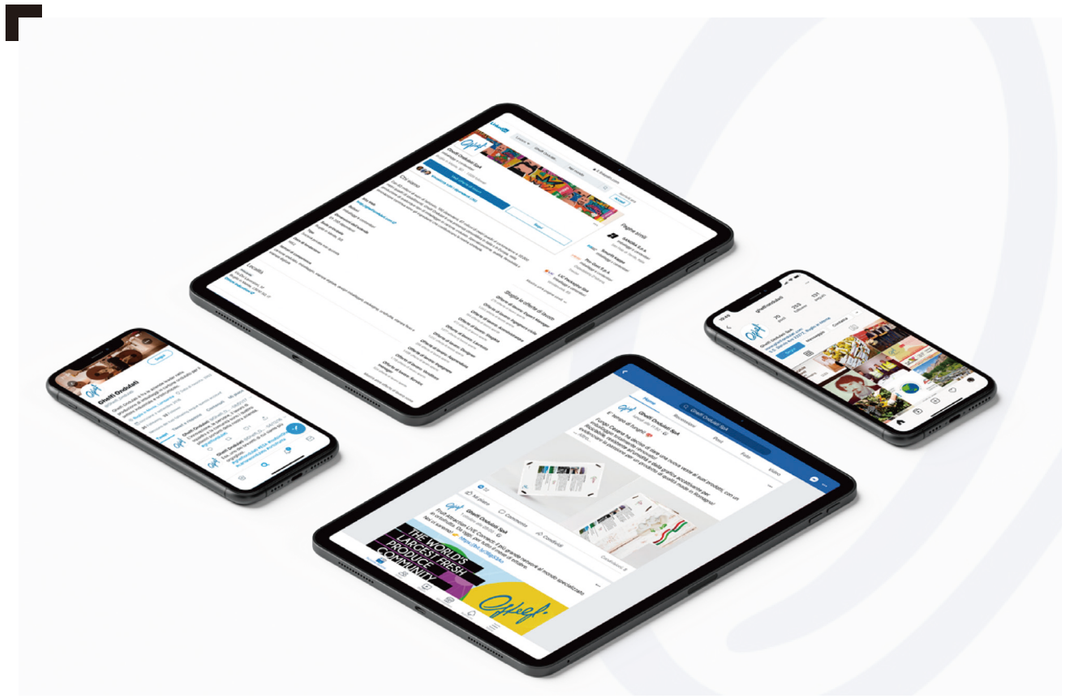
In addition to high-quality paper, the company's main raw material for making products, it also includes inks used in digital printing, as well as printing consumables, glues for cardboard bonding, and various molds. After these raw materials are transported by logistics to the company's warehouse for acceptance and classification, the packaging production process begins.

According to the analysis of the previous product production process, we can find that many high-end technologies of current product manufacturing are included in each link, and the provision and source of these technologies are jointly completed by other production cooperative companies, such as HP.

Provides digital printing technology and machines to complete printing. The company itself will also customize the production process according to the different needs of the products and the geographical location of the customers it serves. When the standard cardboard has passed the internal inspection of the company and meets the standards of FEFCO and GIFCO, the company can choose whether to cut and assemble the cardboard directly or transport it to the distribution center in other regions, and perform the cutting and assembly process locally.

A very flexible process allows products to be easily shipped and reduces shipping costs and losses during shipping. After the assembly is completed, the cardboard products will be shipped to the customer's warehouse or other designated locations. The general customer is the production and processing company of food and agricultural products. After the cardboard is packaged in the food, it will be shipped to supermarkets and distributors in various places, and finally arrive at in the hands of consumers.

The whole process is very complete and skilled in operation, not only considering cost and technology factors in every link, but also the flow of information and materials between different companies is also very smooth, realizing an end-to-end operation mode.



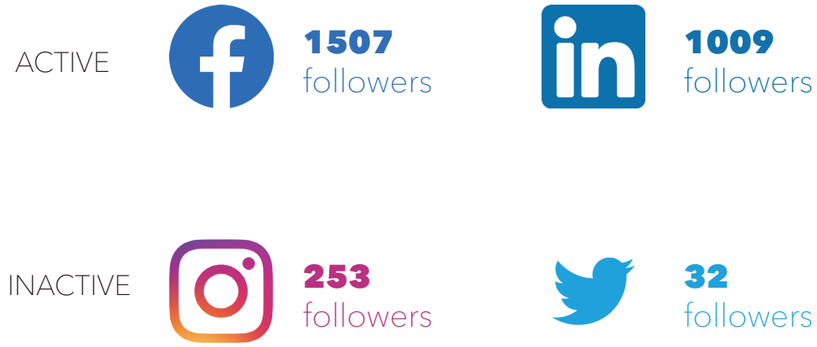


Fig 2.14 - Situation on the social media

2.4.2
Social platform

If this company is classified according to the types of customers it serves, it is a B2B company, and the customer service customers are often other B2C companies, so the operation on social media is not very sound and active. Therefore, it is difficult for users at the consumer level to discover and understand the existence of the company and the status of the company. After the rise of the Internet, social media has become an important means of information exchange, whether it is for ordinary consumers or between companies.

On the two platforms of LinkedIn and Facebook, the company has two relatively active official accounts to carry out the task of recruiting and expanding the company's influence. On FB, there will be some application information of the company's latest technology and the latest activity information. , but the interaction with consumers is still very small, and there is a lot of room for growth and improvement.

On entertainment-oriented social media platforms such as Instagram, twitter and YouTube, the company's official account is stagnant. In fact, this is a good channel to draw more people's attention to cardboard and cardboard culture, but it does not valued by the company.

On telegram, an important platform with many users, the company does not even have an official account application. This is also a great pity, because many users may consult the company's business or technology through different communication platforms, which can not only expand the market but also bring many possible business opportunities.

2.5
Cardboard Market

The market size of corrugated paper has been increasing in recent years. In 2021, the market size of corrugated packaging will reach 67.7 billion US dollars, and the annual growth rate from 2022 to 2028 is expected to exceed 4.4%. In terms of volume, the corrugated packaging industry could reach 294.4 billion square meters by 2028. Recyclability, high protective strength, durability, lightness and cost-effectiveness are key factors driving the increasing adoption of corrugated packaging in various end-use industries.

The advanced design and construction of cardboard gives it great potential for application in a wide range of end-use industries. In addition, these packaging materials are also resistant to moisture, which is a key factor in the high consumption of food and beverage packaging. Moreover, the fast-growing e-commerce industry is expected to provide a new growth engine for the corrugated packaging market in the coming years. For example, according to the U.S. Department of Commerce, the e-commerce industry will grow by 14.2% in 2021. Many consumers have turned to online shopping in the wake of the coronavirus outbreak. However, the global epidemic still hinders manufacturing capacity, resulting in a decline in the global corrugated packaging market in 2020.

Corrugated cardboard is a light, strong and rigid material made of three layers of brown kraft paper. These boxes have a wide range of applications such as ice cream boxes, candy boxes, pizza boxes, corrugated paper rolls, corrugated boxes and more. In addition, various types of corrugated boxes have their own usage scenarios in the market, including single-wall, double-wall and triple-wall corrugated boxes.

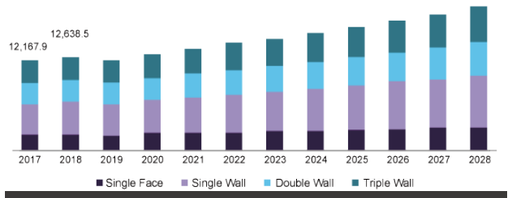


Fig 2.15 - U.S. corrugared cardboard market size 2017-2028

Of these, single-wall containers are used the most because of their low cost, good protective rigidity and cushioning protection, which are desirable characteristics of shipping containers. The segment is expected to grow at a CAGR of over 4.5% through 2028 due to the technology's ability to easily print on rough and smooth surfaces such as corrugated and coated liners.Corrugated packaging has a variety of applications in a wide range of industries including medical, food and beverage, personal care and home care. The food and beverage industry holds a major share in the global corrugated packaging market.

In addition, household appliances and electronic products also hold a considerable share in the global corrugated packaging market. Asia Pacific is a major revenue generating region for the global corrugated packaging market, accounting for 50% of the industry share in 2021 and is likely to grow at an annual growth rate of 4.7% from 2022 to 2028. The high demand for products in the region can be attributed to significant developments in the regional food and beverage industry as well as other industries. In countries such as China and India, more and more professionals have made great strides in the concept of packaged food due to the evolving lifestyle and growing demand for fast food. In addition, the increasing production of consumer electronic devices and home appliances in countries such as China, South Korea, Japan, and India has contributed significantly to the growing market size.

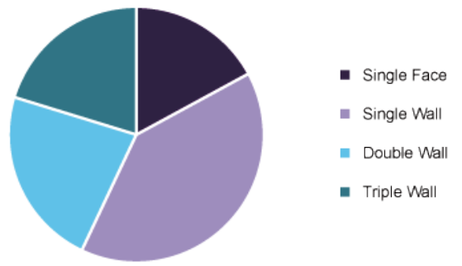


Fig 2.16 - Global corrugated cardboard market share by board style 2020

2.6
Trends of the sector

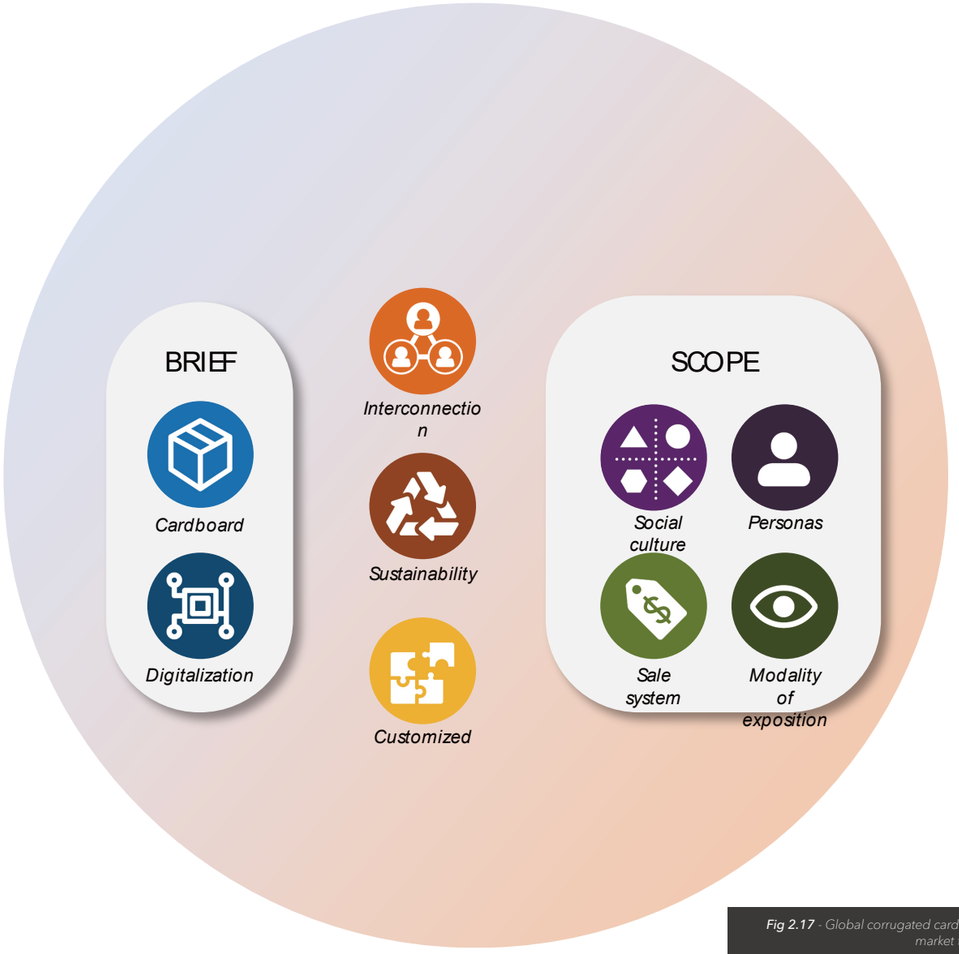


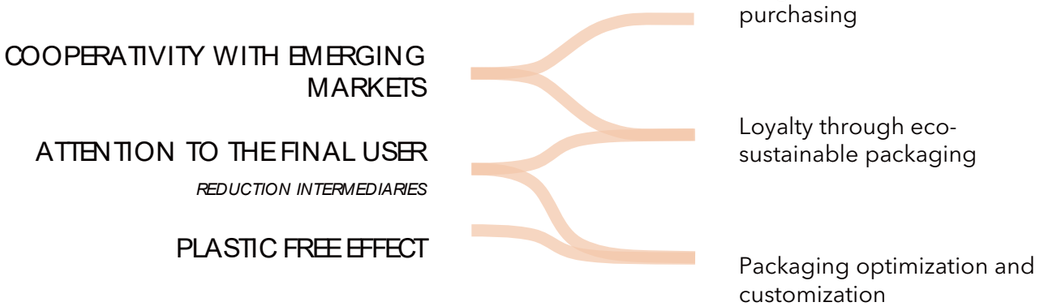
Fig 2.17 - Global corrugated cardboard market trends

2.6.1
Plastic free effect – Sustainability

Ultimately, the industry trend is to gradually replace plastics in certain usage scenarios. If plastic is not a material that considers the unfavorable factors affecting the environment, the use of plastic materials may far exceed the current market share. It is precisely because of the high recycling characteristics of cardboard and the small impact on the environment. The characteristics of cardboard products and cardboard packaging are so valued by consumers and manufacturers. Nowadays, with the use of more technologies such as digital printing, cardboard packaging can not only meet environmental protection and low cost, but also make packaging a good mobile advertisement. Cardboard is a very good printing material.

Many plastic packaging today, such as Amazon's flexible transparent plastic packaging, is gradually replaced by cardboard packaging, and the consistent packaging style also allows users to form a cognition of Amazon's brand concept of environmental protection, forming a positive virtuous circle.

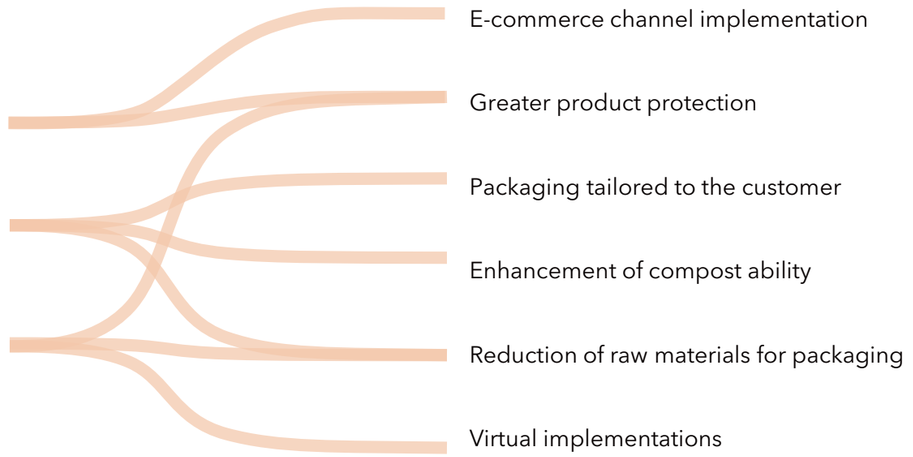
And corresponding to the macro trend is sustainable. With the characteristics of sustainability, combined with other advanced technologies, the possibility of cardboard products is further expanded, gradually replacing the role of non-degradable plastics, and making greater contributions to the global environment.



2.6.2
Cooperativity with emerging markets - Interconnection

This trend can be reflected in many aspects. As the coverage and depth of the market are expanding year by year, the entire industry is also developing continuously, and many new industries have emerged. If the cardboard industry wants to maintain its own development, it needs to adapt to these constant changes and updates. new market technology, new direction. The application of digital technology, finding a new role for cardboard and creating a cardboard environmental protection culture are all strategic plans for the industry to deal with emerging industries. The application of digital technology can not only make the cardboard packaging better serve the original products, but also provide more information for customers and final consumers, make the information of the whole service process more transparent, and increase the trust of purchase.

The redefinition of the role of cardboard can enable cardboard to find a new development direction suitable for cardboard in emerging industries, because cardboard can develop more usage scenarios by virtue of its irreplaceable and excellent properties such as environmental protection and rigidity, replacing the original one. other materials. At the same time, due to the influence of the epidemic around the world in recent years, the rapid rise of online shopping has also led to the extensive use of cardboard packaging. In addition to the packaging field, cardboard products for short-term use have also developed rapidly. The combined use makes the product no longer limited to bundled sales, and with a fixed appearance design, users can develop more unique usage methods.



2.6.3
Attention to the final user - Customized

Whether cardboard products are packaging for food or containers for transporting goods, the final user group is consumers. In fact, many cardboard product companies do not communicate directly with end users, and do not receive feedback from consumers on the experience of using the product itself, which leads to the data source of the company's products in the design stage. For other companies that cooperate, this may lead to differences in the transmission of information due to inappropriate processing, and the final product may not be the best user experience for consumers. The intermediary company not only understands the product in the package, the packaging, but also the end user, but it may also be limited to the product itself, excluding the packaging.

Therefore, in today's focus on user experience, the cardboard product production industry has gradually begun to focus on the end user's experience, and slowly the main design basis has been gradually transferred from the service company and product to the end user, not only the product needs to be considered For the objective needs of packaging, it is also necessary to meet the psychological needs of users in the process of use. And corresponding to the actual product is customization. Customized packaging and product design and production for different products and different final consumer groups.

2.7
Match to the problem

2.7.1
Retro of the problem

Based on the elaboration in the first chapter of this paper, we roughly restate the problem we need to solve through this paper and the final design solution and the possible solution direction of the problem.

The problem is that at this stage, the phenomenon of returns and idle items occur frequently, and the environmental pollution and waste of resources and energy caused by this phenomenon are very huge, but at the same time, they are not paid attention to, and consumers do not really realize the problem and seriousness, and the current solutions are not based on the starting point of how to prevent waste, but on returns and how to reduce waste and pollution after they occur.

The main reason for a large number of returns and idle items is also the problem-solving point of my thesis, which is that consumers cannot clearly understand their real needs and the value that products can actually provide before purchasing products, which leads to The purchased product does not meet the expectations, or the use experience and frequency of use are too low, which leads to the idea and behavior of consumers to return or idle items (this article will not discuss the solution to the problem caused by the return of the wrong product and other reasons) .

