

DECO 7110

Design Thinking

iMarket

Teammates:

Wanqi Yang 46600284

Luyi Dai 47239355

Ting-Han Lin 45253517

Yingzi Zhuang 46863913

Introduction	2
Research overview	3
Method	4
Analysis	4
Outcomes	5
Design process	5
Timeline	5
Empathise	6
Empathise Map	7
Persona	7
Storyboard	8
Definition	10
Ideation	13
Co-design workshops 1	16
Results	18
Prototype	19
User Testing	22
Metrics	23
Evaluation	23
Collaboration Promotion Scale	23
Observations and Interviews	25
Method and process reflection	27
Emphasise	27
Ideation	28
User test	28
Future Direction	29
Reference	29
Appendix	30

Introduction

The context of our design-iMarket is traditional markets. Traditional markets are dense shopping areas of agricultural and marine products, meat, clothes, and retail goods which are normally open every day. Traditional markets are normally located at the centre of transportation hubs which are easily accessible to users (Sungkyun Lee., 2017).

Traditional markets have problems with navigation and layouts where different types of vendors like meat, vegetable and marine products are mixed together. Accordingly, customers might lose their way and cannot find the vendors they want quickly. iMarket's target users are people who seldom go to traditional markets. Besides, iMarket would be installed in traditional markets where vendors are mixed together. Moreover, iMarket is aiming to improve traditional markets' navigation and functional layouts by introducing a new shopping style that divides traditional markets into different areas based on types of vendors and a system that helps users plan shopping routes and encourage collaboration between users. The design also supports the fringe user group which are customers who often go to traditional markets. Due to functional layouts which divide traditional markets into different areas, the fringe users could clearly find and go to different types of vendors quickly which saves them time in finding vendors.

Finally, iMarket solves problems of navigation and layout in traditional markets. It also brings collective experiences of delight and relaxation and encourages collaboration between people by promoting users to help each other in searching for vendors which ease users' tense emotions and save their time.

The following figure demonstrates the workflow of iMarket. iMarket is composed of three parts: functional layouts, a system and a new shopping idea. Firstly, the traditional market would be divided into different areas by types of goods and each area would be given its corresponding colour. Secondly, a system assists users in selecting good types and distinguishing users into new and regular users by sending them white and black baskets. Besides, cards with different colours would be attached to baskets based on users' selections. Finally, a shopping idea encourages collaboration so that news users could ask for help or follow regular users to reach areas they need by checking baskets and card colours.

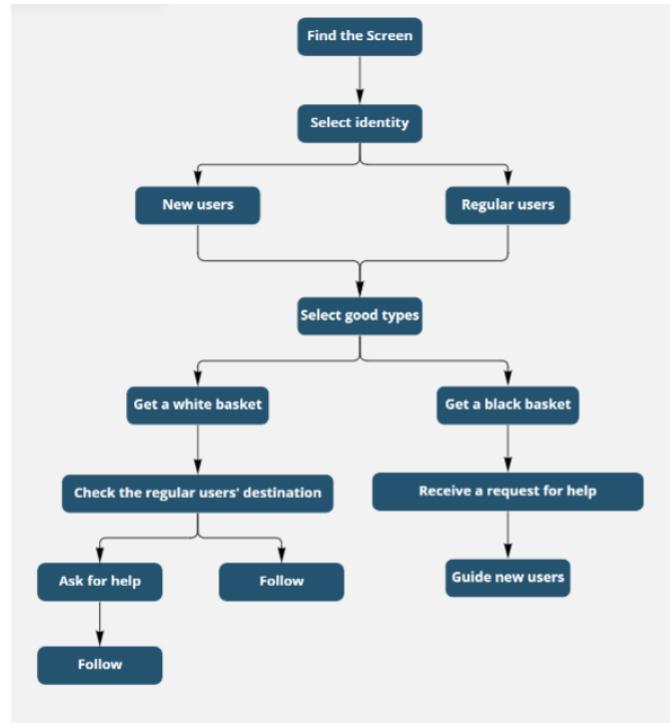


Figure1. iMarket workflow

Research overview

Our team firstly shared research results and contexts we conducted research to figure out which context we should focus on. Luyi's research context is the food market, Yingzi is the decoration market, Ting-Han is the night market and Wanqi is the ATM area in the bank. There is a significant difference between our original contexts except for TingHan and Luyi's contexts. Accordingly, we decided to integrate TingHan and Luyi's research as their research is similar e.g., food-related and user groups. Finally, we decided to choose traditional markets as our context and conduct research on them because traditional markets have similar user groups and features to our original research. Based on the team's collaboration and individual research conducted by different methods, we discovered that the user group of traditional markets are people aged from 30 to 60 years old who want to buy different ingredients to make meals. Furthermore, we found two insights into traditional markets' navigation and layout.

Method

To collect data from potential users, three excerpts were used as observations, interviews and surveys. Firstly, we conducted natural observations of the site to pay attention to the environment and human characteristics. One-hour observations are performed in a huge indoor traditional market in the centre of the area. After a general observation of the market, we conducted interviews with three customers for about 3 hours. Observation sketches with key points and interview transcripts for three interviewees are displayed in the appendix. To broadly understand target users' needs, we have developed an online questionnaire for the target group to collect consumers' perceptions and future expectations. People who were shopping or likely shopping in this traditional market were invited to participate in this online survey. We received 79 responses and the results are in the appendix.

Analysis

Two main insights were analysed from previous methods, which were lack of functions and market layouts, and lack of signs and instructions. The first insight was that some observed people needed a way to increase resting space and a convenient service area as many residents shopped with children and carried many ingredients at the food market. It was also reflected in our survey (question 4 and question 5), which indicated that most participants were not satisfied with some functions and market layouts. After analysing and investigating the data, a potential design opportunity was to redesign the layouts in this traditional market and add more functions.

The second insight was that the second respondent needed a way to navigate all the vendors, especially to point out the excellent ones. Communication is difficult because the crowded large market environment is noisy and cluttered, and research shows that missing and inconspicuous signs and instructions do not promote recommended stalls. In this case, a potential design opportunity is as follows: organise stalls by type of food; add more colourful instructions on floors and walls; display all stalls' signature ingredients and Detailed maps of today's new ingredients; apply navigation tools to such applications. Therefore, users can reduce the time they spend looking for directions and increase the efficiency and effectiveness of their shopping.

Outcomes

After analysing potential users by previous methods, we discussed our design opportunity as navigation and functional layout in traditional markets. The goal of our team was initialised to develop a design to promote collaboration and collective experience between target users for navigation and functional layout in the traditional market.