Therefore, how to research and design a solution so that users can understand their own needs and the functions that the target product can provide before purchasing is the research goal of this paper.

Fig 2.18 - *Plastic waste all around our daily life*

2.7.2
Why cardboard

Through the analysis of the cardboard company's product line, production process and the development trend of the entire industry in this chapter, we can analyze the advantages of cardboard as a material that can be used in a specific and Advantages of physical properties of the own material, such as providing rigidity, keeping dry, lower density, etc. These advantages have also created a variety of uses for cardboard and cardboard products in the market.

Fig 2.20 - *Kid is making a cardboard artifact.*

2.7.3
How to match to the problem

And how to match such excellent cardboard to the above problems, and solve this problem through its own characteristics and advantages? The DIY production of cardboard products is the most important part and the starting point of this solution.
The problem-solving logic is:

- Users make blueprints for cardboard products provided by merchants, make DIY product models, combine specific core components, and conduct product trials, so that users can understand the functions of the products and the degree of matching between products and their needs, so that Users can truly understand whether their own needs and target products are the optimal solution, further reducing irrational consumption, thereby achieving the goal of reducing returns and idle items, and ultimately reducing waste of resources and energy.
- In the product research stage, the designer can send the blueprint of the product demo to the target group through the Internet through the DIY production of cardboard products, so that the designer can receive more real, comprehensive and wider coverage of user analysis data, In order to avoid designing products that do not meet the needs of a large number of users and increase unnecessary production.

Therefore, the goal of reducing waste can be achieved simply by allowing a large number of users to accept this new product trial method. This is the direction of the next design.

2.8 Summary

Through the further study and understanding of cardboard production and the material itself, I found that cardboard is a material that is very **suitable for the rapid making of artifacts**. Thanks to the excellent physical properties of the cardboard material, the hand-making products can maintain a good condition of using and fit the needs of various types of products.

Therefore, the facture of cardboard crafts can provide users with a **brand-new way to try the target product** , with **no needs of** really buying it.

While online shopping brings users a convenient shopping experience, it also leads to the fact that **pictures and videos cannot** allow users to **truly experience** the function and use of the product. Therefore, **combined with the facture of cardboard crafts**, users can have a deep understanding of the product before purchasing to see **if the product is worth buying**. When every transaction is well thought out by the customers , **returns will also get reduced**.

For users to think of using the method of making cardboard handicrafts to try products at the first time, the making of cardboard products **must be easy and accepted by more users**. Therefore, investigating how the making of cardboard products can be quickly accepted and used by more users is the direction of the next research.

CHAPTER 3

Service analysis

Rebuild the
cardboard artifcats making process

3.1
User research

As mentioned in the previous chapter, if we hope to generate a long-term interest and habit by allowing consumers to accept cardboard products, and thus reduce the phenomenon of returns and idle products due to irrational consumption, then we first The starting point must be the process itself of the DIY production of cardboard products. Because only if there are no difficulties and technical barriers in the entire production process will allow users and consumers to make cardboard products without any worries, and thus generate a sense of dependence. After determining the entry point of the project, the next research will have a direction.

If you want to understand the entire process of this behavior and the difficulties for users in the process, then we need to conduct user research to understand the details of the user's operation process in real situations, and then find the points of decreased experience in the process, which can be summarized as The specific pain points are transformed into the starting point of the design.

This user research is set at the initial stage of the project. The main purpose is to explore the production process of cardboard products and the pain points in the process, which will be classified as the subject of the next specific design project.

I will first conduct quantitative research in the form of a questionnaire. Through the question setting, I will know which groups of people have made cardboard products, their general process during production, and the difficulties that most people will encounter in the process. After getting this information, I will Through interviews with specific people, we can further verify the information obtained before, and deeply understand the reasons for these difficulties and pain points, and then summarize them as topics in the design stage.

3.1.1 Questionnaire

Aim

There are three main purposes of this phase:

- *Identify seed users. I will fuse basic information such as age, gender and occupation of the respondents with data on whether they have ever thought about or actually experienced the behavior of making cardboard products to understand which groups of people may be making cardboard products. torrent users*
- *Determine the production process. Before setting the questions in the questionnaire, I will search through YouTube, Instagram, google and other platforms to gain a preliminary understanding of the production process of cardboard products, and verify the questions in the questionnaire. The user's production process or their own unique process links can further improve the process.*
- *Determine the pain points of the process. In the whole process of production, users will face difficulties. Some small problems can be overcome by users by their own methods. Some problems will lead to the suspension of this behavior. Understand where these problems lie.*

Question setting

Based on the above purpose, I transformed it into the following specific question
Age
Gender
Occupation
Have you considered or actually experienced making cardboard products?
If not, what do you think is the reason?
What was the motivation for making these products?
Will the idea of making this cardboard product improve after the epidemic starts?
Have you ever learned about other people's production process? Have you looked for some tutorials on the Internet?
What links may be difficult for you but can still be solved and let you continue to make
Which of the following links might make you feel so difficult that you don't want to continue making
What platforms do you usually use for the sources of blueprint collection?
Do you have the habit of collecting cardboard packaging?
What improvements and enhancements will make you want to make cardboard products even more?

Questionnaire output

In order to ensure the authenticity and reliability of the results of this questionnaire, this questionnaire was delivered through the Tencent questionnaire professional answering platform. The keywords that are mainly delivered to the crowd are, handicraft production, design, DIY, resource allocation, and purchase of family needs. The target delivery volume is 150, and the actual number of valid questionnaire answers is 120.

Questionnaire link

https://wj.qq.com/s2/11146443/4b66/

Questionnaire result is responded by Tencent

Fig 3.2 · Website version

Fig 3.1 · Mobile version

Interviewer selection

Since the production of cardboard products may occur in various groups of people, and I also hope that in many years, the production of cardboard products can become a product trial method acceptable to consumers of various groups. However, as the preliminary research stage of the project, the selection of my target group cannot cover all possible groups. I need to screen the initial possible user groups, and the principles and rules of my screening are

People who have the habit of making DIY handicrafts and have a certain ability to make them by hand

As a group of people in the family who have the power to distribute living materials and ensure the quality of life

People who will pay attention to and consider buying new products to improve their quality of life

Populations who need to carefully consider how the allocation of funds in various areas is allocated

People who can spend some time comparing competing products and testing products before purchasing

People who have experience in making cardboard products

3.1.2
Interviews

Aims

Next, I will conduct in-depth discussions with users based on the results obtained from the questionnaire survey through qualitative research methods of interviews. I hope to achieve the following goals through this survey

- Find out why cardboard product making is still not accepted by most people
- Find out if the difficulties of making cardboard products at the current stage are real
- The reasons for these difficulties and the deeper logic to find solutions

Interviewer selection

According to the previous questionnaire results, the groups that may become the initial users meet the following characteristics, have enough time to compare products, have a certain understanding of the features and functions of the products and their own needs, have high requirements for the products themselves, and People who have a certain ability to make handicrafts and have the right to decide the management of funds and the allocation of resources.

Combining the above rules and principles, I have selected two people around me to visit

A student of product design, 25 years old, male, living alone, with limited distributable funds, with experience in model making and handicraft making. Most product purchases are made through online shopping channels. Before purchasing a product, an objective comparison of competing products will be conducted, and returns will be considered due to poor product experience.

A housewife, 31 years old, female, family of three, plays a role in the family to ensure the quality of family life, allocate living resources and funds, spend a lot of time in life on purchasing household necessities and products, relatively good They know how to select and try products, and have a good understanding of product return rules, and will use this convenience to select and try products.

Question setting

For these research goals, I specifically set the following questions

1. How to deal with cardboard packaging
2. Have you ever known or actually made cardboard products?
3. After the epidemic began, some products could not be purchased while at home. Have you considered using cardboard to make products to meet temporary needs?
4. What motivates you to make cardboard products in general and why?
5. In your opinion, which products are suitable to be made of cardboard, which products are not suitable, and which ones are not suitable, have you made a breakthrough through the combination of some other materials?
6. If you have made cardboard products, what is your general production process?
7. Have you learned about other people's production process, and have you looked for some tutorials on the Internet?
8. Ask questions about the details of the process, how and what to do
9. What do you think about your own process that you find difficult and may make you give up making it?
10. What do you think are the best solutions to these difficulties?
11. How do you think cardboard product making can help you?
12. If making cardboard products is very convenient, will this make you a habit?
13. Did you know about Nintendo's cardboard toys?
14. If there is an official blueprint before purchasing the product in the future, will you try to make and try the product, and use the result as a consideration for whether or not to purchase the product?

Specific questions and answers

Student

Questions	*Answers*
1 From what I have known about you before, I know that you really enjoy shopping online. The transportation packaging for online shopping is mainly made of corrugated boxes or paper bags. How do you usually deal with these cardboards?	It is true that there is a lot of paper and cardboard and cardboard, and I usually throw away these cardboards, unless there are some cardboard boxes or cardboards that are in very good and neat condition, I will consider saving it , when the item's storage box comes to use.
2 Now you can search online for many videos or blueprints of making DIY handicrafts using cardboard, such as simple versions of VR glasses, or other products, such as lamps, which can be used with bulbs and wires purchased by yourself. Have you tried to make these simple products before?	For my own daily life, I don't make many times. I have made daily necessities, but most of the production is from the previous school. I used a lot of cardboard-type materials for simple model making, so I say For candy bar model making, I still have some production experience.
3 Due to the epidemic, in fact, I also found that many people encountered a lot of difficulties when purchasing products. For example, they could go to offline physical stores to continue to try, and then consider purchasing. However, due to the epidemic, they cannot try products or buy offline in many cases, so many people are trying to use cardboard for short-term product production to meet their temporary needs, such as some stools and tables. Production, if there are suitable materials, have you encountered these similar problems during the epidemic, or have you made similar attempts?	Yes, because during the epidemic, computers or tablets were often used at home for online courses, so in many cases, when using a computer, the height of the table will greatly affect the comfort of long-term use. Ordinary desks can't meet all the functions and needs, so I made a small workbench out of cardboard. And after the epidemic, I found that this product was very suitable for my needs, so I subsequently purchased a metal desk work platform online for my long-term use.
4 How was your experience with the production of the product?	That production was considered a short-term production of cardboard products for my own needs. In general, the production experience took a long time and encountered some hardships, but in terms of the use effect of the final product, I think it has reached a level of use, so I am very satisfied.

Questions	*Answers*
5 It's really good, you can use some resources around you to meet your own needs through the production of product cardboard. Then can you tell me in detail, the specific process when you made this product, how did you finally make the product and use it through the use of some materials and the search for resources?	At that time, I first felt that I needed such a product, because in many cases, placing the computer on the table may be very suitable for me to sit at the height, but sometimes I sit for a long time and want to stand up. , When conducting video conferences or video courses, there are specific requirements for the height of the table, so I want to make a workbench that can increase the height of the items to meet such a requirement. After learning about the type of product I wanted to make, I did a specific search online. First, check the appearance of a similar product on an online shopping platform to see if there is a product that can meet your needs. But then I found that even if I found the right product, I might not be able to make it with cardboard or some materials around me, so this method didn't end up being taken by me. Later, I thought of the material cardboard I made. There may be a lot of resources on the Internet to provide some blueprints for cardboard products, so I used this method to conduct some keyword searches on the Internet to search whether someone uploaded some information about the table, A blueprint for making a product of this type, a workbench. After I found a more suitable blueprint for the product, I saved the blueprint in the computer, printed it out with a printer and pasted it on the cardboard, made the product cardboard, and then used glue, scissors and other tools to glue and Assembled to finally complete this product.
6 What aspects of the production do you think were difficult for you?	In fact, the whole process is not very complicated for me, because I have experience in making similar products and model making, so the overall production process is not particularly difficult for me from a technical point of view, but There are other things that bother me a bit, such as the source of suitable cardboard materials and the search for blueprints. Because I didn't have the habit of collecting cardboard as a resource material, I was worried when I was making it, where to find these cardboards, and finally I thought that in the community garbage storage room, there are many other neighbors who don't use it. The cardboard box, folded and placed in the garbage storage room, I just found more suitable materials in the garbage storage room

Questions	*Answers*
7 Indeed, as you said, if you don't have the habit of making cardboard products, storing cardboard is actually a very space-consuming act, so when we want to make it, this resource may not be very convenient to obtain. In addition to this, do you think there is anything else that makes you feel that the whole process is not very good, or that you feel that if it can be optimized, you will be more accepting of the behavior of making cardboard products Woolen cloth?	For me, the main reason for not making frequent productions is because in many cases, it is difficult to find a sample that is very suitable for my needs and meets my aesthetics on the Internet, and in many cases there is no suitable platform on the Internet. Let me search for blueprints, in many cases, I can only search on google images or pinterest, but there will be a lot of unrelated information. Therefore, I think this link of searching for blueprints can be optimized.
8 Indeed, as you said, on these websites, because its main function is not to provide us with a blueprint search function for cardboard products, other information appears, which is indeed correct. From your point of view, if you can provide a platform to provide blueprint search, upload and download and share these services, do you think you will use it, and will it affect the frequency of product production?	I think if I have a need to make a product, and I can find suitable resources on this website, or if the resources of the platform are very diverse and give me new inspiration, I will use it. At the same time, if the platform can inspire me, or let me find some needs that I didn't realize, I will also consider making it.
9 So what do you think is the main reason for you now, in many cases, you will not consider the production of candy bar products?	I think that firstly, cardboard resources are difficult to obtain, and secondly, cardboard itself has many limitations, because it can only be used for a short period of time. At the same time, if it comes into contact with water, this product may face scrapping. A process of product production is actually more time-consuming and energy-consuming for me. If there is some way to simplify this process, I think I will consider making product cardboard.

Housewife

Questions	*Answers*
1 Do you have any experience in making cardboard products or using the outer packaging carton and carton materials of the product to make products?	Do handicrafts made from cardboard count? Or some simple toys made when playing with children.
2 Of course, it seems that you are quite experienced. Will these cartons or cardboards that you usually get after shopping be classified?	Um. Because cardboard boxes or cardboards take up a lot of space, most of the cardboards are still treated as garbage. But in order to prevent the need to make cardboard handmade products in the future, I have classified the cardboard, such as, the condition is better, or the cardboard is clean and tidy, and there is no damaged cardboard, I will keep it at home.
3 Then can you share some of your experience in making cardboard toys for your children, or how you made them at the time, and can you briefly tell me about the process?	The first time I came into contact with a cardboard toy, I saw it in a supermarket. It is sold in the form of printed and cut cardboard. After buying it, you only need to follow the instructions to assemble it. It is a simple paper castle. After buying it, I made it with my child. The production was very simple and didn't require much operation. The child liked it very much, and when I got tired of playing, I didn't need to worry about the cost. Just throw it away, and it is also a recyclable material. There will be no psychological burden when discarding. After that, I thought about whether I could design and make the kind of toys I want. In fact, I don't know much about the making of toys, so I first searched the Internet and found a suitable blueprint. I printed the blueprint and then drew it on the cardboard. I've had a lot of failures after my cut. In the end, I handed the cut parts to my child, let him assemble, and finally completed this paper car model.
4 It was an interesting experience. After you made a toy car last time, what links did you think were very difficult for you, or gave you a headache or even wanted to give up?	Judging from the results that time, the model was made and some interaction with the child was made. He was also very happy, which was very meaningful. But it's actually quite difficult to recall the whole process. The thing that gave me a headache was the process of blueprint it onto the cardboard after finding the blueprint. Because in many cases the painted wheels do not match the final body, they need to be remade, because the size ratio is difficult to control. Another headache for me is the source of cardboard. Although I usually collect some cardboard, I rarely use it in toy making. I always buy some new cardboard to make it because the cardboard I collected before They all exist in the form of external packaging. Considering the issue of cleanliness, I do not want these packaging to come into contact with my children, because toys are things that children are frequently exposed to.
5. Q Indeed, when it comes to making toys for children, the quality of the cardboard and the cleanliness itself are very important. If a cardboard is introduced in the future, it will be in the form of ordinary cardboard, but it can facilitate your production and guide you to draw accurate blueprints. Such a clean and tidy cardboard that is very convenient to make, you will consider Do you want to buy toys for your kids?	I really want to have this kind of cardboard, because it is really difficult to get such a product. If it can be convenient for me in the production process and provide me with some guidance in the process, maybe I will be more willing to make toys . Because the production of cardboard toys can not only give us an interactive method, but also exercise children's ability.

3.2
Research result and analysis

3.2.1
Questionnaire result

AGE OF THE TESTER

A total of 166 users participated in this questionnaire, and all of them were under the age of 40. There were 26 participants under the age of 18. Most of the people who participated in the survey were between the ages of 18 and 25, with 124 people. There are 16 people between the ages of 26 and 40. Therefore, we can roughly see that the current use of the Internet to conduct questionnaires or use the Internet is relatively frequent, and more online shopping groups may occur. They are between the ages of 18 and 25, and they are users of online communities and various online platforms. the most active group.

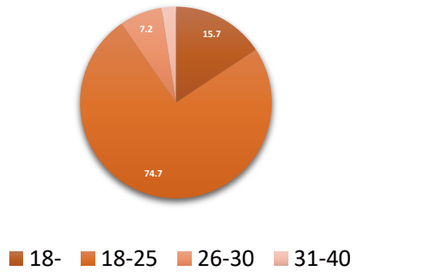


Fig 3.3 · Age of the tester

GENDER AND THE EXPERIENCE

Through this parent-child chart, we can find that there are 130 women and 36 men who participated in the questionnaire survey. Twenty-two men (61.1%) were those who had considered or had production experience. 95 women (73.1%) were those who had ever considered or made a cardboard product. Therefore, we can find that in the two groups, women's enthusiasm for the production of cardboard products is relatively high. But whether men or women, the production ratio has reached more than 60%, so we can conclude that the production of cardboard products is favored by the majority of users.

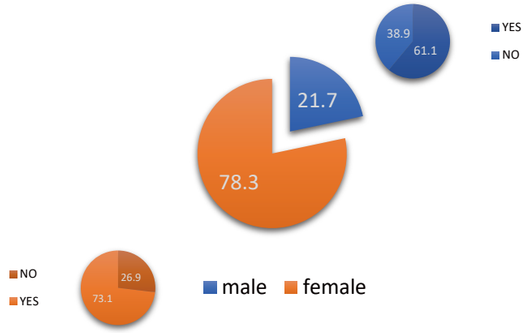


Fig 3.4 · How the gender will influence if they have ever made the facture

Reasons that they make the artifacts

From this chart, we can find that among all the people who have made cardboard products, 77 people make cardboard products because the process and results of making cardboard products are very interesting, and 52 people make cardboard products because of the needs of work or study. Cardboard model making, 39 people are making cardboard products with the goal of environmental protection. Therefore, we can see that the reason why most users make cardboard products through personal wishes is fun, and products can provide users with fun.
Combined with the impact of the epidemic on the willingness to make productions, I found that the people who received the most positive impact were also the people whose main factor was fun.

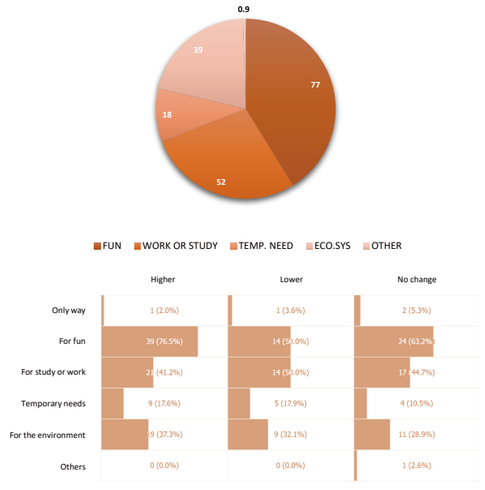


Fig 3.5 - If the epidemic have influence on different motivation of making factures

IF THEY HAVE THE HABITS OF COLLECT CARDBOARD

Observing this chart, we can find that among the respondents, most of the respondents who have participated in the production of cardboard products or thought about cardboard products have the habit of cardboard classification, induction and storage. From this, we can discover that some people who do not have this habit have also made cardboard products, indicating that they will use other channels to find cardboard and make cardboard products.

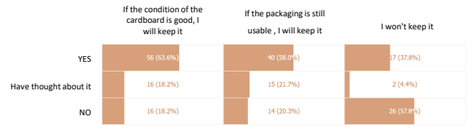


Fig 3.6 - People who have the habits of collecting cardboard have more possibility to make factures

Reasons that they would make more factures

The results of the question "Which of the following functions might make you more likely to make cardboard products" shows that there are four main reasons that will greatly promote users to accept and implement cardboard product making. Among them, users can provide Professional image uploading and downloading platform, and can quickly and easily let users get high-quality and clean cardboard, there can be many teaching videos on the platform, and the content of the platform will be updated continuously, providing more possibilities for product production . When the above conditions are met, the willingness and possibility of users to make cardboard products will be greatly improved.

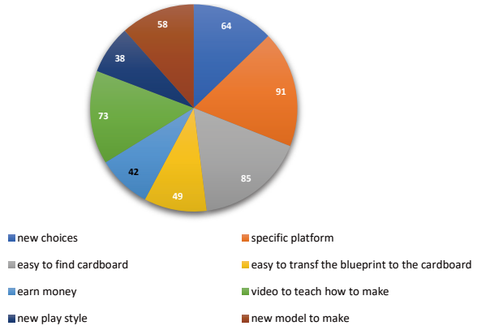


Fig 3.7 - What are the resons that make the poeple want to make more factures

Problems that they faced

Through the data analysis of the production process and the answers to difficult questions in the process, I found that the user must go through the process in the entire production process: browsing to determine the target, searching for blueprints, collection of cardboard materials, blueprint blueprints onto cardboard, cutting blueprint, assembling and sharing. During these processes, it can be found that most users will have difficulties in the four main links of "browse to determine the target", "cardboard material collection", "blueprint on the cardboard" and "assembly". Most of them will choose to be particularly happy when "sharing the results", which proves that after everyone's production is completed, they are very likely to share with others, so it is extremely important to have a dedicated community and platform at this time. important.

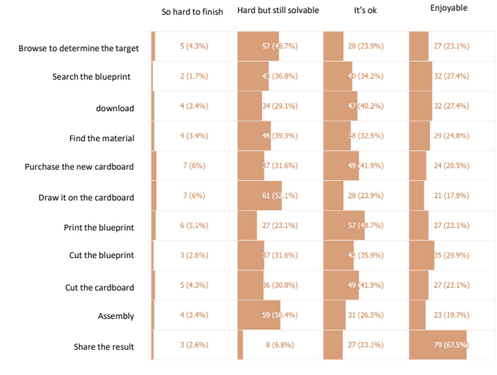


Fig 3.8 - Which part of the process is the problem to the users

3.2.2 Interviews result

Through interviews I found that the two interviewees identified several different difficulties and problems during the production of cardboard products. One of the more prominent problems is that for the student group, they do not have a more convenient and efficient way to obtain cardboard materials. Because they do not have the habit and ability to collect cardboard and organize and classify them, they will need to temporarily search for resources when making products. At the same time, they have relatively high requirements for the appearance and overall functionality of the product, so they have a lower degree of demand for cardboard to meet their needs. They want to have a more comprehensive platform with a wider variety of products that can be produced. In this way they may consider using cardboard products more frequently.

The production process of this group is to first search for the type of the target product through the Internet. After determining the type, search for the blueprints of the target product cardboard, and carry out a customized design, redraw and print it and paste it on the cardboard, and then cut and paste it finally. assembled.

For the group of housewives, in many cases, they will roughly divide the production of cardboard products into two parts, one part is the production of communication toys between parents and children, and the other part is the production of some handicrafts and decorations in daily life . When making handicrafts, cardboard is very easy to obtain, because they usually have the habit of collecting cardboard, so resource material resources are not a very big problem. For the production of toys, the acquisition of materials is a very serious problem. Because at present, cardboard still exists in the form of outer packaging in our entire social environment, so it is difficult to maintain the cleanliness and integrity, and children's toys have relatively high requirements for the cleanliness and integrity of the entire cardboard. So in most cases, when it comes to the production of toys, users will consider buying a new cardboard for production. Buying a new cardboard is actually buying a carton package, dismantling it, and then making it.

Therefore, if there is a cardboard material for cardboard toys, it may greatly increase the willingness of users to make products and reduce the difficulty in the production process.

During the interview, Nintendo's questions about the combination of cardboard products and video games were also mentioned. Housewives and students are very optimistic about this product, because it not only improves the entire interactive experience, but also the cardboard printing is very delicate and the cutting is very accurate, providing users with a very good experience during the entire production process.

In the entire product production process, there is still a very big difficulty for the housewives group, that is, the technical requirements in the process of transferring the product blueprints to the cardboard are very difficult for them to control, because the whole process is very difficult for them to control. It may face the difficulty of scaling the scale, and the error in the process of cardboard blueprint is difficult to control, which may lead to this process may require constant attempts, and the worst result is that the user will give up the production.

Combining the results of the questionnaire survey and further verification of the results of the questionnaire survey through the follow-up questions and answers to the above two respondents, I can conclude that the link in the whole process that is likely to cause trouble to the entire group is that:

- When searching for target products on the Internet, there is not a very centralized platform for them to search, and there is not a very comprehensive and diverse product blueprint resources on the entire Internet for users to choose.
- During the whole production process, there are many technical barriers, such as how to transfer the blueprints to the cardboard in the proper scale for cutting in the subsequent process.
- At the same time, it is very difficult to collect cardboard materials. Finding the right size, the right thickness, and maintaining good cleanliness can be difficult.

In the final assembly process, as long as the blueprints are properly designed and the parts are accurately cut, everyone will have a very good assembly experience, because everyone likes the process of making DIY products very much.

3.3
Process analysis

According to the previous research result, I divided the process into 3 parts. The first part is to determine ideas and search for product blueprints; the second part is to determine the blueprints and obtain cardboard materials, and then integrate the cardboard and blueprints; 3rd part is to cut and assemble the parts and use.

3.3.1 Determine the blueprint

The first part, the main purpose is to determine the blueprint of the product, I divided the first part of the action into the following 3 links

Use online image search tools or online shopping platforms to determine the types and forms of products you need based on your own needs. For example, the category of the product, what does it roughly look like? What are its functions?

Then, through these appearance and functional requirements, conduct keyword searches on the Internet. The commonly used website platforms are Google images or Pinterest image sharing websites.

After finding the required blueprint on a specific website, download the blueprint to a smart terminal such as a mobile phone or computer.

The search for blueprints in the first part seems simple, but it is actually very difficult, because these picture websites are not specially made for cardboard products. When we enter keywords, most of the results that appear are product display pictures, not It contains blueprints for production, and the types of products will not be classified, making people dazzled and unable to quickly find the blueprints they want, which in turn affects the progress and difficulty of production.

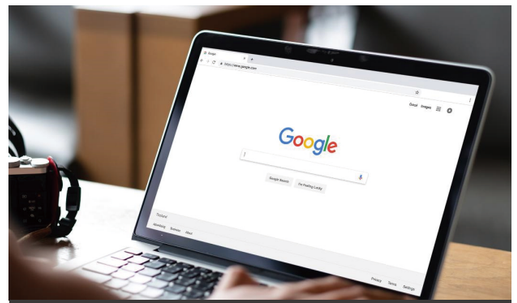


***Fig 3.9** · Making process 1*
Search on the internet

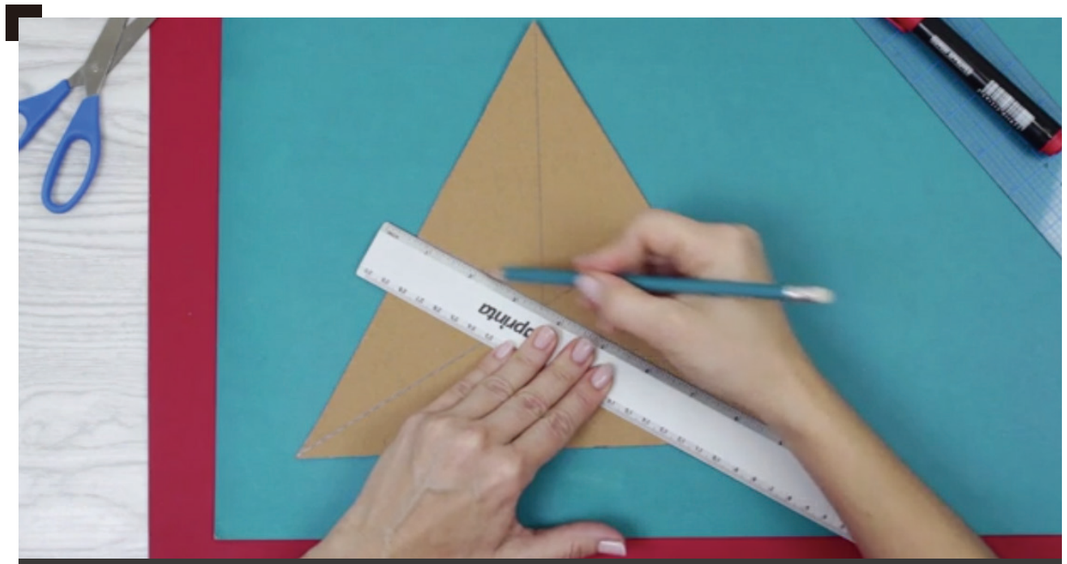


Fig 3.10 - Drawing the blueprint on the cardboard

3.3.2 Blueprint Transfer

After finding the blueprints, the user will proceed to the second part of the process, finding the appropriate cardboard material and transferring the blueprint to the cardboard. I divided the second part of the action into the following segments

The user evaluates the volume of the product they need to make, knows the size and quantity of cardboard they need, and collects the materials. The collection of cardboard is a very important link, and most users stop at this link, because they need to use the cardboard they usually store to make cardboard products, or they can buy new cardboard packaging , for the production of more refined products

After getting the right amount of cardboard, the user needs to decide which way they should transfer the blueprint. The user can choose to print it out through a printer, then glue the entire blueprint to the cardboard at the right scale

Another way is to customize the blueprints according to their own needs through the ability of users to redesign, and then draw them on the cardboard.

Finding cardboard in this part is a worthy part, because users will not collect suitable cardboard immediately after they have the idea of making cardboard products. They need to consider how to collect or buy cardboard, but even if they want to make cardboard products Buying a brand new cardboard, the products you can find on the online shopping platform are only the sales version of the cardboard box, and the price is not very low. Most of the cardboard that can be obtained for free usually comes in the form of product packaging. It is difficult to control the cleanliness and integrity of such cardboard, especially after the cardboard is bent, its physical properties will change, such as The rigidity of duty will be reduced a lot. The first method in the subsequent transfer process mainly tests the user‘s ability to operate and control the scale of the printer and blueprints, while the second method takes into account the user's ability to redesign their own needs. At the same time, the accuracy of blueprint blueprints will also be tested. These technical problems are very important and difficult to complete. Many users will also need to redo the entire process because they cannot adjust the appropriate ratio or control the errors of the entire production, which will eventually lead to the termination of the process and the production cannot continue. an important reason.

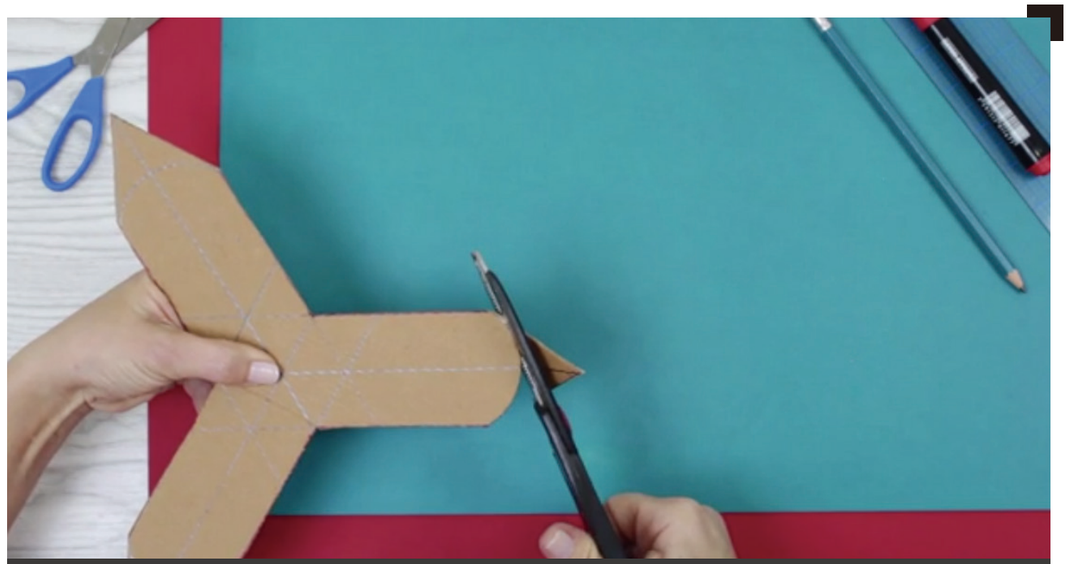
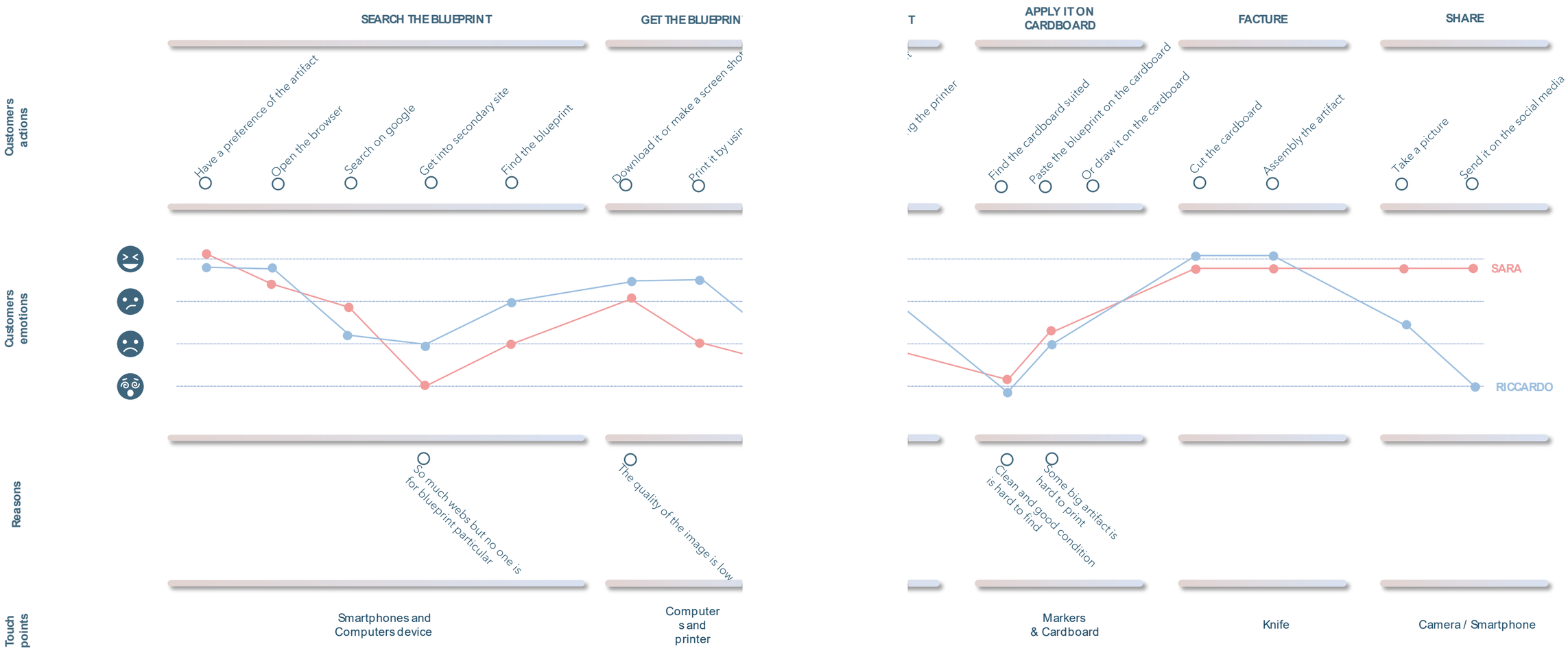


Fig 3.11 - Cut the cardboard along the lines

3.3.3 Product assembly and use

After the blueprints of the product have been determined and have been transferred to a high-quality cardboard suitable for making the product at a suitable scale, almost all users will complete the assembly with a very high sense of experience. And in the end, if you want to cultivate a culture of making cardboard products, it involves how to share and communicate this product. For example, users do not have a very suitable channel to provide feedback and update suggestions for such cardboard blueprints, as well as the sharing of the entire experience of production. Therefore, if there is such a platform, it can allow them to share the experience of making cardboard products and exchange and feedback on the innovation of cardboard product blueprints, which is conducive to the formation of the whole habit and the cultivation of culture.