Design process

Timeline

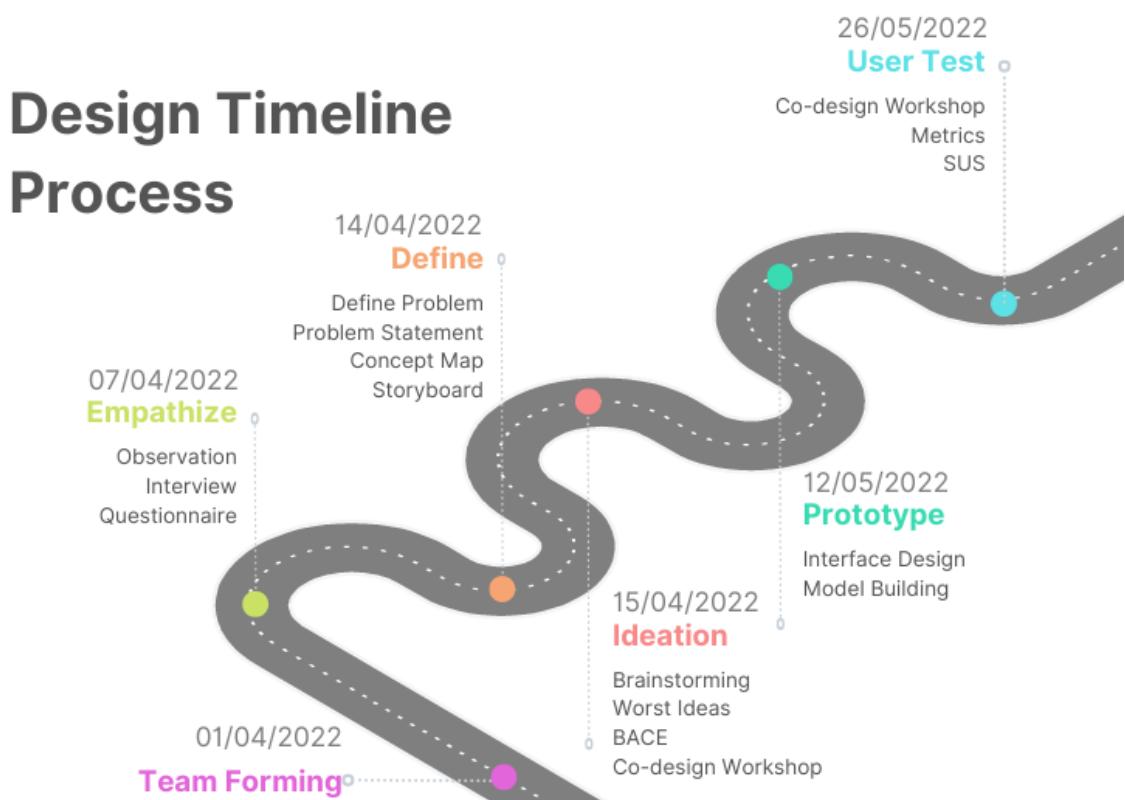


Figure2. design timeline process

During the empathetic period, we used the dataset obtained by team member Luyi about observation and interviews in the traditional market. After discussion, refinement, and extraction of the data, we summarised the following design opportunities:

1. Traditional market vendors are scattered and navigation systems are lacking here.
2. Problems with food hygiene and safety exist in traditional markets.
3. There is a lot of plastic pollution in traditional markets.

After the studio discussion, we focus on the navigation system and functional layout of the traditional market as our main design opportunity to help users find their destinations more quickly and improve their efficiency. The navigation system and good layout are actually more effective for new users or less frequently used users in the traditional market, such as users who are used to ordering takeout or eating in restaurants rather than cooking at home, so these users will also be our target users. Frequent customers who regularly go to the market will become our fringe users, and we will also consider how to provide a good experience for them.

After defining our questions, we used brainstorming, BACE, the worst ideas method to generate our ideas and designed the prototypes of the system for user testing. During the user testing phase, we held a co-design workshop to introduce the system to our classmates and absorbed their suggestions. We also designed the prototype evaluation annotation to make a matrix to quantify the user experience, and A scale similar to the system usability scale (SUS) is used to quantitatively assess the availability of the system. Our design process was not always developed linearly. When we designed the system, we often overturned our ideas, so ideation methods such as brainstorming ran through our whole design process.

Empathise

By analysing and summarising the research data of team member Luyi, we made user empathy maps, persona and storyboards to study the problems that users face, their experience and motivation in the traditional market environment. Through empathy, we will have shelved our assumptions about traditional markets and gained insight into the real needs of our users, which is an important part of our human-centred design.

1. Empathise Map

Empathy graph is an empathy mapping tool that helps us think in the user's shoes. Based on the real data we obtained during the research phase, we designed an empathy map to visualise the user needs to reveal the problems waiting to be solved. We divide the graph into four quadrants and summarise four different aspects of the user's inner experience respectively. The variables include: what the users see, what they hear, what they do and say, and the psychological experience the users obtain. At the bottom of the empathy map, we add users' gains and pain points. Unlike the persona, the empathy map helps us develop a general understanding of our users.