3.3.4
Customer journey map



3.4
Rebuild the process

Through the analysis and research on the data of the previous questionnaire survey and the content answered by the respondents in the interview, I found that the mainstream process of the production of cardboard products can be determined as the following links: Users first look for blueprints on the Internet, download and transfer to the user-ready on the cardboard, and then cut the parts, and finally assemble the product to complete the entire production process.

During the whole process, based on the feedback of the data, I found 3 main links that will lead to the decline of the user's production experience. The difficulties in these three links are also the pain points that I will solve next.

- The first phase is in the process of searching for blueprints on the Internet, users have no way to quickly find blueprints that suit their needs; in the process of searching on the Internet, there is no special platform to provide users with the service of searching and downloading blueprints. The user's progress in the search process is very slow, and the user cannot generate new product production willingness through rich choices, which reduces the possibility of production.
-
- The second phase is the process of finding cardboard. Because most users do not have the habit of sorting and storing cardboard in their lives, and because of the identity of cardboard in social life, it is the outer packaging of product transportation. This also leads to the inability to obtain high-quality and clean cardboard quickly and easily when users want to make cardboard products. Such difficulties will prevent the user from proceeding with the subsequent process, thereby increasing the possibility that the user will stop the behavior and continue.
- The third phase is that when the user has determined his own product blueprints and found suitable materials for production, the technical requirements in the process of transferring the blueprints to the cardboard may not be met by the user. Whether the blueprint is printed first and then pasted on the cardboard, or after the redesign, the blueprint is drawn onto the cardboard, there will be technical requirements for the user. For example, adjust the scale of product blueprints and strictly control the accuracy of blueprint. If there is a slight deviation, the product will be cut and assembled incorrectly, resulting in the need to redraw and cut. A lot of rework will make users lose confidence and interest in continuing to do it, and may cause users to terminate this behavior.

After these three main pain points were clearly presented, the direction of my next project became very clear. First of all, I will further refine the key elements from the user's feedback, and summarize what the users really need in these three links, what kind of service they need help, so that they can smoothly complete the whole process. After understanding the real needs of users, I will translate these needs into actual designs, and then re-apply the new design concepts to the whole process to reconstruct the user's process of making cardboard products. This new process will allow users to have a very good experience and facilitate each link in the process, thereby improving the possibility of cardboard product production and reducing the possibility that users may encounter difficulties in the production process. possibility.

3.4.1
Insight analysis

“ So much webs but no one is
for blueprint particular , I don’t know where can I find what I want.... ”

“ The quality of the image is low, and I don’t have that much choices, if there is a place that is full of the blueprint that will be easier for me to chose. ”

“ Clean and good condition is hard to find , if the condition Is bad , it will influence result. Found no cardboard will make me stop to do this thing. ”

“ Some big artifact is hard to print , and the dimension is hard to control if I choose to draw it on the cardboard , and the scale of the model is also a problem for me . ”

Easy to find the one

Provide a solution that allows users to easily and quickly find a complete blueprint in their minds, or when users only have a preliminary idea, help them to diverge their thinking and determine their preferences to complete the blueprint search task .

Multiple choices

The types of blueprints available to the user should be diverse, and need to meet the requirements of high quality and multiple formats

No limits on technology

Any technical problem will make users want to stop the process , so provide a solution that allows users to not need to calculate the number of raw materials needed to make handicrafts, as well as the size ratio .

No warry about the material

Provides a solution that makes it easy for users to obtain the right amount of clean, complete cardboard suitable for crafting

Get into assembly phase easily

Provide a solution that allows users to easily transfer blueprints to cardboard, reducing the difficulty of transfer operations

Hobbyist

After the assembly is completed, users are more willing and enthusiastic to share their achievements, making cardboard crafts a popular trend

3.4.2
Insight transformation

Provide a solution that allows users to easily and quickly find a complete blueprint in their minds, or when users only have a preliminary idea, help them to diverge their thinking and determine their preferences to complete the blueprint search task .

Easy to find the one

The types of blueprints available to the user should be diverse, and need to meet the requirements of high quality and multiple formats

Multiple choices

Any technical problem will make users want to stop the process , so provide a solution that allows users to not need to calculate the number of raw materials needed to make handicrafts, as well as the size ratio .

No limits on technology

Provides a solution that makes it easy for users to obtain the right amount of clean, complete cardboard suitable for crafting

No warry about the material

Provide a solution that allows users to easily transfer blueprints to cardboard, reducing the difficulty of transfer operations

Get into assembly phase easily

After the assembly is completed, users are more willing and enthusiastic to share their achievements, making cardboard crafts a popular trend

Hobbyist

Blueprint share platform

The most basic function of this platform is to enable users to quickly, conveniently and accurately find the blueprints they want. In order to maintain the diversity of blueprints, users are supported to create their own channels, upload their own designed or found blueprints, and the size and files of the blueprints on the platform. Quality is controlled. In order to ensure that users will not encounter material shortages and technical difficulties in subsequent operations, the platform provides detailed explanations of the production process and material purchase channels. In order to cultivate users' love for cardboard products, the platform provides a community for sharing and communication.

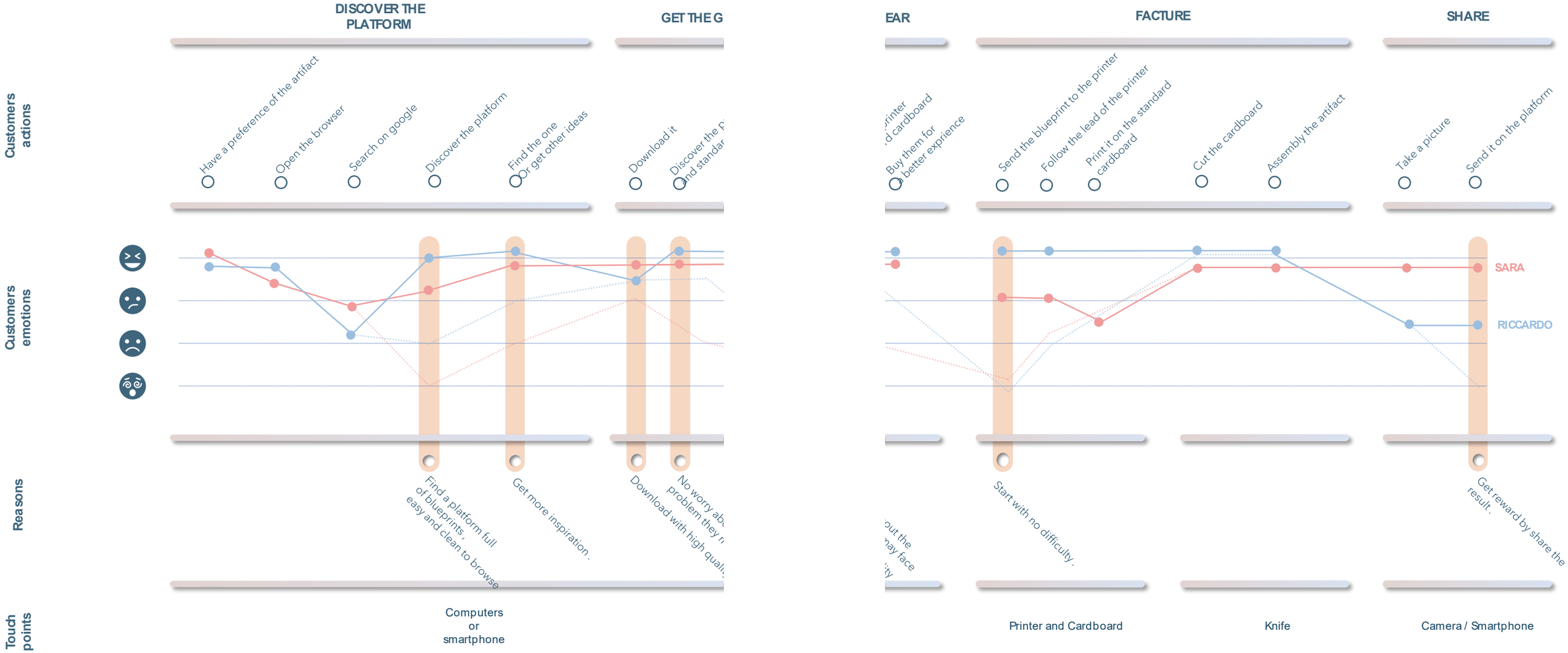
Portable printer

In order to simplify the process, a portable printer is designed to allow users to easily and quickly print blueprints on the cardboard. The product needs to have a function of cooperation with the platform, so that the blueprint can flow seamlessly and quickly between the platform, the printer and the cardboard.

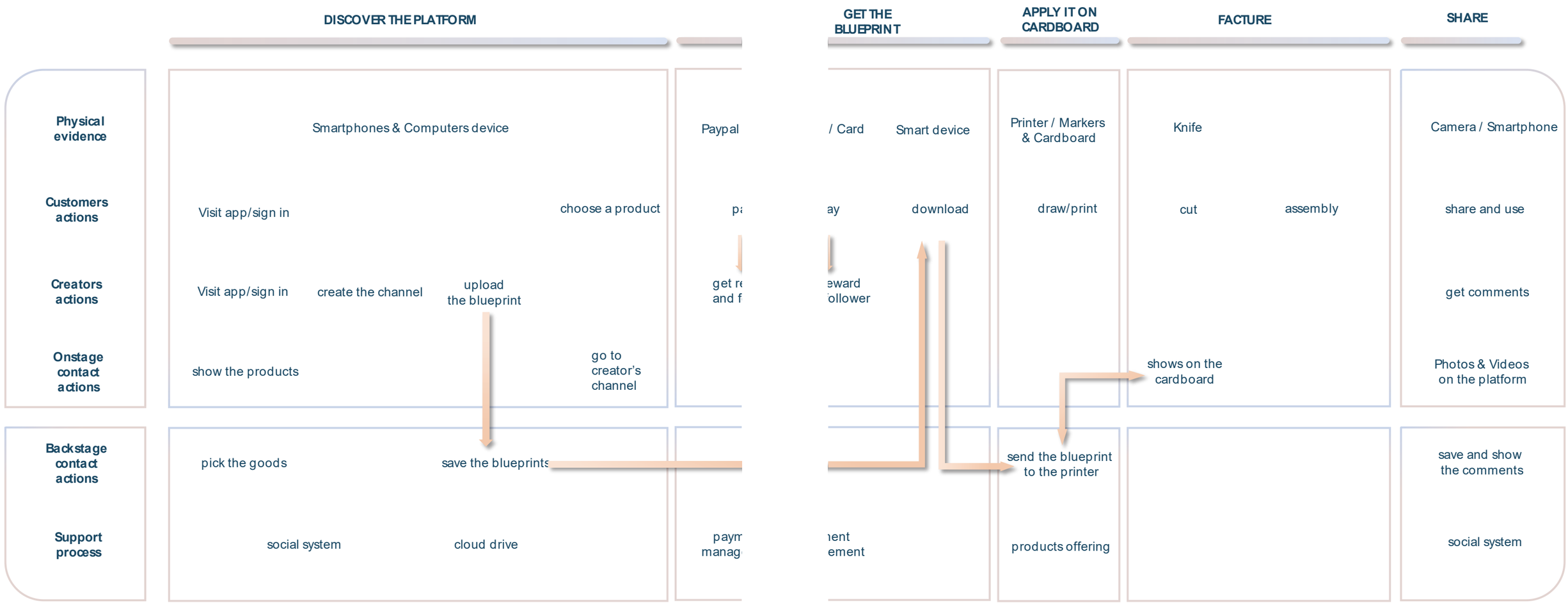
Standard cardboard

Design a cardboard product to ensure the quality of the handicrafts, reduce the problem of lack of raw materials in the process and simplify the process to improve the user experience

3.4.3
Rebuild the Customer journey



3.4.4
Service blueprint



3.5 Summary

After analyzing the data obtained from the questionnaire and the interviews , I have summarized **three main problems** that will reduce the experience during the whole process

There is **no specific platform** for users to search for blueprints. And during the process, there is **no reliable method for users to obtain high-quality and clean cardboard** . And there are **technical difficulties** that are difficult to solve when **transferring the blueprints** to the cardboard.

Through deeper analysis of these three problems, I transformed m into the needs of specific users, and then summarized them into three specific design briefs.

First, I will design **a specific platform** where users can download, upload and share their own cardboard products or cardboard product blueprints.

Secondly, I will use the cardboard digital printing technology that GHELFI is good at and design a **cardboard product** that can be purchased through the platform. While ensuring cleanliness and high quality, the marks printed on the cardboard can also guide users to quickly draw or transfer blueprints, reducing the technical difficulties in the process.

Finally, I will design a **portable printer**. This portable printer can work together with the platform and cardboard, making the whole process easy and fast. It allows users to directly transfer the blueprints that they have downloaded on the platform to the printer. The technical issues of transferring blueprints will be solved by this product .

CHAPTER 4

Concept Design

A platform especially for cardboard artifacts blueprint sharing.
Work together with a portable printer and standard cardboard.

4.0
Introduction

This design project has contained 3 main parts which are the **platform design** to previed a place to share the blueprint , the **standard cardboard product design** to let users find the material to make the cardboard artifacts easily and the **portable printer** to solve the technical problems that users will face in the blueprint transfomation phase.

These 3 designs will **enhance the experience** of making cardboard artifacts process , by doing this , **more and more users** will come into this party and get used to making models , finally they will have the **habits** of it then reduce the irretional purchase, reduce the waste.

Let's get into this chapter and have a look at the new world for the cardboard and us.

GHELFI STANDARD CARDBOARD

GHELFICRAFT PLATFORM

PORTABLE PRINTER

SHOWCASE

4.1
A New Platform for Cardboard Blueprint Sharing

4.1.1
Scenarios

The content of this part is the design of the **cardboard blueprint sharing platform**. This platform is the core of the entire design project .

Users can **search** for the blueprints they want to make cardboard products on this specific platform, and **upload** the blueprints drawn by other users and creators. The blueprints that reach the entire platform can be **continuously updated**, and **more play styles** will **emerge**, allowing users to play in the game. The platform also provides making **tutorial videos** and a **communication community**, so that if users encounter difficulties and problems in the production process, they can also ask for help through the platform. When users encounter technical difficulties in the process of making cardboard materials difficult to obtain and transfer blueprints, users can also **purchase cardboard and portable printers** through the platform. Finally, after the process is completed, users can also **share the results** of artifacts or give **feedback** of experience through the platform, which will trigger discussions and form their own communication circle of cardboard product making culture.

The whole process of platform design is from summarizing the problems existing in the current platform, as well as the functions and specific forms to be provided by those platform. Through the analysis of all the stockholders of the platform, determine the operation mode of the entire platform. Finally, through the analysis of different users , the specific functions and information architecture that the entire platform needs to provide is further summarized, and the platform design results are displayed through UI design.

4.1.2
Competitors selection

In this section I will conduct a competitive analysis of other platforms that offer similar functionality. Although there are various entertainment interactive platforms on the Internet now, they provide users with a variety of services and functions to meet the needs of all aspects of life. Such as shopping platforms, audio-visual entertainment platforms, social media platforms based on pictures or videos, etc. However, among the many online platforms, I have not found a community that can provide users with blueprints for making cardboard products or allow users to share their experiences and thoughts on cardboard product making. However, the number of users who like and want to try the production of cardboard products is very large, which can be known from the number of searches and comments on cardboard products by users on various platforms, but most of the results obtained on these existing platforms are searched. It is meaningless information for the production process, which leads to the fact that most users do not know how to start even if they are willing to produce.

Therefore, the screening scope of the platforms in the selection of competing products in this part is the platform that can realize the function of searching and downloading the blueprint of cardboard products, and the platform that can search for information and inspiration about cardboard products.

And this competitive analysis is conducted after the main functions of the platform and the positioning of the platform have been determined. Therefore, the main dimension of this competitive product analysis is to analyze the design concepts of each platform, as well as the types of information that the platform can provide to customers in the cardboard product production module, and how to interact. And in this module, the degree to which users can play freely, analyze the main features of the platform that can maintain user stickiness, what are the features that most attract users to use the platform, analyze the advantages and disadvantages of each platform, and analyze the UI design. specialty.

Through the above rules and screening requirements, I selected 4 platforms for this competitive analysis. Search engines such as Google, Baidu, image-based social media platforms such as Pinterest and Instagram, and social media platforms such as Xiaohongshu and YouTube for sharing inspiration and sharing videos of production results. Users can find relevant information on the production of cardboard products and the sharing and teaching of the production process of cardboard products on these three types of platforms.

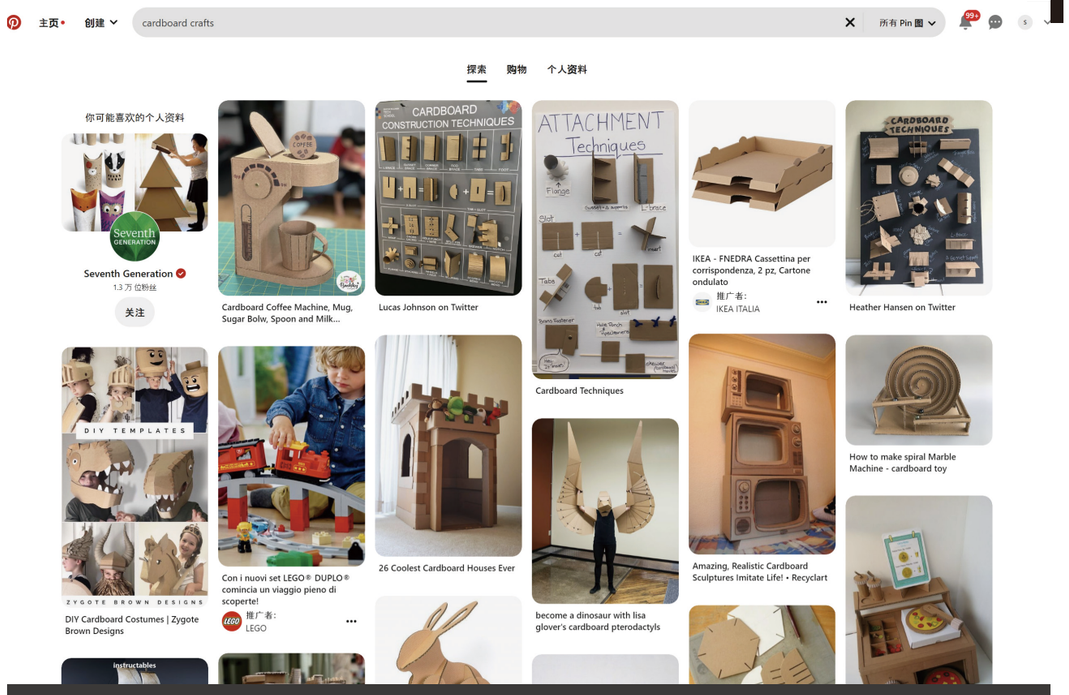


Fig 4.1 - Informations shown on the Pinterest

Pinterest

The first types of platforms I analyzed were Pinterest and Instagram. The main communication medium of these two platforms is pictures, and many elements associated with artistic inspiration are integrated. When users want to search for pictures related to inspirational production, they will first think of these two platforms. The biggest advantage of these two platforms is that they provide users with high-quality pictures and colorful ideas, so that users can quickly find pictures that meet their needs. Users can upload and download freely on the platform, which can enrich the content of the entire platform. Users can continue to upload a variety of content, which can not only meet the needs of users, but also may allow users to burst out new ideas in the browsing process.

This also makes it possible for users to search for blueprints made of cardboard products through this platform, not only can they find the blueprints they want, but they may also find product pictures of product types they like but have not thought of.

However, the disadvantages of such platforms are also obvious. It is the main function of this type of platform, and it is made for cardboard products. Therefore, when the user enters a keyword, the content that appears may not only be blueprints, but also the appearance of the product or other content related to product production. From an angle, it may appear that the information is very complicated, and it is impossible to quickly search for the most important content about your needs. Moreover, although the form of pictures is intuitive, for manual production, the content and information that can be provided are still too scarce, so that users cannot get very good help in the whole production process.

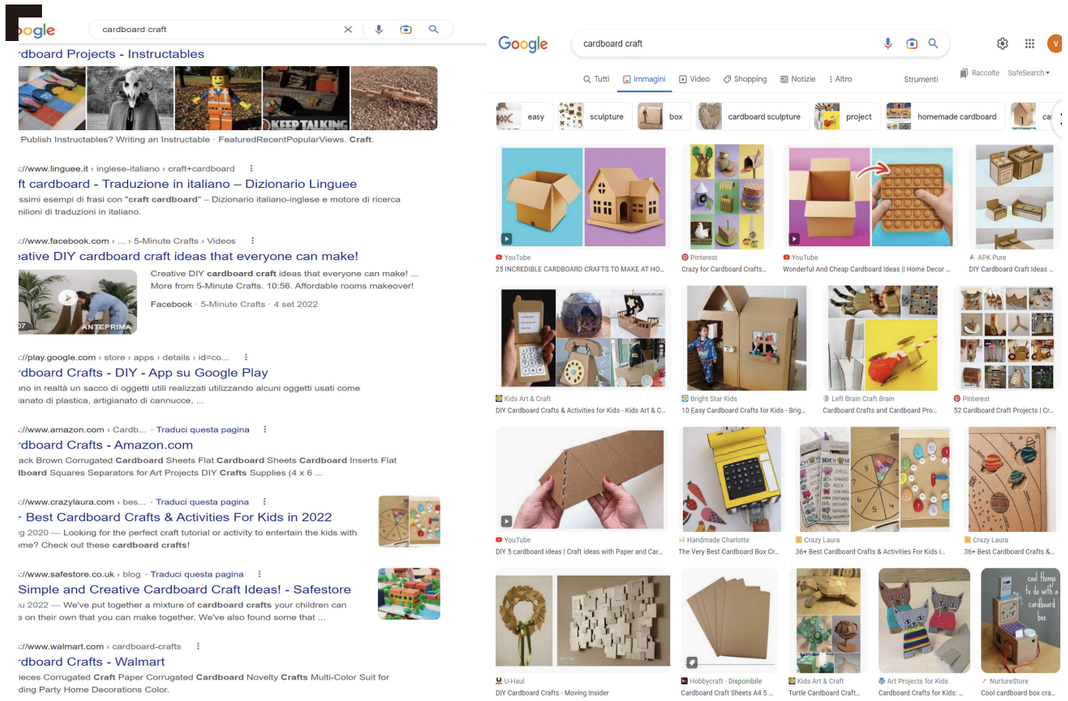


Fig 4.2 - Informations shown on the Google

Google

Next, I will analyze search engine platforms such as Google and Baidu. When people want to search for something or some information, the first website or platform they enter is Google, Baidu and other search engines. Just enter the keyword, all relevant information will be presented in front of us. The biggest advantage of this type of platform is that all information about keywords on the Internet will appear in the search content, so we will have all the information at a glance, and will not miss any information that may be beneficial to us.

And this richness and completeness of information can cause certain troubles. That is the complexity of information caused by too much information.

When we enter the production of cardboard products on a search engine such as Google, the content that appears not only includes production blueprints but also includes, for example, the possible benefits of cardboard product production, and news or latest research on cardboard product production, or other Level 2 web pages. After entering the Level 2 webpage, we need to search or browse again to get the blueprints we want. If you need to search for the produced tutorials, you may need to enter other level 2 websites. Therefore, the whole process will not only lengthen the links of the whole process, but also have certain requirements on the ability of users to filter information.

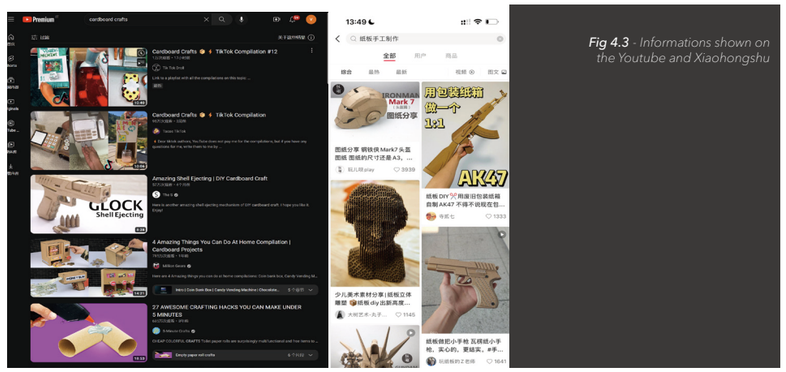


Fig 4.3 - Informations shown on the Youtube and Xiaohongshu

Youtube

Finally, I will analyze YouTube and Xiaohongshu, which are video-based media platforms. The main user group of the platform of Xiaohongshu is users in China. The content of the platform is very rich, such as various tutorials, life skills or current affairs news. This is very similar to YouTube, no matter what type of information or video, just search can get relevant content. When we entered the production of cardboard products, there were a lot of videos and pictures about cardboard products.

Most of the information is about the display of the product, and does not provide information about the production process and blueprints. This type of website shows users a large number of advanced products made of cardboard. These products not only have unique mechanical structures to meet various needs, but also can meet the production of complex peripheral products that match video games, and these products are difficult to make. Extremely high, but with excellent viewing, it can fully mobilize the enthusiasm and desire of users to make cardboard products. However, the authors who upload these videos and pictures rarely upload the production blueprints or production methods of this product. After watching the videos and blueprints, users can only silently envy but cannot make them realistically. Therefore, the advantage of this type of platform is that it can stimulate the desire of users to make cardboard products. The disadvantage is that it does not provide users with useful information about the production.

Summay

Based on the analysis of the above three types of platforms, I found that video sharing platforms such as Xiaohongshu and YouTube can stimulate users' passion and desire to the greatest extent, and at the same time display and teach in the form of videos. Minimize the difficulty of production, and users can easily complete the production under the guidance of the video. Through research on platforms such as Pinterest and Instagram, I found that attracting more creators to join this platform will greatly enrich the diversity of content on the entire platform, allowing users to observe other products in the process of browsing. Sending associations inspires more users to want to make other products.

Therefore, this platform will draw on the advantages of the above three platforms in the design process. For example, users are divided into two different users, Customer and Creator, to drive the uploading and sharing, downloading and production processes of the entire platform content. In the form of search and recommendation, pictures and videos of cardboard products are pushed to users of the platform, so that they can discover more interesting products that can be made in the process of browsing. And after the push, users can directly download and watch all useful information about the production of this product, such as making teaching videos. The above are the advantages and functions that the new platform should have through the analysis of competitive products.

4.1.3
Stakeholders map

In order to have a deeper understanding of the customer groups that the platform mainly serves, and the relationships with other stakeholders that maintain the normal operation of the platform, I will draw a stockholder map in this part to further visualize the principles and logic of the platform.

The main core users of this platform are customers and creators. These two kinds of users can download, upload and communicate with each other on the platform respectively. The role of the cardboard product company is the main provider of technology and production materials. Combined with the joint operation of the logistics company, users can purchase printer products and cardboard on the platform. The cardboard product company will ship the product to the customer through the logistics company.

Customers can download any resources in the entire platform through the platform, and then make DIY cardboard products. During or after the production, they can feedback the production experience or ask for help to the creator, and they can also share experience with other users in the community, and make blueprints. Difficulty or how the product feels to use.

Creators can upload their own blueprints on the entire platform, and sell them through downloads or through paid blueprints. Details, get related income. This ensures that the creator has the motivation and enthusiasm to design and upload new blueprints. Since then, a steady stream of new blueprints has been generated across the entire platform. Creators can also be commissioned by customers to draw cardboard blueprints of specific products. This function not only enables customers to generate more production possibilities, but also provides creators with more sources of income.

Developers and maintainers for the entire platform will also be included in the relationship network of the entire platform. Constantly communicate with the company and users to maintain the normal operation of the entire platform.

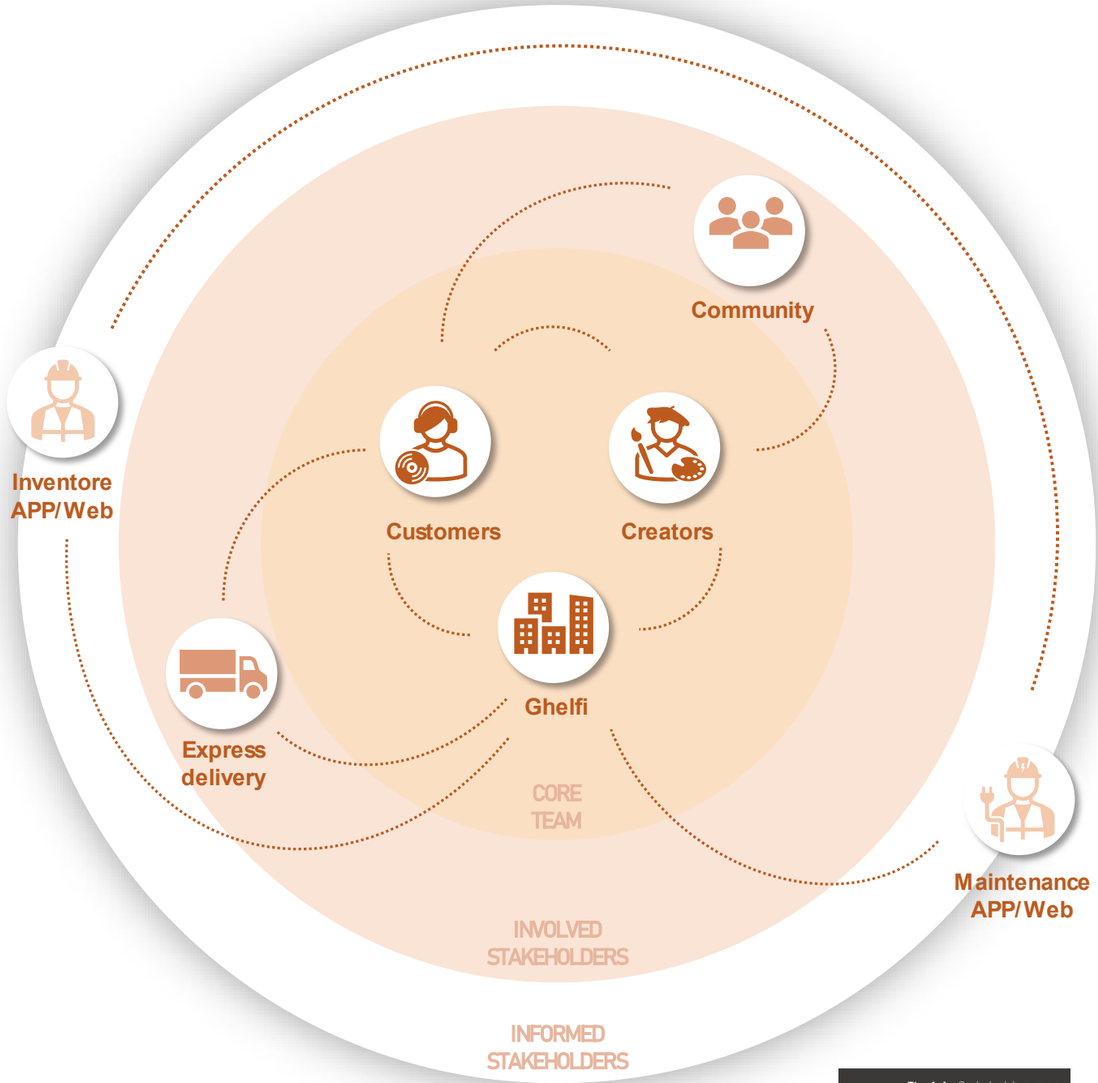


Fig 4.4 - Stakeholders map

4.1.4
Blueprint share platform

Through the research and analysis of similar platforms before this chapter, as well as the sorting out of the relationship between the relevant stakeholders in the platform, I will further summarize the services that the platform needs to provide to the two users and the functions that the platform needs to meet. The function summary will start from the perspective of the two main service groups, customer and creator. The most basic function of this platform is to enable users to quickly, conveniently and accurately find the blueprints they want. In order to maintain the diversity of blueprints, users are supported to create their own channels, upload their own designed or found blueprints, and the size and files of the blueprints on the platform. Quality is controlled. In order to ensure that users will not encounter material shortages and technical difficulties in subsequent operations, the platform provides detailed explanations of the production process and material purchase channels. In order to cultivate users' love for cardboard products, the platform provides a community for sharing and communication.

First of all, it needs to meet the two major user groups, creating accounts and creating personal channels, so an account management system is required. Secondly, after the customer has created their own account, after entering the main page of the platform, the user will start to search or browse the content. In this process, it is necessary to collect user behavior information, analyze the user's preferences, and push blueprints or blueprints according to the customer's preferences. Channels that may be of interest to users and provide them with more ideas. A search function that allows users to search for specific blueprints directly by keyword. After each blueprint is uploaded, the Creator can set whether to charge the blueprint and the price of the charge. After setting, when the customer wants to download or purchase the blueprint, the platform needs to provide the function of the payment system and the guarantee of payment security. Since it needs to meet the functions of users to download and upload and save blueprints in the cloud, the platform also needs to provide cloud processing services. Finally, in order to allow communication between users and order processing between customers and creators, the platform also needs a social media system that allows users to exchange information throughout the community.

	Customers	Creators
Account system	Follow a channel Create account	Create channel
Analysis and push system	Push random blueprint	
Search system	Search blueprint	
Payment system	Purchase the printer and cardboard or a blueprint	Get reward
Cloud system	Download and send the blueprint	Upload the blueprint
Social media system	Watch product detail Know assembly detail Leave comments Send message	Get customized orders Connect to the technical manager

4.1.5
Ui design - customers

SEARCH PAGE

In this page the customers can see all the categories of the blueprints that can download on the platform .
Or if they already have the idea , they can just simply search for it by using the keywords .

The platform not only have the product that you can use but also the artwork , you can find every blueprint on this platform

HOME PAGE

In this page users can find the blueprint picked by the platform just for your hobby. Users can also see the blueprint that uploaded by the creator they followed.

PRODUCT PAGE

If users find the one, they want , they can go into the product page by touching the imagine .

In this page you can see the detail of the product and know if this is difficult and more you can see how much the cardboard will be needed to make this .

Also, in this page users can go into the store to buy our cardboard to make the artifact and the printer to print the blueprint on the cardboard .

DOWNLOAD PAGE

Once users have decided , they will get into the download page .
In this page users can choose where to download the file , and where to send it .

Users can send it to the phones and print it out then draw it on the cardboard like the way that it should be .

Or they can send it to the portable printer , then the printer will handle all the work , just follow the lead you will finish it easily.

Fig 4.5 - *Search page*

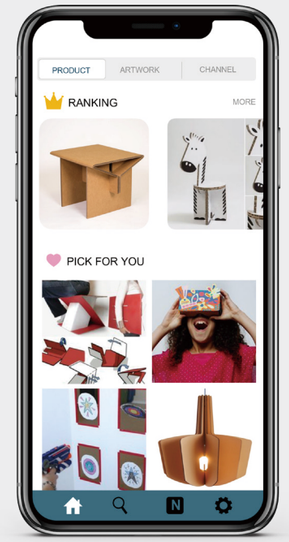


Fig 4.6 - *Home page*

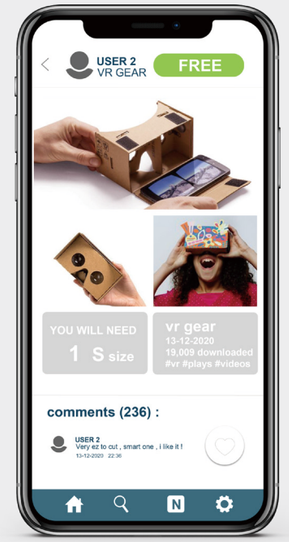


Fig 4.7 - *Product page*

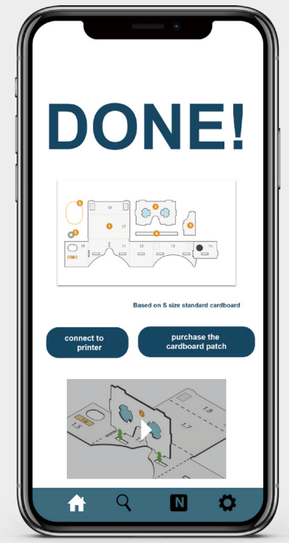


Fig 4.8 - *Download page*

4.1.5
Ui design – creators

PERSONAL PAGE

In this page users can find the personal infos also in this page creators can upload the blueprint that they designed .

WALLET PAGE

If the creator have uploaded the pay blueprint and someone have purchased it , then creator can find how much money he have earned .

UPLOAD PAGE

In this page creators will be asked to type the title keywords and some description .After finishing all the tables, the artwork will upload to the platform .