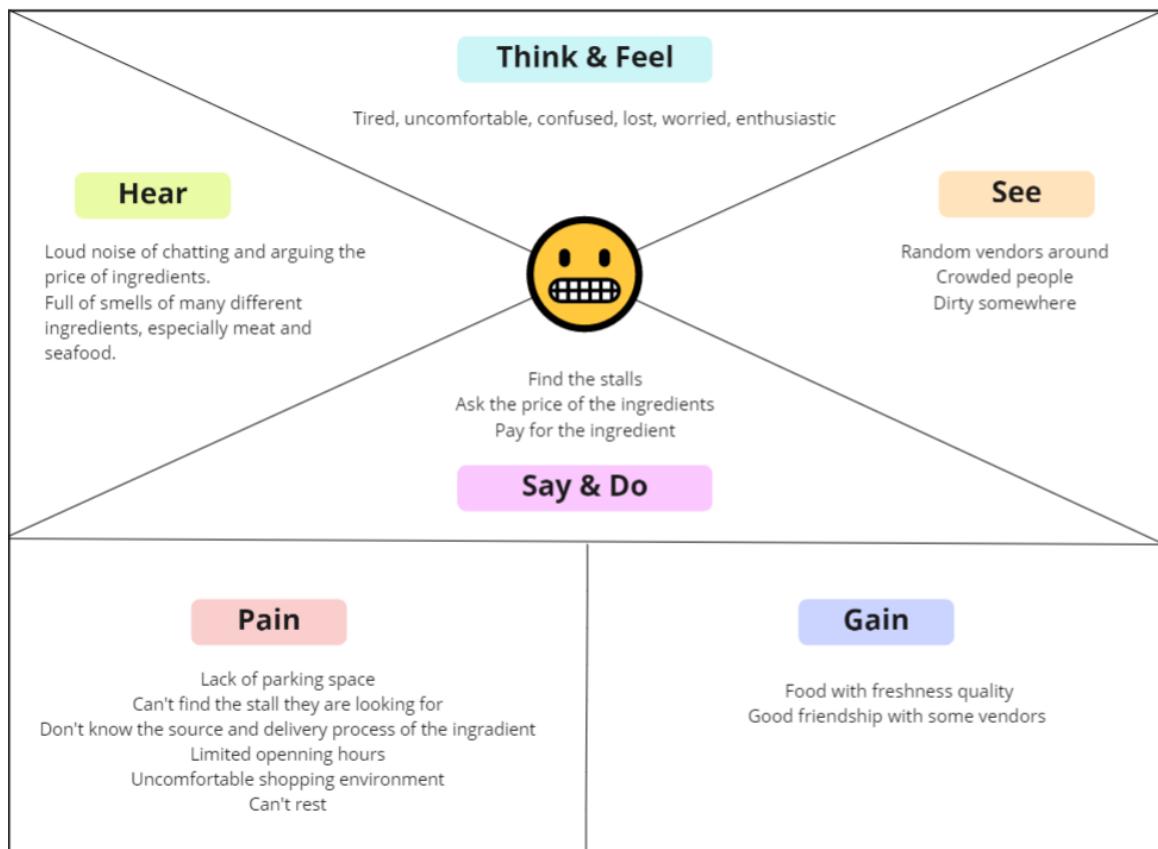


Figure3. empathise map

2. Persona

Persona is an effective tool to delineate target users, visualise user demands and design direction. The core of personal is to abstract each specific information of users into labels, and use these labels to specify the user image, so as to provide users with targeted services. After summarising the design opportunities, our team members chose different aspects to describe the personnel. I will display the persona which is relevant to our final design here.

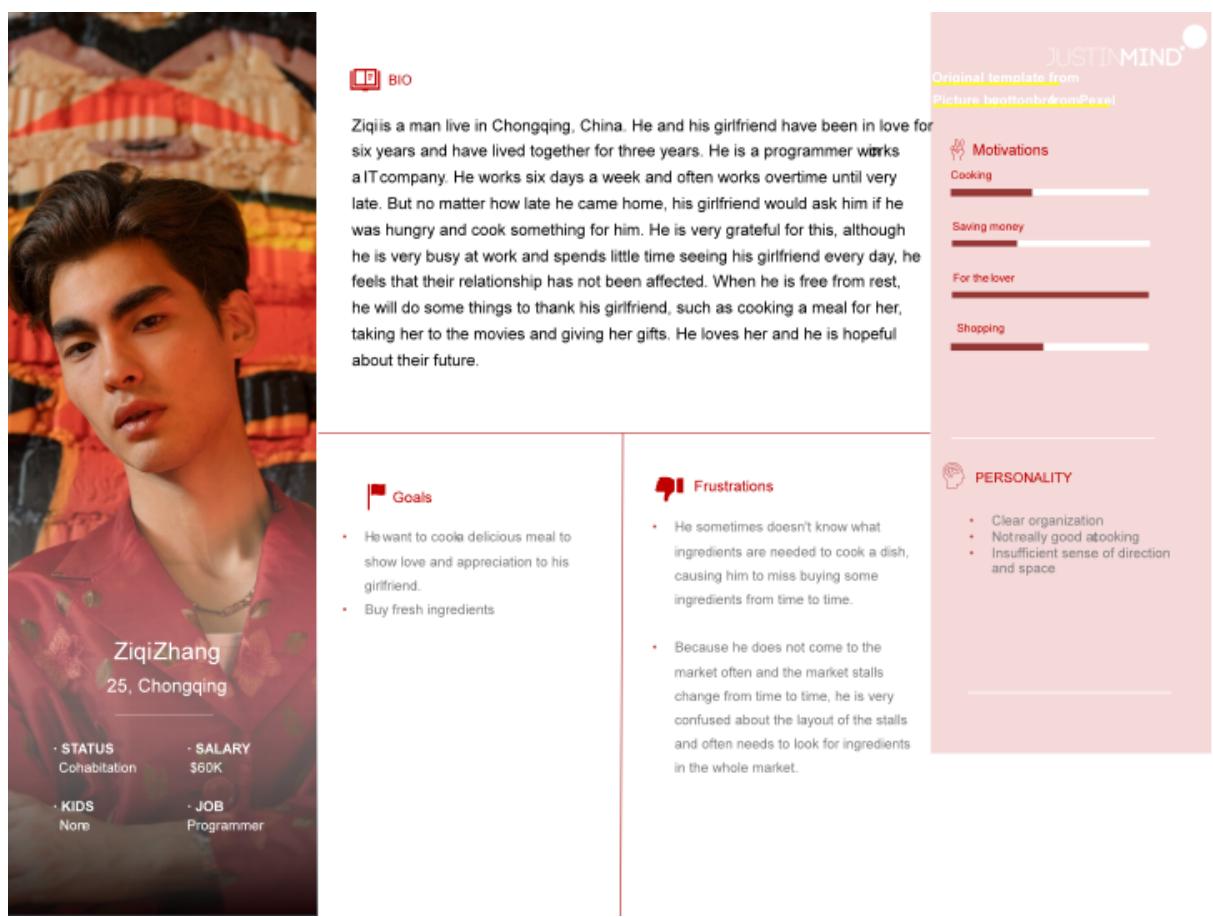


Figure4. persona

Our team member, Wanqi, depicts a man who rarely goes to a traditional market and wants to buy fresh materials and cook for his girlfriend. His main problem in traditional markets is not knowing what material to buy and being unable to find vendors who sell the relevant ingredient.

3. Storyboard

The storyboard is used to help designers show the usage situation of the system, including the process of user interaction, and to present the interactive experience between a person and a product or service through illustrations. Storyboards can explain the important steps of user experience in a highly readable way and can arouse the empathy of designers and readers so that readers can have a strong sense of participation and interest. Our group members proposed different solutions to the design opportunities we obtained during the empathy phase and set up scenarios to describe them as storyboards.