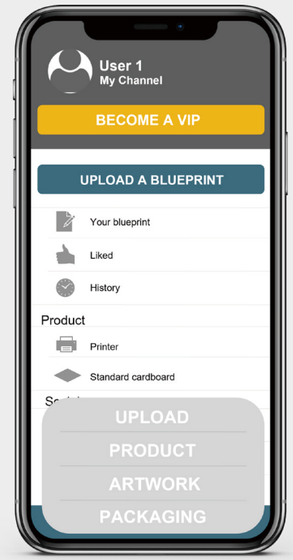


Fig 4.8 - Personal page

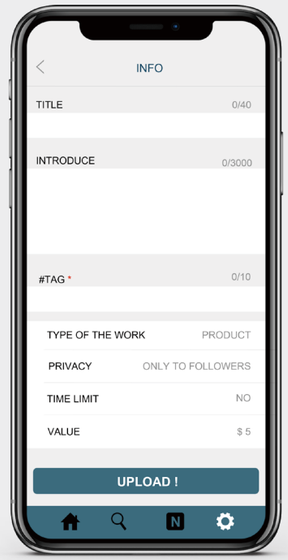


Fig 4.8 - Upload page

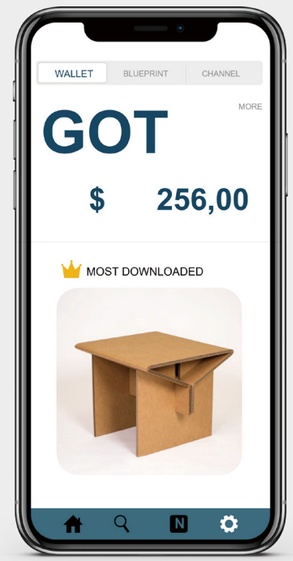


Fig 4.10 - Wallet page

4.2

A New Role of Cardboard in digital era

4.2.1

Scenarios

The content of this part is the product design of **GHELFI Standard Cardboard**. This product offers a whole new role for the cardboard material. As we all know, the main role of cardboard material in the current society is the **outer packaging of product transportation**. Although the amount of use is very large, this material is very suitable for the current social environment that promotes environmental protection and has very good physical properties. Compared with the single use and low sense of existence of this material, cardboard materials **can do more meaningful things** . At the same time, in order to adapt to the **ever-changing digital environment** , it is very important to **find a new position and role for cardboard materials**. How to combine with digital technology is the primary goal of each cardboard product production company. As the outer packaging for product transportation, cardboard packaging is an accessory functional product.

The brand-new standard cardboard change the cardboard material itself from an accessory product or material, into an independent product. The combination of **RFID** and **digital printing** technology enables standard cardboard **productization** , improves the existence of cardboard materials, and finds a new position in the digital environment.

The main goal of this product design is to **solve the problem that users do not have reliable and convenient access to obtain clean and high-quality cardboard in the process of making cardboard products**. This problem seems to be easy to solve, but in the actual situation , I found that this difficulty will cause the user to stagnate the development of the process or even stop the behavior.

Therefore, the main function of standard cardboard is to meet the needs of users for cardboard with high quality, cleanliness and quick access when making cardboard products. Secondly, the cardboard will be combined with digital printing technology, so that the cardboard can guide customers to transfer the blueprint through the surface printed marks during the making process, and the combination with RFID technology allows users to read the internal information after purchasing the cardboard to get a blueprint random that the fun when users use cardboard to make products, adding more value to the standard cardboard itself.

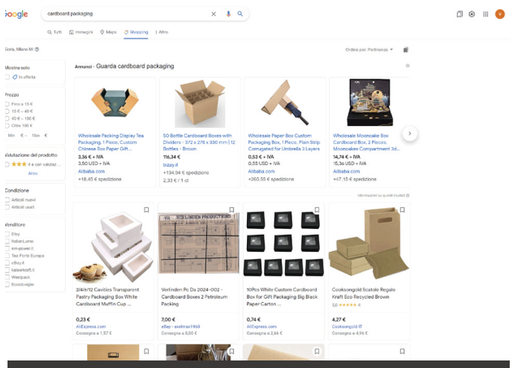


Fig 4.11 - Buy new cardboard box as material

Fig 4.12 - Collect daily packaging cardboard

4.2.2

Exist solutions

Before the standard candy bar was designed, users have been making cardboard products. In the process of behavior, it is inevitable to encounter the problem of shortage of cardboard materials, and when this problem occurs, users have a variety of methods to solve it. For example, sorting and screening the cardboard that is usually collected, then cutting and making products, or buying a brand new cardboard package, dismantling it into cardboard materials and making it. However, these solutions all face a problem, that is, it is difficult to control the size, thickness, quality and cleanliness of the straight board.

According to the production intention of different products, the size of the cardboard will also have different requirements. Therefore, these solutions may allow users to continue production, but they will not guarantee the quality of the final product, and the experience during the production process will be greatly reduced.

4.2.3

Features analysis

Therefore, in understanding the other difficult problems encountered in the above-mentioned user self-solving methods, I summarize the main functions that the new product needs to meet.

First of all, in order to make the product maintain the characteristics of cardboard itself as the main feature, this product will not do redundant appearance design in appearance, surface treatment or appearance decoration. In order to reduce the manufacturing cost of the entire product, the product itself is mainly cut out of high-quality cardboard, and then produced only through basic digital printing. In order to allow the cardboard to work together with the platform and the printer, grid-like partition marks will be printed on the entire surface of the cardboard to help users more accurately locate the blueprints during the production process, and where each part should be. In order to ensure the size of the entire blueprint and the integrity of the scale.

At the same time, in order to meet the user's demand for cardboard and the requirements for different sizes and thicknesses due to changes in the types of products produced during the production process, this product will be sold in different sizes and different thicknesses at the same time. For sale, and in the form of customized bundles according to the recommended size and quantity of different products on the platform. This cardboard also needs to be possessed, which can allow users to increase the fun in the production process, as well as the function of bursting out new production inspiration, and increase the user's fun and experience in the production process.

- Main part is cardboard
- Cooperation with platform and printer
- Sale by packet
- Signal printed

4.2.4

Concept

As shown in the picture, this product is very simple in appearance, and is the most basic technology in terms of cutting process, all to reduce the production cost of cardboard. Different partitions will be printed on the entire surface of the cardboard. By co-locating the abscissa and the ordinate, the entire cardboard can be divided into different areas. The different codes of these areas will be displayed on the printer or on the blueprints downloaded on the platform in sequence. Correspondingly, users can know which area should start and end in which area when blueprint or printer is printing. In this way, the possibility of technical problems such as scale adjustment and precision adjustment that will be encountered in the whole process is reduced.

This product can be purchased through the platform. This convenient and fast method not only eliminates the problem of difficult to obtain materials in the production process, but also can automatically recommend different bundles for users through the platform's understanding of each blueprint on the platform to meet the production volume required by users The minimum amount of cardboard will not cause waste of cardboard, but also make the whole production process more intelligent. There is no need to ask users to search and buy on other platforms or channels, and think about the quantity they should buy or whether it is suitable for making the target product.

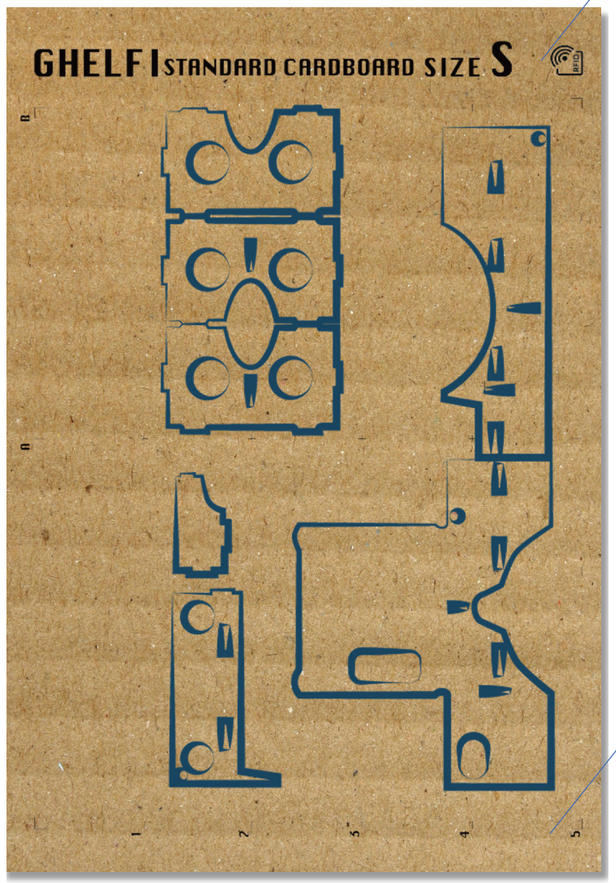


Fig 4.13 - Ghelfi Standard Cardboard

4.2.5

RFID

In order to increase the value of the cardboard itself and improve the user's production fun when using the cardboard. This candy bar has an RFID chip inside. The addition of such chips can improve the product, functionality and value of the cardboard itself. At the same time, the role of cardboard itself is changed from a material to an independent product. When the user buys a candy bar, according to the different information contained in the internal chip, after receiving the cardboard, the user can read the internal information of the chip with a mobile phone or a portable printer to get a random blueprint, this blueprint will be Any blueprint on the platform includes free blueprints as well as paid blueprints. It not only increases the functionality of the product, but also increases the fun for users to use, making it possible for users to get very expensive blueprints and providing surprises for users. The random blueprint the chip can provide will match the cardboard it is on. No need to buy extra cardboard for crafting. Therefore, when the user purchases cardboard, it is also equivalent to purchasing a cardboard product. Provides its own unique value to the cardboard itself.

RFID BLIND SURPRISE

Every cardboard we sold has a **rfid inside** , customers can **scan** them by using the phones ,and then they can **get a random blueprint** , the blueprint can be anyone on the platform **no matter the cost** , so customer buy a cardboard but at the same time it is **also a artifact mysterious**.

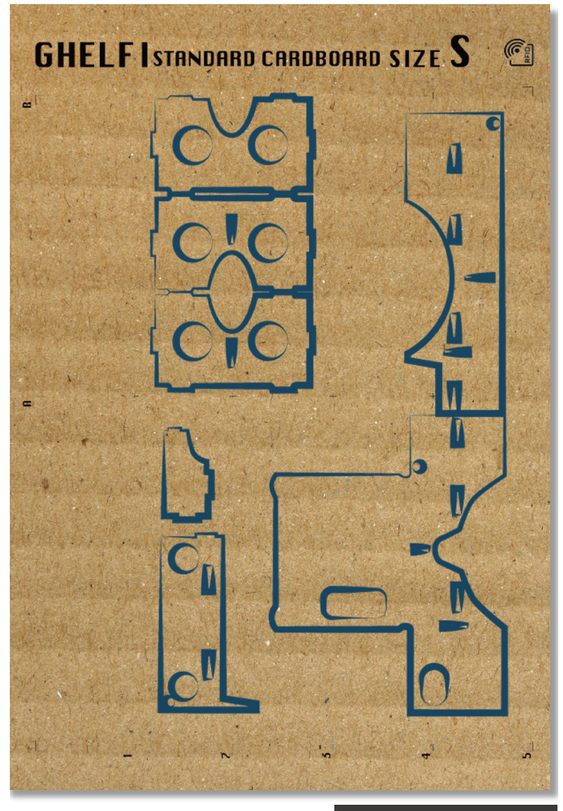


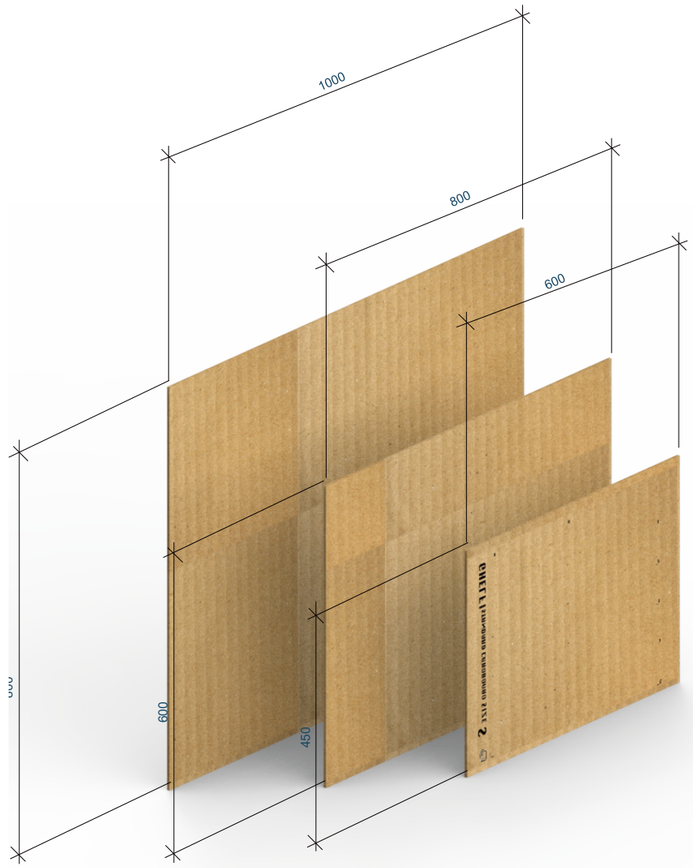
Fig 4.13 - Ghelfi Standard Cardboard

4.2.6

Sale pack

When using cardboard to make cardboard products, the types of products that users want to make will be diverse. For example, the amount, thickness and physical properties of the cardboard required to make a table and chair will be different from the properties of the cardboard required to make VR glasses. Therefore, in order to meet the needs of different users for the production of different products, I have designed 3 different sizes, among which the small size cardboard, the size design is based on the fact that a piece of cardboard can be used to complete the production of small objects, such as VR glasses. The medium size cardboard is designed on the basis that a single sheet of cardboard can be used to make small items such as table lamps. The large-sized candy bar will satisfy the production of large-scale products. It has a larger area and better physical properties to maintain the firmness of the entire product after production.

The sales method can be freely selected and sold according to the user, or the platform can launch customized bundles according to the needs of different blueprints. For example, 3 large-sized cardboards and 2 medium-sized cardboards can perfectly make a chair, Therefore, when the user downloads the blueprint of the chair, the platform will recommend this cardboard set for him, which perfectly solves the user's demand for materials and also avoids the waste caused by inappropriate quantities of purchases. Use at any time, buy at any time, you can make the best use of everything.



The standard cardboard has **3 different dimensions** for building up different kind of the artifact . The cardboard will **be sold by pack** , in one pack customers can get 3 small size , 2 medium size , 1 large size . Or they can **customize the pack** as they like .

Fig 4.14 - Ghelfi Standard Cardboard sales pack

4.3
The Collaboration Portable Printer

Fig 4.15 - Printer rendering

4.3.1

Scenarios

The content of this part is the **product design of portable printers**. The goal of the portable printer design is to solve the problem that **users can't control the scale and the dimension of the blueprint** accurately during the transfer of blueprints. This problem may cause repeating work of blueprint transfer or cutting process, complex work and rework will reduce the user experience, and make the project become more difficult, which may cause the user to stop this behavior.

In order to integrate the entire making process, the portable printer can **work with the cardboard and platform**. After downloading the blueprint on the platform, it can be directly sent to the printer, and the printer will display the identification and zone information which are printed on the surface of the standard cardboard through the **LCD screen**, allowing the user to know **where to start and transfer the blueprint** to the cardboard **quickly and easily**, to quickly lead the whole process to the final cut and assembled part. During this phase, it not only ensures that users do not need to consider the problem of scale control, but also ensures the accuracy of printing result.

There are other same type products in the current market. So, the next process is to **analyze the competitive products** of same type or different positioning products with similar functions, find the advantages and disadvantages of other products, and combine the unique features of this product. Then, through the **feedback of the personas**, the brief of the product will be seen. Product appearance design and product function expression are carried out through mood board and sketch. Design a simple and easy-to-understand UI interface, allowing users to easily operate the printer and work with the platform and cardboard. Finally, storyboard will show the whole cardboard artifacts making process.

4.3.2

Competitors selection

In this session, I will collect and analyze market information for portable printers. Since there are many types of portable printers in the current market, the positioning of other portable printers and this product will be very close without considering the core function of working with the platform. Therefore, the main goal of this competitive analysis is to discover the advantages, disadvantages and characteristics of existing products through the comparison of products of the same type and meeting similar needs in the market, as well as other types of products that meet similar needs. Understand the features in function expression and function settings, and understand users' preferences for the appearance and design language of each product through product feedback. In order to find the positioning of this product in the market, as well as the display form and development direction in appearance design and functional expression, so as to determine the differentiation from other products.

Fig 4.16 - EVEBOT portable printer

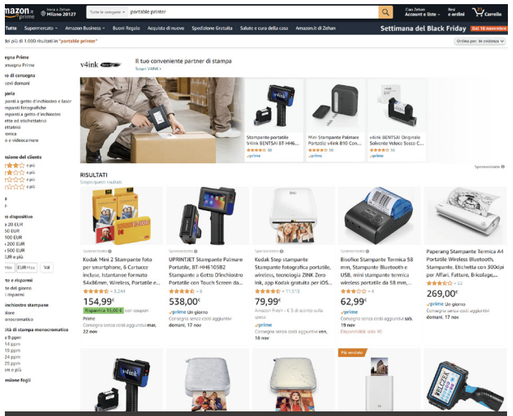


Fig 4.17 - Portable printer can be purchased on Amazon

REINER

EVEBOT

STRENGTH

The size is the smallest among several competing products, which is equivalent to the size of an electric toothbrush. The printing nozzles are assembled on a special ink cartridge, and the user's feeling when using it is not much different from writing on a whiteboard with a whiteboard pen.

The EVEBOT is the originator of this type of printer, and it was the first to drive the trend of portable printers. The ink cartridges of this printer are specially made, and the ink can be eaten by. Although it is larger than the REINER, its shape is also long. Therefore, the grip in use will not be too different, and the capacity of the ink cartridge is increased, so the print volume is also increased a lot.

WEAKNESS

Due to the excessive control of the volume, the function is defective, and the single printing volume is no more than 40 characters at most, and the small size of the ink cartridge makes it impossible to print at high intensity for a long time.
No screen so smartphone is needed.

Although the ink cartridges are of high quality, they can only be purchased from official channels, and the printing cost is high. Also due to volume constraints, the size of a single print is also affected.
No screen so smartphone is needed.