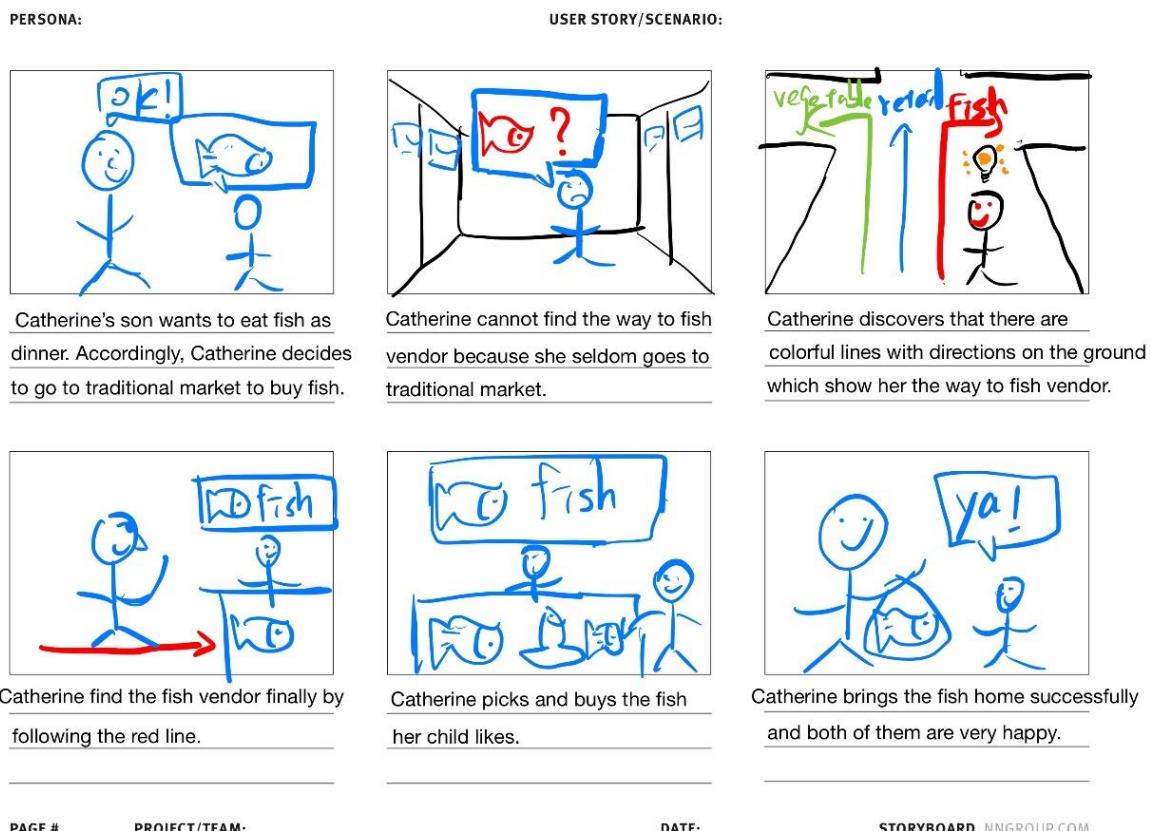


Figure5. navigation storyboard

Team member TingHan provides users who are unfamiliar with the traditional market vendor layout, with a navigation system on the ground, in which lines in different colours will indicate the location of different types of vendors. For example, blue represents seafood vendors and red represents meat vendors,

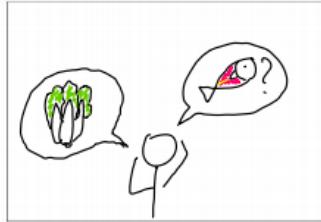
etc. By dividing the types of vendors into different areas, he helps users find what they need more quickly.

PERSONA: 2 - Ziqi

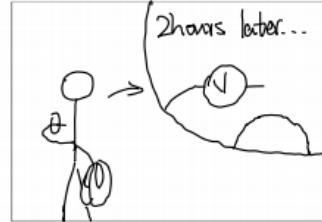
USER STORY/SCENARIO: 2



Ziqi will go to the supermarket from time to time to buy food and cook for his girlfriend to express his love for her and thank her for doing housework.



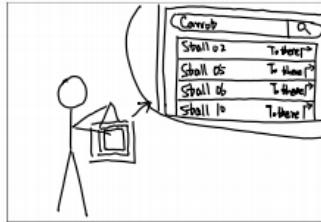
Because he seldom went to the market before, he doesn't familiar the layout and distribution of stalls. So he looked around and search every section and stalls. It's time-consuming.



When he finished the purchase, he spent more time in the market than he expected.



This time he comes to the market and found that he could get a shopping bag with a display screen free of charge at the entrance of the market.



He could enter the goods he wanted on the screen, and the corresponding list of goods and stalls where he could buy goods would be displayed on the display screen.



He can choose one of the vendors in the list, and the navigation system on the shopping bag will guide him to the stall.



When he is confused about the detail of route, he can also check the specific route and road conditions on the screen.



When he has purchased the necessary ingredients, he can return the bag at the exit.



With the help of the bag, this time it took him less time than before, even less time than he expected. It took so little time that he felt he could have more opportunities to cook for his girlfriend in the future.

Figure6. navigation storyboard

Team member Wanqi prints a map of the market on the environment-friendly bags, by which users can find the product when they get lost. By providing users with environment-friendly bags, he has also improved the problem of plastic pollution in traditional markets.

Definition

During the definition phase, we organised the information collected during the empathising to define the core issues of our target users and make problem statements. We took the strategy layers and scope layers in the Elements of User Experience (Jesse James Garrett, 2002) as the basic framework for problem statements, and summarised our design concepts through this framework.

Strategy It is the start of the whole user experience process design, which focuses on the value needs of the system	Users' Needs	Problem Description	1. The classification and distribution of vendors and products in traditional markets are confusing and illogical. 2. The traditional market lacks the guide system of public space.
		Target User	Users who are not familiar with the traditional market.
		Users' Values	Efficient, convenient, friendly, time-saving
		Hidden Things	1. Users may have anxiety and fear in an unfamiliar and

			<p>noisy environment.</p> <p>2. Providing users with a quickly familiar environment may allow new users to get a better impression and increase the possibility of repeated visits.</p>
		Conclusion	<p>Users can quickly find the items they want to buy in the noisy and chaotic environment of the traditional market even though they are not familiar with it.</p>
Product Target		Agency/ Responsible	Traditional market manager
		Conclusion	To provide a method for users who are unfamiliar with the traditional market to quickly find the items they want.
Scope: To analyse the functions that can support the needs of the strategic layer.	Functional Requirement	Guidance for target users can be achieved through a visual navigation system, or through the establishment of consulting centres, etc.	
	Content Requirements	Agency Demand	Market managers should

			improve the market environment and rationalise the layout.
	Technique Demand		A market navigation system/method that is easily understood and learned by users.
	Special Demand		Collaboration: We hope to promote the user's sense of cooperation in the market through this system.

After analysing the strategic and scope layers of user experience, we summarise the following product concept definitions:

'The system is a navigation-like system applied in traditional markets, aimed to provide an efficient, convenient, time-saving and friendly solution for users who are unfamiliar with the traditional market to find their way. The system will improve the current traditional market environment and layout, and promote the user collaboration in a more friendly environment, and reduce the negative psychological state of the target users.'