MBRUSH

TIKTONER

STRENGTH

This printer is currently the best seller in the portable category, suitable for printing on a variety of textured surfaces, the shape of the square perfectly fits the hp62 ink cartridge, which greatly reduces the cost of printing, and makes the print size Reached the level of desktop printers. With some printing accessories, it can achieve the function of printing A4 paper normally.

The difference goes to the first three printers, this printer is more focused on printing monochrome, simple graphics, and high-volume printing jobs. The double-sided rollers can effectively regulate the path during printing to avoid distortion, and the printing intensity is the highest among competing products . LCD screen is built in , the product can be used solo .

WEAKNESS

However, the high price of the accessories makes the additional functions useless. When printing large-size patterns in a portable situation, it will be difficult to control the printing direction due to the single row of rollers. No screen so smartphone is needed.

Since the positioning of the product is biased towards industrial production, the design of it is more like industrial style, which is not suitable for daily use, and can only print monochrome patterns.

External roller may cause users' hands get dirty.

Summary

Through comparison, I found that among the 4 target products, REINER, EVEBOT, and MBRUSH are all 2C products. Among them, taking the smallest REINER as an example, it can meet the core functions of portable printing while satisfying the smallest volume. Therefore, the effect of the machine's battery life is the worst among the 4 products.

The second product, EVEBOT, is very balanced in terms of volume and battery life and has a very simple design. With high-quality surface treatment and selection of high-quality materials, the product has won unanimous praise from users in terms of design language. However, it is precisely because of the meticulous design in appearance design and material processing, as well as many high-cost functions that are not frequently used in the functional configuration, the production cost of this product is very high, so that the selling price too high. For example, it can be printed on the surface of food. This function has very high requirements on ink, and also on the cleanliness of the use environment. Therefore, the function of this product is too numerous, resulting in the cost of the product cannot be used by most users. accepted.

The third product, MBRUSH, has the highest market share at present. It not only has a small size, but also has a transparent protective case that makes the design look simple and full of technology. The built-in ink cartridges are HP's general-purpose ink cartridges that have a lot of channels on the market, so no matter the printing life or the appearance design and the number of functions of the whole product have reached a good balance.

However, according to the user feedback of the product, during the real printing process of this product, because the ink nozzle is at the bottom of the square, it is difficult for the user to see the specific location of its printing, so it is difficult to control the printing process during the printing process. starting position. At the same time, due to the compromise made on the size of the bottom roller, the shape and direction of the print cannot be perfectly maintained during the final printing, and it is difficult to ensure the quality of the print.

The fourth product, TIKTONER, is more inclined to commercial use. From the appearance, it can be seen that the material used is an integrally formed black PVC plastic. At the same time, in terms of function, the realization of functions and the comfort of operation are the main elements, and aesthetics are not the main design elements. An LCD display function has been added to the main body of the product, which allows the entire printing process to be visualized, reducing the possibility of errors or difficulties encountered during the printing process. At the same time, in order to ensure the image quality and the printing direction during printing, there are very obvious rollers on the left and right sides of the ink nozzle, so as to accurately control the printing direction without deviation and ensure the quality of the printing results.

4.3.3

Product positioning

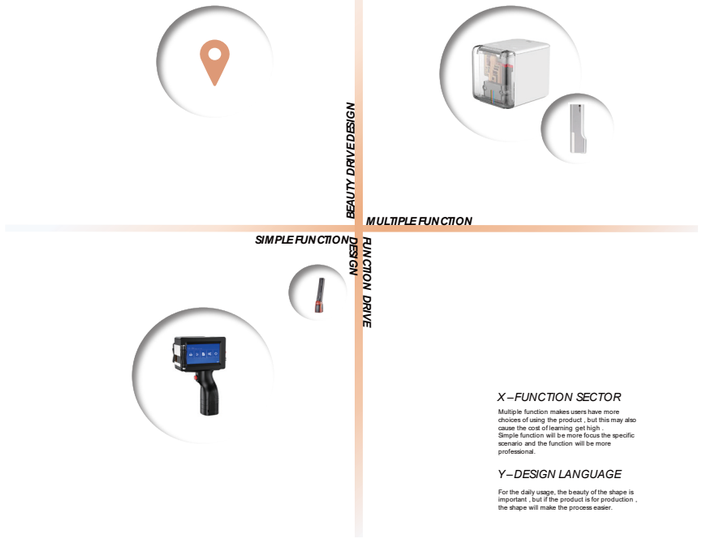
Based on the above analysis of the advantages and disadvantages of the 4 portable printers with relatively good sales in the market, I will determine the differentiation between this product and other products of the same type and determine the market positioning.

The characteristics, advantages and disadvantages of the above four products are mainly reflected in the design language and function realization of the product. Therefore, the positioning dimension of this product is the appearance and the number of functions as two important indicators.

The core function is hand-held printing, and these 4 products perfectly meet this function. However, in terms of the richness of functions, the 4 products reflect different product differences. From the function-specific to the complex, they are TIKTONER for commercial use, then REINER, the smallest printing pen, followed by the printing block MBRUSH, and finally EVEBOT.

According to my previous evaluation of the two feature-rich printers, this product will avoid having too many features due to the addition of too many interesting features that make the overall product function too complicated and expensive. In addition to ensuring the main hand-held printing function, it needs to meet the needs of cooperating with the cardboard and the platform, and at the same time, it can be connected with the smart phone to meet the needs of users for simple printing functions other than making candy bar products.

The choice of design language should be more inclined towards everyday use. Although the appearance of commercial printers is more suitable for the realization of functions, and the quality of printing can be guaranteed, however, the over-industrial design language will reduce the possibility and interest of users in daily life. Therefore, the design should be more simple, while reducing unnecessary decoration as the main design language. Built-in LCD display function to increase the intelligence in the production process and reduce the difficulties encountered in the production.



4.3.4

Features analysis

Ink and rollers protection

Most users who use portable printers will worry that the ink will stain their hands during the printing process, so the product should design some protection measures for the ink and rollers

Low cost of usage

The consumption of ink cartridges is the main source of the cost of product use, so in order to reduce the cost of subsequent use, it is a good direction to integrate ink cartridges of existing brands.

Simple & basic function

The main use scenario of this product is to print in conjunction with the platform and cardboard, so the function of the product should be more targeted. For example, the function of high manufacturing cost of other civilian products cannot appear in our products.

Screen interaction

For the analysis of the interaction logic of each product, we found that having a screen on the product will simplify the entire operation process, and because it can be used independently of cell phones and computers, the frequency of use will be higher.

Beauty driven shape

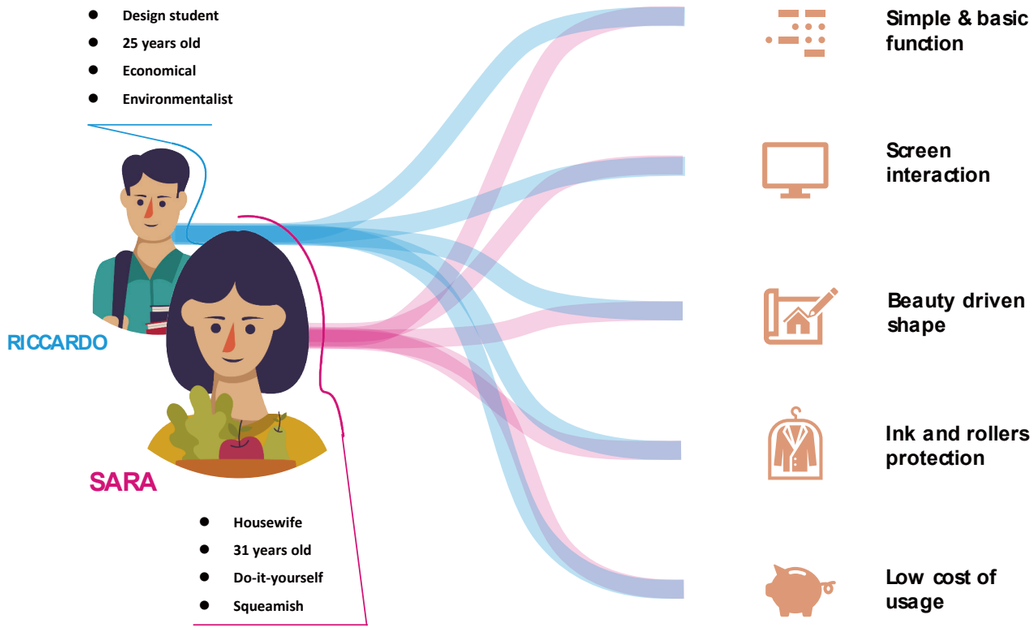
For the comparison of appearance design, we found that the appearance of 2b products will be more helpful for efficient work, but it is not as good as living products in terms of look and feel, and the appearance of products should conform to the design of the current 2c consumer electronics product trend. language

4.3.5
Personas

According to the function summary in the previous part, I can draw five main functions of this product.

1. This product only has basic functions, these functions can make the printer work with the platform and standard cardboard, delete the "innovative functions" with high manufacturing cost but low usage rate, so that users will not be confused by complex functions during normal use. The interference increases the difficulty of use and reduces the cost of product production.
2. The product will contain an interactive touch screen, so that users can operate the printer more conveniently and complete the printing process quickly and intuitively.
3. The design language is more inclined to daily life. This design language can attract more customer groups and increase the possibility of users' trial.
4. Taking into account that the user's hands and clothes will not be contaminated by ink during printing, the inkjet area will be designed with shielding and protection functions.
5. Minimize the cost of continuous use after purchase as much as possible.

For the above 5 basic product requirements, I revisited the interviewees in the cardboard production process: Sara and Riccardo. They corresponded to two target groups, namely, family resource allocation managers with women and housewives as the main characteristics, and youth groups with strong hand-making ability and strong learning ability as the main characteristics. The following is the emotional feedback of the two groups on the basic characteristics of these five products.



Simple & basic function	I could handle more functions not a big deal…	😐 😕	Less learning cost is good , but more function will make more fun
Screen interaction	The screen is cool , can I draw on it?	😍 ☹️	Having screen will make interaction harder?
Beauty driven shape	Some hardcore style is my type , after all this is also a tool.	😐 😍	I like nice curves on the product , and beautiful design will be a reason of using.
Ink and rollers protection	I agree clean is important.	😍 😍	I hate to make my hands get dirty, you are right
Low cost of usage	Saving money to buy more cardboard hahahahahah	😍 😍	This is cool , at my home I have some cartridge free , can I use them?

Sara

She is happy to know that the product does not have very complex functions and that the cost to use and purchase is very low. But at the same time, she also thinks that more functions will lead to more possibilities of use, and will bring more fun. With the addition of an interactive screen, she would worry about whether the interactive screen would also increase the learning cost of using it. As for the more everyday appearance design language, it shows a very fond attitude.

Riccardo

For the student group, they have very high learning ability and crafting ability, so he believes that more functions will not make them helpless, but more functions will produce more creativity in products. The interactive screen allows them to operate the product more conveniently and quickly, which he likes very much. As for the design language, he proposed that the product should increase the operating feel during use and maintain comfortable operability.

Therefore, through further research on the user group, I made some changes in the function of the product.

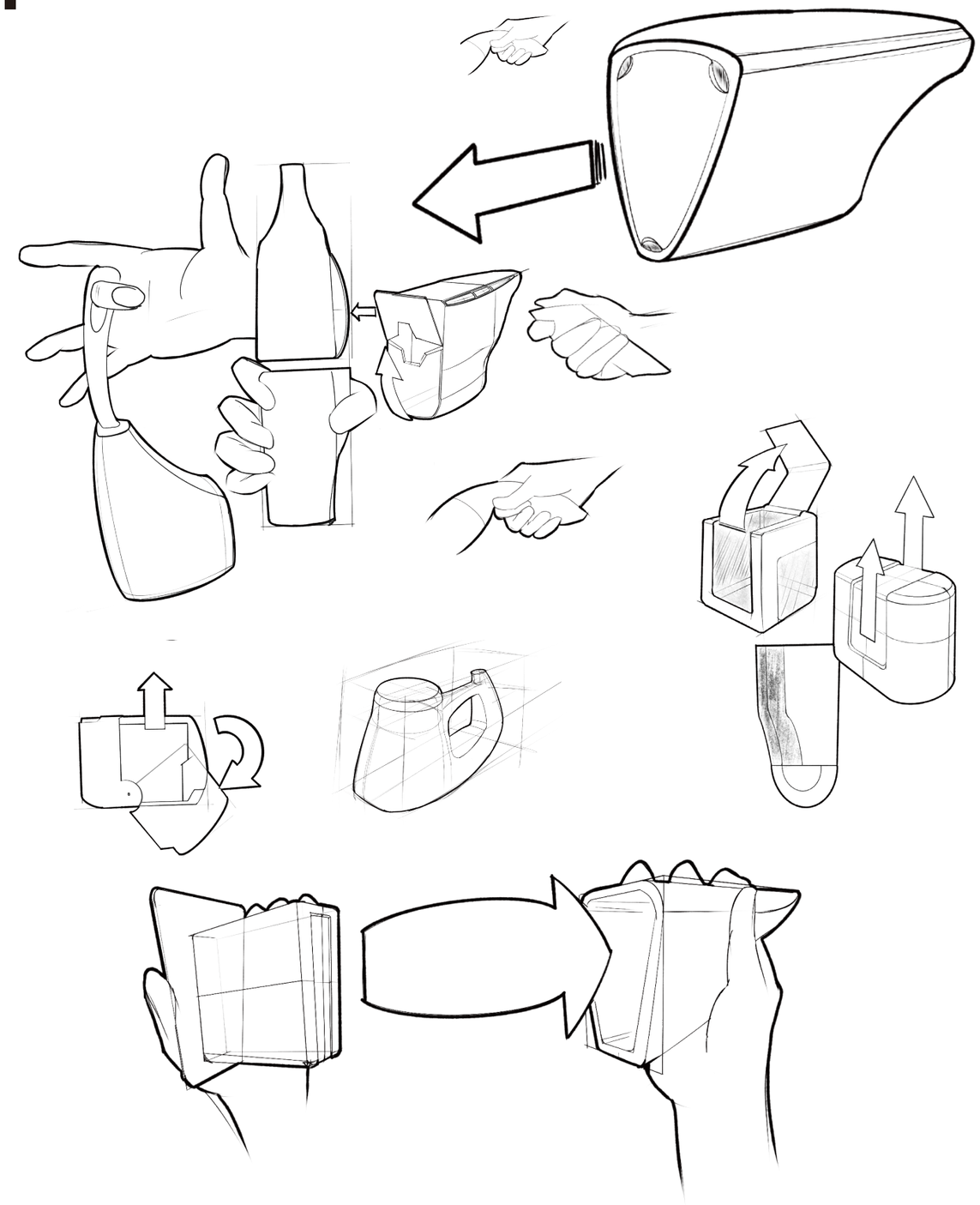
While satisfying to work with the platform and standard cardboard, it also adds the function of connecting with terminal devices such as smartphones, and transmitting pictures for customized printing. While adding interactive screens, a set of simple and easy-to-learn operation UI interface is designed. While maintaining the design language for daily use, the design details are added to facilitate operation and increase the experience during use. And in order to reduce the cost of use, the replacement ink cartridges of the product will use HP's general ink cartridges, which is convenient for purchase.

4.3.6

Inspiration

In the design process of product appearance design and functional expression, I refer to the appearance design style of other products. The main design language of this product will be a single color, and on the basis of satisfying functions, unnecessary decorative designs will be minimized. In the use of materials, materials with good touch and not easy to be scratched by other sharp tools will be used. In the hand-held part, the comfort of the user's holding will be considered, referring to the design of door handles, kettle handles, etc., and adding surface treatment of non-slip material, so that the product can meet the user's good experience when holding it. In the experience of filling and replacing the ink cartridge, I designed it to be realized by the action of extraction, which is convenient and intuitive, and at the same time, it is convenient for replacement. The ink cartridges used in this product are HP's universal integrated ink cartridges, which not only reduces the cost of product production, but also allows users to replace ink cartridges more conveniently and quickly in the subsequent process of replacing ink cartridges. In order to ensure perfect control of the printing direction during the printing process, I designed two larger rollers with wider wheelbase at the bottom of the printer. Maintain a rounded design language on the overall shape of the printer to avoid the appearance of too sharp edges and corners, so as to meet the needs of user groups of various ages, and will not cause unnecessary damage due to the appearance design. At the same time, adding a screen at the top allows users to understand the printing progress and printing area more intuitively, so that the operation of the product can be quickly adapted by users.