Ideation

After the design concept was defined, our group did a targeted brainstorming in an attempt to generate ideas that fit the concept definition, and drew the thumbnails during the process. We shared the resulting thumbnails and tried to find the thumbnails which were useful and available for integration. The thumbnails we adopted and integrated are:

1. Design a new layout according to the product category sold by the vendors, and distribute the same category of vendors together.

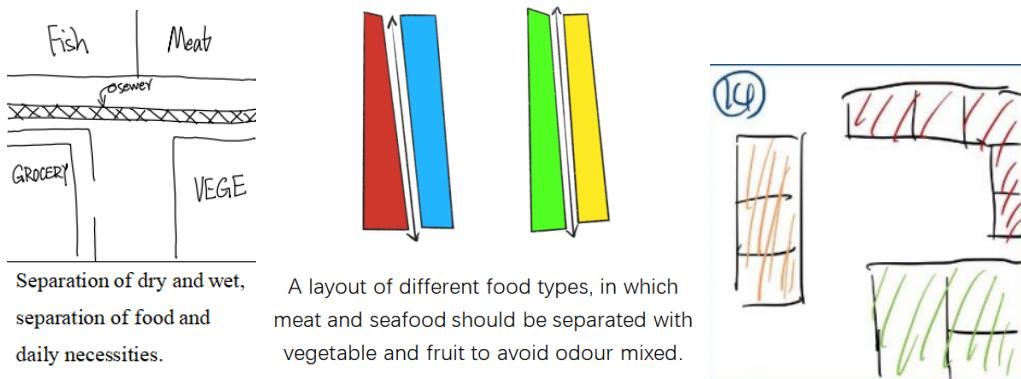


Figure 7. market layout

2. Design representative colours for various categories of products and apply them to the navigation system.



Every vendor can get a sign in different colors which represent their product type and also decorate their own places.

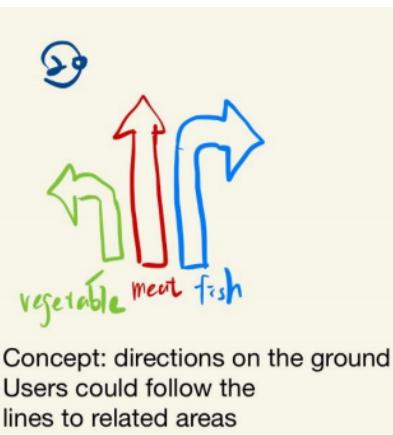
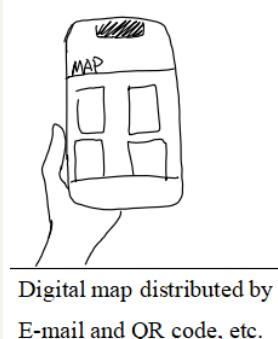
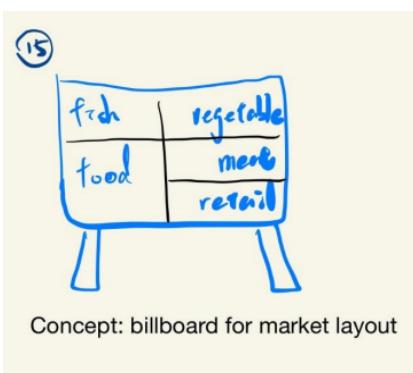


Figure 8. vendor colour

Figure 9. navigation arrows

3. Provide the users with an overall map and route of the traditional market somewhere.



Display market map on the tote bags which can be got from the market and used recyclable.

Figure 10. layout board

Figure 11. digital map

Figure 12. map bag

4. Provide artificial assistance to target users (users unfamiliar with traditional market environments), which may be provided by traditional market staff (such as setting up inquiry offices, AI robots, etc.), or other field personnel.



Make the marketing staff more recognizable, for example by wearing a distinctive apron. So people can consult them when they get lost.

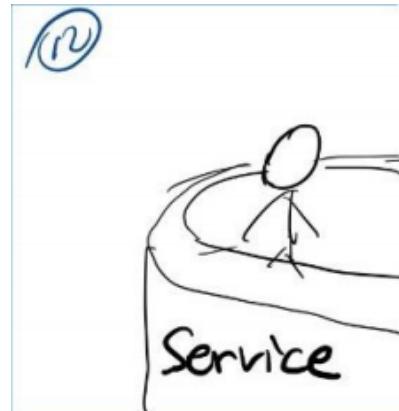


Figure13. staff look

Figure 14.service desk

Due to the collaboration requirement in the concept, we want the providers of help to be other users rather than staff, namely users familiar with the traditional market layout (fringe users of the system). We hope that our concept will encourage users to communicate, help each other in the market, and will not cause trouble for fringe users of the system. This requires the fringe users not to take a roundabout way just for leading the target users, or that the target users have the same destination as the fringe users do.

By integrating the above design thumbnails, we first put up with the following idea:

'When the market is well-positioned, users are asked to select the product types they would like to buy on an electric screen, and the machine near the screen will print a small map for them to guide where they should go.'

However, when we were doing reflection and mapping the idea with the system definition, we found that the idea did not fit the system requirement of collaboration. Therefore, we held a brainstorming activity again to integrate both design thumbnails and the system requirement. The final idea we chose to develop is:

'When the market is well-positioned, provide all users with an environmentally friendly shopping basket, and the colour of the basket indicates the user category: white basket represents the target user, who is unfamiliar with the market layout and may need help with navigation; while the grey basket represents fringe users, who are regular traditional market customers and can'

provide the target users with help. Inside these baskets are shopping bags or smaller baskets in different colours arranged in neat rows, representing the type of goods that users currently need to buy.

When the target user needs help, they can identify the regular customers who can help them quickly, by the colour of the basket, and judge whether the regular customer has the same destination as themselves according to the colour of the small basket / small bag inside. If their destinations are the same, the target user can get guides by following or asking the regular customers.'

We described our design concept to the students in the studio communication session and received feedback indicating that too many baskets or plastic bags may cause inconvenience to users and a waste of resources. Therefore, we once again deepened and improved the design concept through brainstorming, replacing small baskets of different colours with recyclable paper labels in a prominent position of the basket, so as to reduce the load of users. In addition, the printing and pasting of paper labels will be automatically done by the machine which is placed near the entrance of the traditional market, and the colours of baskets and labels will be selected by users on the operation screen near the machine.

Co-design workshops 1

We conducted a co-design workshop which was designed to demonstrate our ideas to other people to obtain their opinions and their unique perspectives of our design. We designed 4 activities to help us decide on useful areas and suitable layouts in traditional markets.

Activity 1

The first activity is asking participants to pick photos similar to their traditional markets and share their experiences and feelings about traditional markets. The purpose of this activity is to check if participants have an understanding of traditional markets and if we miss potential problems of traditional markets.



Figure15. activity 1 result

Activity 2

The second activity is asking participants to share their preferred functional areas in traditional markets. The purpose of this activity is to filter useful and preferable areas from our dozens of ideas.

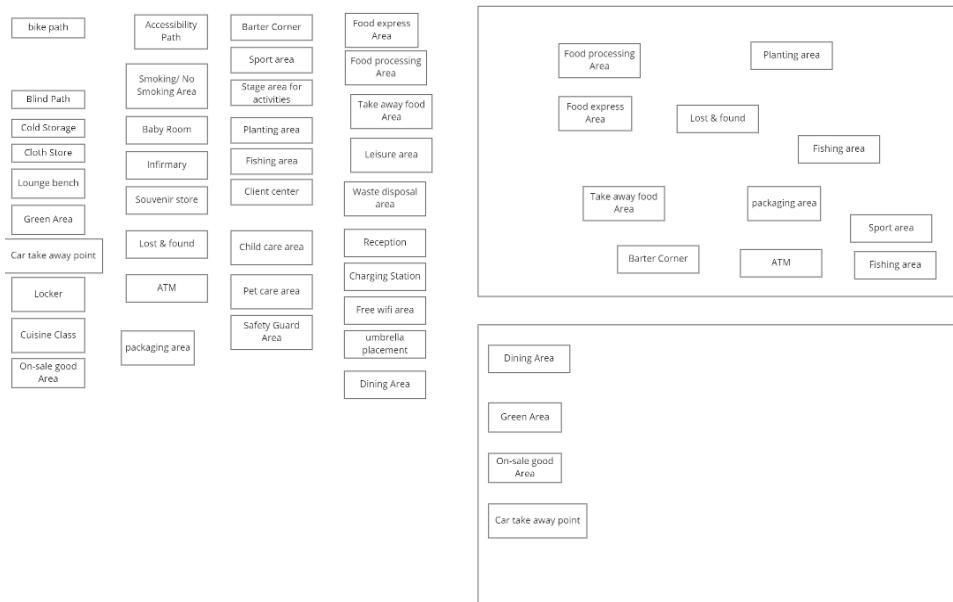


Figure16. activity 2 result

Activity 3

The third activity is asking participants to arrange their ideal traditional market layout by using the areas they chose from activity 2. Besides, participants

could resize the areas they chose. We designed this activity to have an understanding of what layouts would users prefer.



Figure17. activity 3 result

Activity 4

The fourth activity is asking participants to write down the reasons why they arrange the functional layout in that way. Knowing the reasons would help us design a reasonable and enforceable layout of the traditional market.

I set distances between different areas because it would be easier for me to find vendors I need.

I arrange areas based on types of vendors. I can buy cooked food and enjoy it immediately if there is dining area around deli vendors. Neat and convenient layout of markets would enhance my shopping experience. And big space for areas makes me feel relaxing.

Figure18. activity 4 result

Results

The results from the activities demonstrate that participants have the same understanding of traditional markets and their experiences and feelings of markets are crowded, smelly, price compare, stalls change and product change daily. Besides, participants tend to arrange different areas with clear boundaries because it is easier for them to find the products they need. Moreover, participants prefer sufficient space for different areas and put related functional areas with similar attributes which indicate that they like uncrowded layout and areas with related speciality which would enhance their

shopping experiences. Based on the results, we decided to arrange vendors by their types and set functional areas related to their types.

Prototype



Figure19. white and black baskets with cards



Figure20. iMarket system

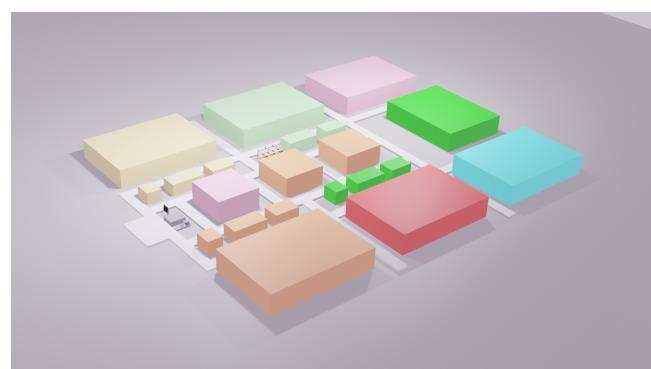


Figure21. iMarket layout

After the end of the ideate phase, in order to carry out further product verification, we made a low fidelity prototype for further and in-depth user testing. We have also tried some other means, such as cardboard models and

3D models, to allow us to verify and improve our ideas in rapid assessment and group reflection.



Figure22. iMarket system



Figure23. regular user



Figure24. white and black bags



Figure25. new user

The prototype is composed of bags, colour tags and an iPad. We use post-it notes in different colours to replace the colour tags in the final concept. The

iPad is presented as the operation screen (figure 1,2). Users can choose whether they are regular customers and the types of goods they need to buy by operating the iPad at the market gate, and then we will give them different colour bags and manually paste them the colour paper of the area they want to go in order, which will be automated in the final concept. The white bag indicates that the user is a new customer, and the black bag indicates that he is a regular customer.

When users leave, they can return the bag and colour tags at the exit.

User Testing

In the test phase, we invited ten participants of different ages to experience how it feels in different roles in the system by playing the roles of regular customers and new customers. Seven of them are our target users, that is, people who don't go to the traditional market very much (no more than once a month), aged between 25 and 38. The other three are our fringe users, people who often go to the traditional market (more than three times a week), aged between 38 and 60. The test site was selected in a medium-sized market of about 400 square metres in Jiangmen City, Guangdong Province, China.

Because layout optimization requires a change in the layout of a large space, which is implemented in our current situation. So in our user test, we will focus on the test of the user experience of the iMarket system. In the test, we will artificially divide a certain area of the market into certain colour areas and inform the participants who play the role of regular customers. Through this method, to make up for the impact on the whole system caused by the lack of layout optimization in the test as much as possible, and ensure the accuracy of the test as much as possible.

In each round of tests, one participant acts as a new customer and one as a regular customer. We will have a staff member playing the role of a regular customer to ensure that each participant has not played a regular customer before playing a new customer, that is, to make sure that they know nothing about the regional distribution. The new customers will be asked to use the operation screen to select four areas required by the task and will be given four colour tags of different colours in their bags. And each regular customer's bag will have three colour tags of the same colour as the new customer's

colour tags, that is, the new customer needs to find two regular customers to complete the navigation task to four areas. During this period, regular customers will only walk around in the traditional market and buy goods to simulate normal market shopping. Whenever a new customer arrives in an area by following an old customer, our staff will take off the corresponding colour card for him.