Fig 4.18 - MOODBOARD



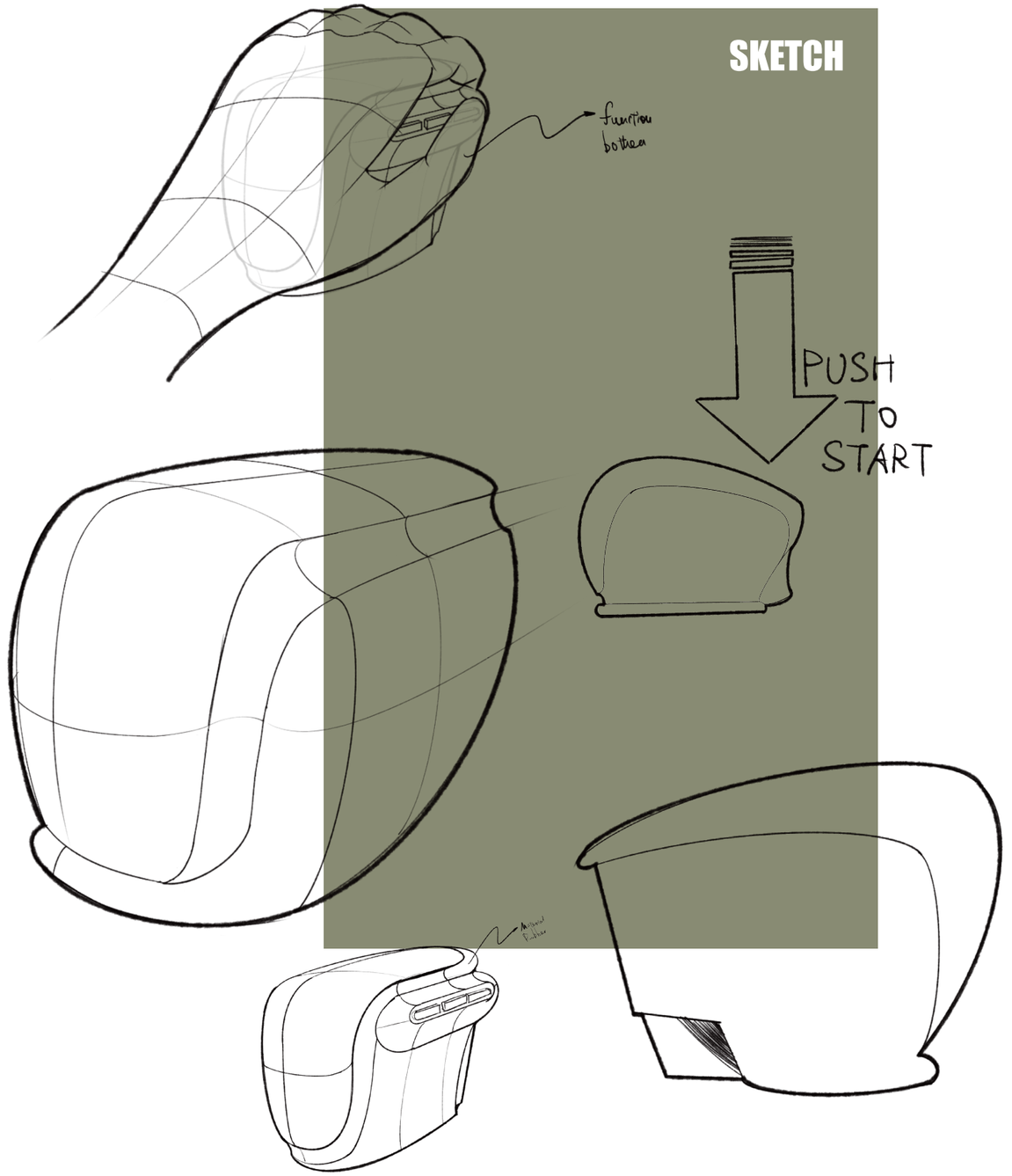


Fig 4.19 - SKETCH

Fig 4.20 · Printer rendering black ground

4.3.7

Concept

This is the portable printer that I design for platform and standard cardboard to work together. This portable printer can connect to any smart devices such as mobile phones or computers through WIFI or BLUETOOTH, receive blueprints, save the blueprints and meet the most printing needs according to the user's wishes. This product has a simple appearance, and its round shape can better fit the curve of the palm, which is ergonomic. An LCD touch screen is designed on the top of the printer, which can facilitate users to check the printing progress and printing information at any time, reducing the possibility that users may encounter difficulties when printing. The product also considers that a large amount of ink consumption for printing blueprints will bring huge usage costs, so the product will be combined with HP 62 all in one ink cartridges, which is convenient to buy and the price is low.

The shape of a whole piece of curved glass makes the product very technological and futuristic. The shape refers to the helmet of an astronaut. This shape is very acceptable to users of any age and any group.

This product connects the platform and cardboard more closely, making it convenient for users to make products, and it also further improves the entire product system.

4.3.8

Usage

The biggest difference between this product and other printers that already exist in the market is that this **printer can be connected to the platform**, which greatly enriches the richness of printed works, allowing users to have more printing options and improving printing efficiency. Efficiency and interest have greatly increased the frequency of use of the printer.

Since the printed blueprint may last for a long time, the appearance design of this product has **no obvious edges and corners**, so that users will not feel uncomfortable after using it for a long time. At the same time, it can also meet the needs of users in different scenarios. Different postures for long hours of comfortable printing.

After the user finds the blueprint he likes in the platform, he can easily start printing through the guidance of the **LCD screen**. The user can start or pause printing at any time by pressing the screen. The operation feel is very similar to that of an **Apple mouse**. The rubber material can achieve very good and clear physical feedback.

At the same time, users can choose to print **any picture or text**, even if they do not need to connect to the platform, they can also start printing work, providing users with more printing possibilities.

Fig 4.21 - Printer with hands

4.3.9

Features UI

The core function of the product is to work in conjunction with the platform and to print easily and quickly through partitions on the cardboard. Most of these functions are guided by the top LCD display. The pages that can be displayed on the top screen are:

Collection page, in this page, users can quickly browse the blueprints of all products that have been purchased and stored in the cloud or in the machine, and can view the relevant information of the blueprints at any time by selecting, such as the production time, the finished product renderings, etc. Wait.
Print the page.

Users can click to start printing, or automatically enter the ready-to-print page by scanning the RFID. This page will automatically display the printing order and printing area and other information. Increase the intelligence of printing and reduce the occurrence of difficulties. During the printing process, the specific location where the user needs to place the printer, such as the A1 area, will be displayed in the middle of the screen. After each area is printed, the user is directed to the next area to be printed. The printing speed can be freely controlled by the user, and the printing progress can be monitored at any time during the printing process. Printing can be paused or terminated according to the user's needs. Due to the appearance of this screen, the user does not need the intervention of other terminal devices in the whole process, which reduces the operation process and facilitates users of all ages to complete the printing work. Simple interactive interface avoids complicated functions, but can complete the core functions of the printer.

Fig 4.21 - LCD screen

4.3.10

Refill the printer

Through the research on other products on the market, I found that some handheld printers decided to develop customized replacement ink cartridges independently in order to meet the unique appearance design. Although it can meet the needs of the appearance, the production cost of this method is very high. The channels for purchasing ink cartridges are also very limited, and the price is also very high, which leads to the high cost of using the product, which reduces the frequency of use of the product, not only failing to meet the needs of users for printing, but also making the product a Obsolete product with very little use.

Therefore, the replacement ink cartridge of this product will use the very common **HP 62 ink cartridge**. This ink cartridge is not only small in size, but also incorporates an inkjet nozzle, which not only reduces the cost of printer production technology, but also improves the life cycle of the product, because in Every time the user replaces the ink cartridge, the inkjet head is also replaced, so that the core components of the product are updated.

The user only needs to open the bottom cover, assemble with the new ink cartridge, and then put it back into the printer, the entire refill operation is completed, which is very convenient, even for children.

From the pictures, we can also see the bottom rollers mentioned above, which are respectively distributed in the corners of the printer. While fixing the printing direction, they will not touch the printed pattern, avoiding the occurrence of scratches on the pattern.

Fig 4.22 - HP #62 cartridge and bottom of the printer

Fig 4.23 - Rubber material closeup

Fig 4.24 - USB - C charging port

4.3.11

CMF

Since this product is an electronic product aimed at users of all ages, in terms of CMF design, I will customize the design in combination with different usage scenarios and applicable groups.

Color: Since an LCD screen is designed on the top of the printer, the color of the top is determined by the screen, which is black, but in order to make the product not look too heavy, so that users have the desire to use it, and the color will not appear abrupt , so I chose white as the color of the main body, which can not only form a good contrast with black, but also make the product look very light, full of futuristic and technological sense.

The choice of material is very simple. Because of the top screen, the glass on the top will be the same **Victus tempered glass** that is used in smartphones in the market, and the surface will be treated with **Ceramic Shield coating** to further strengthen the toughened performance of the glass. The main part of the handheld will be made of **PC plastic.**

This material not only ensures the high-definition color of the product, but also provides very high impact resistance, so that users will not worry about the product being damaged when using it. The stable chemical and Physical properties drove the choice of this material.

The two main parts will be connected by **rubber**, which can meet the functional requirements while satisfying the diversity of product appearance and materials, because the top screen can be pressed, so the soft rubber provides a good range of motion.

The surface finishing of the PC material will be **polished**, and there are two different methods of frosting on the handheld part. The comparison of these two methods will guide the user to hold the product correctly, which is easy to understand.

Fig 4.25 - Printer explosion view

4.3.12

Structure design

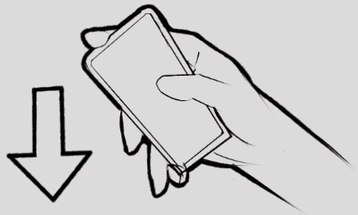
In addition to the unique design of the appearance, this product also has a different design from other printers in the expression of functions. For example, having a larger diameter printing range at the bottom of the printer not only shortens the entire printing process, but also improves the printing progress and printing efficiency. At the same time, there are also large-sized rollers on both sides of the printing ink nozzle. The design of these two rollers will ensure that the printer will not be confused in the printing direction due to uneven force exerted by the user during printing, thus ensuring that the entire printer is printing. The demand for high-quality image printing in the process.

The ink cartridges used in this printer are HP universal print cartridges that can be purchased in various shopping malls and online shopping platforms. This ink cartridge integrates ink and nozzles, so users can not only obtain new ink cartridges in various channels, but also replace them.

The ink cartridge can also update the print head of the product to ensure that the printing effect can still maintain the best working condition after using the product for a long time. At the end of the printer and where the ink cartridges are replaced, there are easy-to-operate, intuitive and easy-to-understand designs. And in the use of the external material of the product, a relatively high-grade glossy material is selected. Thanks to the choice of this material, even in the printing process, the ink will not remain on the surface of the printer even if it comes into contact with the ink. The neatness of the printer and the cleanliness of its appearance. There are function buttons on the top where the LCD screen is connected. These buttons can guide users to use all the functions of the printer, which is convenient for operation. The physical buttons will also bring users a reliable feeling.

4.3.13

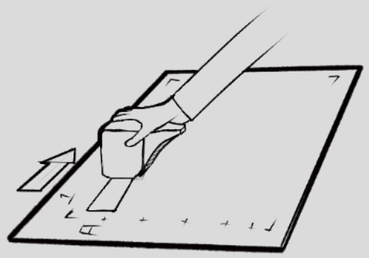
Storyboard



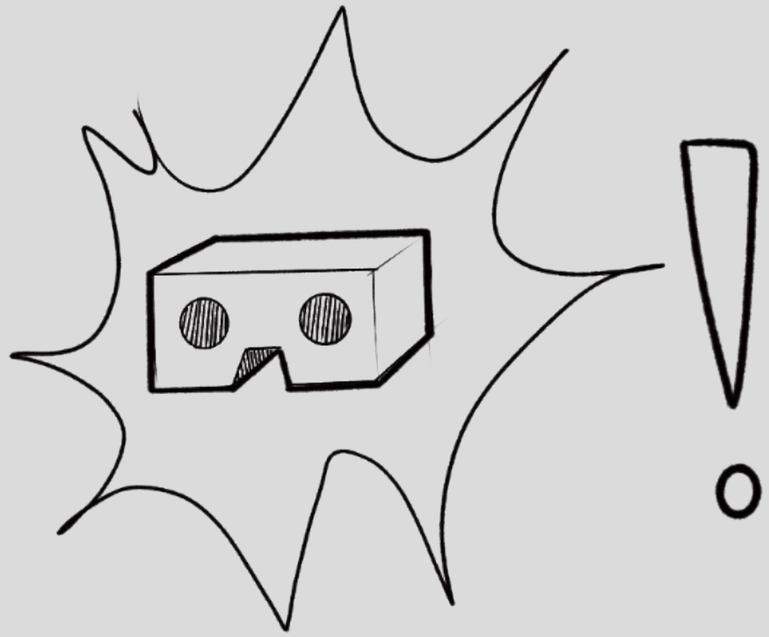
1 Find and download the blueprint you like on the platform

2 Prepare all the materials that you need , and send the blueprint file to the printer

3 Printer recognize the file and give you the information about the print, the zone you start with .



4 Print the blueprint according to the signal on the screen .



5 Cut the cardboard along the lines .

6 Build up the artifact the share it on the platform !

Fig 4.25 - Storyboard

4.3.14

Dimension

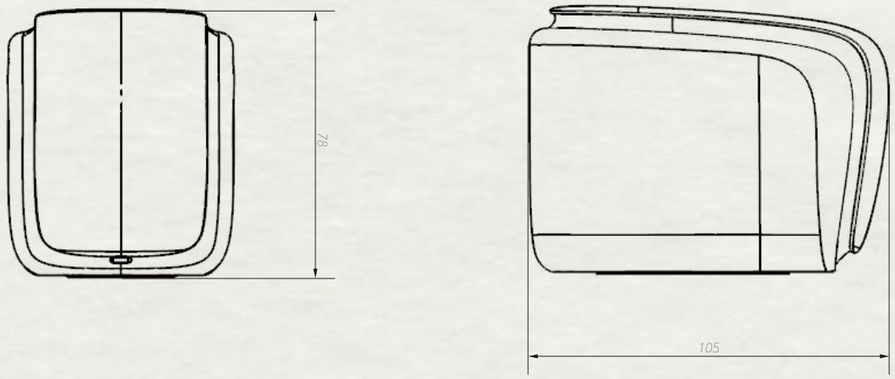


Fig 4.26 - 3 - views of the printer

CHAPTER

Conclusion

5.1
Material productization

Fig 5.1
- Ice cube sales in the supermarket

I think the most interesting part of this paper is to find the new role of cardboard in our life. Because cardboard is a common material , most of the time usage are the outer packaging of product transportation. Even if the packaging of this product is used in a large amount, but the single function and a low sense of social presence, which is very likely to be eliminated for a gradually changing and gradually digitized society. Therefore, it is extremely important to find a new role for cardboard. Although there are currently some products that combine cardboard materials and digital technology for direct use for users. But the cardboard material still can't get rid of the identity of the material , cardboard is still a material , the problem is not solved .

But he emergence of standard cardboard, which is designed to attach to the platform, provides a new role that is completely different from other cardboard products and packaging. The first feature that distinguishes it from other cardboard products is that the functions of the old role satisfied by the type of products produced, such as a cardboard table, the function of the product is determined by the table . So, these products are still tables. It's just that the material is changed from metal or plastic to cardboard. However, the product of standard cardboard itself is an independent product, and its function is not determined by any other product.

First, it can provide users with the demand for cardboard materials in the making process of cardboard products. Second, due to the combination of RFID technology, users can also get its own function when buying cardboard, that is, after scanning the information, the cardboard itself has an independent value.

We have a lot of similar products, such as ice cubes in supermarket , before ice cubes appeared in the form of products, everyone would not think that ice cubes could become products independently, because water is a resource that we can easily obtain in our lives, and at the same time we just need the assistance of the refrigerator, we can get the free ice. But after the product of ice cubes appeared, the selling price and the sales volume exceeded our expectations. Now ice cube products can be found in every supermarket, and ice cubes with different flavors are also available for users to buy . This is the productization example of water, a material, into ice cubes.

Therefore, the process of productization from cardboard to standard cardboard not only has precedents to prove the feasibility, but also provides a new direction for the development of new roles for cardboard materials to adapt to the new digital environment.

5.2
Cardboard culture and retail revolution

Fig 5.2
- Kid plays video games with Nintendo labo

In today's society, consumers want to buy products that meet their needs, and there are various purchasing channels. We can experience the product through the physical store, and then decide whether to buy it, we can also determine whether the product meets our needs through the product description online or by watching influencer's product experience videos. This form of retail has also experienced many changes before it has developed into what it is now. For example, due to the rise of the Internet and social media, with the blessing of high-speed shipping services, online shopping has become another major channel no less than offline shopping.

However, in this new retail situation, there are many problems. For example, the influencer mentioned above can be employed by product sellers to make non-objective evaluations that are different from the real situation of products. And driven by the celebrity effect, users will misunderstand the real information about the product. On the Internet shopping platform, the promotion of the product by the merchant does not 100% conform to the real function of the product. Deviations can occur in the transmission of important information about a product at any phases , such as product features, to users and consumers. Over-reliance on online shopping as a form of retail can delay the decision of whether users will hold the product for a long time until after the purchase. After purchasing a product online, the user receives the product and begins to try the product, then they will decide whether to hold it for a long time or send it back.

The trial phase, which occurs after the purchase phase, is a major factor of the large number of returns generated by online shopping. Therefore, even for online shopping, it is very important for users to have a way to try the product before deciding to buy, and this method of product testing needs to be carried out before the target product is shipped to the customer, otherwise it will not reduce the shipping costs anyways .

The method allows users to further understand whether the function of the target product meets their needs through the making and trial of cardboard models before purchasing.

When this behavior forms a large-scale mainstream trial method, sellers or companies can also use this trial method to release production blueprints of related products, which can restore the main functions of the target product to the greatest extent and combine AR and VR technologies in the future. It is possible to realize the possibility of trial interaction, making cardboard products a more perfect way to try before purchasing target products.

From the perspective of product designers, when the behavior of making cardboard products forms a large-scale habit, it will also have a great positive effect to the product design industry. In the demo testing stage of product design, when the main functions have been designed and the functions need to be tested, the designer can release the product cardboard version blueprints in an official form to the users who are to be tested . The coverage of this form of product trial phase will no longer be affected by the region, as long as there is the Internet and testers with experience in cardboard product making ,the test can be completed . As a result, a larger testers can be covered and a deeper understanding of whether the new product meets the expected goals. Thereby reducing the design and production of low-demand products due to insufficient understanding of user needs and then reduce the demand for resources and energy production of such products and reducing waste.

It is meaningful to train this culture no matter from the perspective of the consumers, from the perspective of the entire industry of product design, or from the perspective of saving resources for the protection of the environment.

5.3
Details save the environment

Fig 5.3 - Environment friendly material

The topic of environmental protection and the rational use of resources and energy has always been a topic of concern today. Both the government and the people have made great efforts to achieve this goal. But waste and environmental pollution occur always in places that we have not been paying enough attention to, such as the waste of resources and energy mentioned in this paper due to shopping returns and idle items. Whether from the perspective of consumers or from the perspective of shopping platforms, this kind of waste has not been paid much attention. For example, consumers will not reduce refunds due to consumption or energy loss. On the contrary, many people will take advantage of the refund policy to buy the same product in a variety of sizes. After receiving the goods, try it out and return all unsuitable products, so one purchase may lead to multiple returns.

From the point of view of the shopping platform, the companies are most interested in cost and profit. When they sells a product and then receives a return request for this product, they will evaluate whether the recovery cost of the product can be covered by the profit from selling the product again. If not, even if the product is returned by the user, the merchant will not recycle the product, but dispose of the product for waste. This makes the consumption of energy and resources in the material of the product itself and the production process meaningless and increases the industrial waste. These costs are unnecessary.

Therefore, I hope that through this paper, users, consumers and more people can notice this phenomenon and its side effects. Even if making cardboard products may not be the most effective solution, I still hope that the society will pay more attention to this waste and consumption of resources, because it may be possible to reduce this phenomenon simply through a better understanding of their own needs. , which is not a very difficult goal.

Only when each of us pays attention to the details around us and deeply thinks about the possible side effects behind it, the protection of the environment and the rational use of resources will get realized slowly, instead of a dream.

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