1. Metrics

In the test, we use qualitative and quantitative evaluation methods to evaluate our prototype.

For quantitative evaluation, we will use a scale and measure similar to SUS(System Usability Scale) to analyse and evaluate the degree of the system, encouraging collaboration between users. We call our own scale CPS(Collaboration Promotion Scale). On the scale, we mainly collect data about collaboration, but we also do some usability analysis to verify the feasibility of our ideas.

For qualitative evaluation, we will observe and record the test process of the participants, conduct interviews for them at the end, record their feedback and analyse it.

2. Evaluation

1. Collaboration Promotion Scale

Our Collaboration Promotion Scale consists of eight questions, the responses to CPS are done on a scale of 1 to 5, where 1 means strongly disagree and 5 means strongly agree five of which are designed to evaluate the promotion of collaboration between users, two to evaluate usability, and one to conduct an open assessment to inspire later interviews. Of the eight questions, there are five positive questions and three negative ones. When we deal with the raw data, we will convert the data according to the way SUS handles it (Sauro, 2011).

- I think I'd like to communicate with regular customers.
- I have no impulse to communicate with regular customers.
- I think it's easy to talk to regular customers.
- I think I need more encouragement to talk to regular customers.
- I think there is a friendly atmosphere among customers.

- I would love to use this system frequently.
- I think this system is very helpful to my shopping experience.
- I encountered difficulties in using the system.

By processing the raw data(can be found in Appendix C), including using the similar method of SUS to convert the data, to make sure the final data is neutral and the higher the score is, the better the performance is. In the end, we have boxplots for each question to interpret.

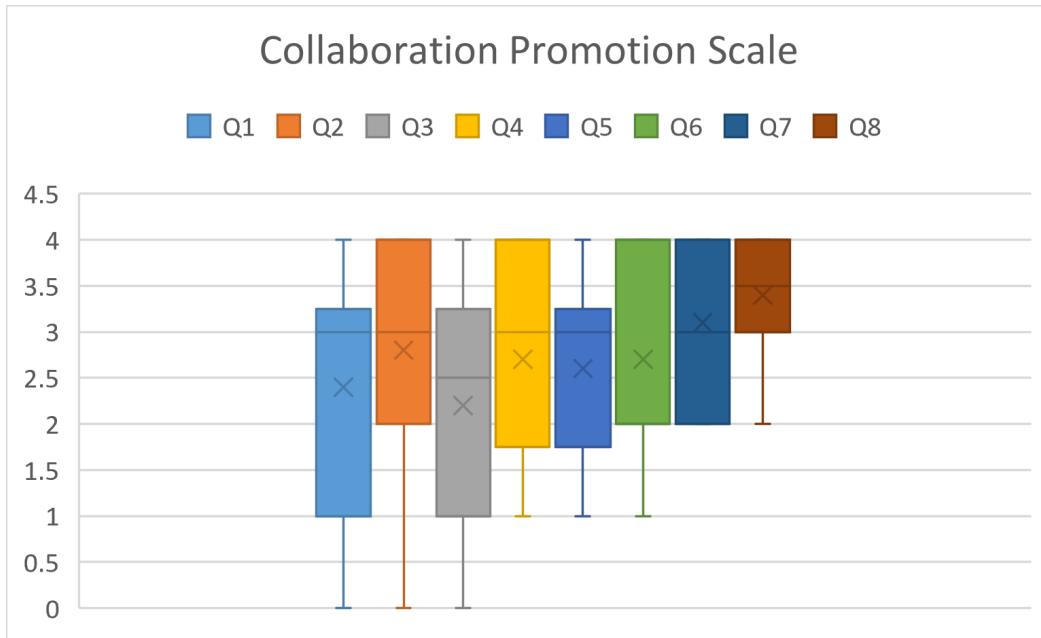


Figure26. evaluation result

In the box plot, the “x” in each block represents the average score, the column represents the 50% score range distribution with the median as the central value, and the upper and lower horizontal lines far from the column represent the maximum and minimum values of the score.

Generally speaking, the participants' evaluation of the usability of our system is relatively high. There are basically no problems in using our system, but there are also some difficulties. I will pay attention to these questions in later interviews.

As for the evaluation of collaboration, the participants got the collective experience roughly, but the experience is still insufficient and can not make the participants completely satisfied. The relevant analysis will be carried out below in observations and interviews.

Among the three problems of communicating with regular customers, there is not only 1 score of strongly disagree but also 5 points of strongly agree, which reflects the gap in the social experience of users with different personalities in

our system, that is, individual differences have a great impact on our system experience.

Therefore, we believe that with the mechanism of colour tags and following, introverted users can use the iMarket system to complete navigation even if they do not need to communicate with others, which can ensure that people with different personalities can get the best experience in the system. We believe that even if there is no need for too much interpersonal communication, this mechanism of silent help between people also provides collective experience.

2. Observations and Interviews (data can be found in Appendix D & E)

According to the observation of new customers, most new customers spend more time looking for regular customers with black baskets. It is possible that for a market of hundreds of square metres, there are only two regulars. customers, which may be too difficult to find. Another problem is that when new customers are looking for regular customers, they are also moving. The combination of these two problems makes it very challenging for new customers to find regular customers. This also makes us think about how to ensure the experience of new customers when there are too few regular customers using the system in subsequent iterations.

Through the observation, seven participants will communicate with regular customers during the test and play with new customers in the course of the test. Most of these exchanges take place when asking for assistance, and five of them continue to chat with regular customers after asking for assistance, and one of them is still chatting with regular customers after arriving in the area, expressing his interest in interpersonal communication. The three basically said nothing when they received answers from regular customers to lead the way. The remaining four choose to follow regular customers silently to complete the task.

In the interview, three participants who were unwilling to communicate with regular customers said that they were reluctant to chat with strangers, and the whole system could navigate without communication. They thought this was very good and had no dissatisfaction with the lack of communication between customers, which was consistent with the results of our CPS analysis. We don't think this is necessary and urgent to encourage people to communicate

because users have the right to choose freely, and when users are willing to communicate, they do not need additional encouragement. When you set up measures to encourage users who do not want to communicate, it will create a sense of compulsion and reduce the user experience of the system.

For testers who communicate with regular customers in the process, we ask them in an interview what their motivation is. Some of them think that this is a direct method, because "sometimes customers will stop while they are shopping, and if I wait for them silently, they will waste my time." At the same time, some people say that it is out of politeness, "I think it is very impolite to follow others silently," while others say that they hope to learn some shopping skills from regular customers. Generally speaking, they will chat up for some motivation, and they also express in the interview that the iMarket system has created a good opportunity for them to communicate with people in traditional markets, an opportunity that has been difficult to meet in any type of market before.

Participants said in the interview that they were happy that using an identifiable shopping bag could help people in need. From the point of view of new customers, nine participants thought the iMarket navigation method was more intuitive and full of human touch than a cold map, and they think it is a novel way and are satisfied with it. From their feedback and test observations, I think our system is very good to promote collaboration between people, this mutual assistance does not need to be reflected in direct communication, but in a collective experience.

From the observation and interview results of the whole test, the iMarket system promotes the collaboration between customers in traditional markets, which rarely existed (novel) before the emergence of iMarket.

There is an outlier that a new customer found a regular customer with tags of the same colour, he directly asked the regular customer if he could take him to the three areas where he needed to go. Along the way, they began to chat about themselves, which was similar to our concept, but it was a bold move to ask the regular customer directly if he could take him to the three areas. Because we don't know if this will disrupt the shopping plan of regular customers. In a later interview, we asked three participants with long-term traditional market shopping experience about this question. One said it was possible to disrupt their shopping plan, one said it would definitely disrupt their

shopping rhythm, and the other one said it would not. The respondents who expressed varying degrees of affirmation, one said that sometimes she shops not for hanging out, but for lunch/dinner's ingredients, the bold request of the new customer may cause them to spend more valuable time. The others think that time is not important, but when they take new customers to the area where they want to go, they are forced to shop with new customers.

Sometimes they need to compare between different vendors and new customers may not want to do it. This causes them to meet the needs of new customers and then go shopping themselves, which is a bit too onerous for volunteer service.

In the interview, seven participants also mentioned feedback on improvements to baskets and colour tags. They think that as regular customers who need to be looked for, black baskets are not conspicuous. Six participants think that colour tags may be difficult to identify and may be confused with some colourful customers' dresses or colourful decorations in the market. When they mentioned this, we showed them our early concept of giving users multiple baskets of different colours, which they thought would help make it easier to find, but agreed that so many baskets would lead to too many things to carry. It would be easier to replace it with a bag, but they still want a better way than carrying multiple bags.

In the analysis of CPS, we found that some users encountered varying degrees of difficulties in using our system, so we also had open-ended questions in the interview, trying to locate some flaws that we ignored before. There is a participant over the age of 50 who said it would take her time to get started with the electronic system. Two participants also said that regular customers may walk too slowly, it may be more time-consuming to follow them, and it would be better to have a rough map distributed with the bag.

Method and process reflection

Emphasise

Empathy helps us gain insight into user needs and definition issues after obtaining user research data, so it is basic and essential during the design process. In the process of user empathy research, we once confused the definition of our target users by failing to successfully develop the scope of

empathy objects, which took us a long time to clarify our thinking, and finally set the target users as users unfamiliar with the traditional market environment. In the whole design process, we spent a lot of time to target users' research and empathy, but inevitably ignored our fringe users, namely who often go to the traditional market. Currently, in our design system, our fringe users can only get shopping baskets and may have chat up opportunities. However, though the needs of our fringe users may not be the mainstream in the system, they also have certain development potential, so we cannot ignore them.

Ideation

In the process of ideation, we used brainstorming and the worst possible ideas produced a lot of thumbnails. A free brainstorming environment and atmosphere helped us to think more widely, and in the process, we also put forward a lot of unconstrained, imaginative ideas. While the worst possible ideas help us avoid ideas that are bad to the user experience. BACE helps us to make the idea more complete after generating, and to think about the pros and cons of the approach from the user's perspective. By integrating our thumbnails, we were initially very pleased with our proposed idea of the electronic screen and map printing, however, when we combined the idea with the definition of the system, we found that the idea did not quite fit some of the requirements in the definition. Therefore, even if we need to be unconstrained in the process of generating ideas, we can not be separated from the definition and requirements of the system itself, and we need to continuously revisit the system requirements in this process to achieve the design scheme that most meets the definition and requirements of the system.

Prototype

When we make prototypes, we try to use the materials around us to make them. Considering the economy and environmental protection, we have used bags instead of plastic shopping baskets. We initially thought that this prototype alternative should not cause too many changes to the experience in the concept design. However, in the subsequent user tests, different users still gave their preferences about the choice of baskets and bags and gave different experience feelings for these two choices. Therefore, I think that in prototyping, we should try our best to restore the real conceptual design and strive to simulate the critical experience. Temporary modifications should be

cautious. The impact on the realisation of the concepts should be judged in user testing.

User test

Due to the limitation that the functional layout optimization can not be presented in the test, we can only make specific roles for this part in the test, which leads to the situation that users will not be able to find the way on their own in our test. This is the deficiency in this test. Maybe in the next round of design testing, we can try to build a small market scenario to test the impact of layout optimization on the entire iMarket system.

In the test, the participants who have met in advance also may affect the assessment of the willingness to communicate to a certain extent, which should be avoided in the subsequent test. Fortunately, we still got useful data and inspiration from the observation and interview.

Future Direction

Through a co-design workshop, user test and studio critique, we summarise some of our future development directions.

Collaboration: We can distinguish between “welcome chat-up” and “do not disturb” among regular customers so that it is convenient for new customers to judge how to communicate with regular customers and enhance the experience of collaboration between the two sides.

Accessibility: When there are few regular customers using iMarket on the spot, how to ensure the experience of new customers (will not spend too much time and energy on finding regular customers).

Improve the identification of baskets and colour tags to make it easier for regular customers to be found

Accessibility: How to design the electronic system suitable for ageing. At the same time, it is also mentioned from critique that how to ensure the experience of people with disabilities such as colour-blind using iMarket system.

Reference

- Garrett, J. (2002). Elements of User Experience, The. Pearson Education Inc.
- Lee, S. (2017). A Study on traditional market decline and revitalization in Korea-improving the Iksan Jungang traditional market. Journal of Asian Architecture and Building Engineering, 16(3), 455-462.
- J. Sauro(2011). "Measuring usability with the system usability scale (SUS)," *MeasuringU*, 03-Feb-2011. [Online]. Available: <https://measuringu.com/sus/>. [Accessed: 09-Jun-2022].

Appendix

Appendix A

Observation and key points:



- Crowd of people in this food market
- People are chatting and arguing the price of ingredients loudly, noisy environment
- full of smells of many different ingredients, especially meat and seafood
- Customers are mostly women and people with jobs.
- A woman shopping with a tired child

Interview data from two respondents (after introducing our purpose):

1. Which community are you from? How far is your community from here?

- I'm from Huifeng Community. A little bit far from this traditional market.
- I'm from Baiyun Community. It takes about a 20-minute drive.

2. How often do you usually come to this traditional market?

- Twice or three times a week.
- Once or twice a week.

3. What specific time do you usually come to this traditional market?

- I usually go to this market at 4 p.m. on weekdays and 7 a.m. on Weekends.
- I often go to this market on Sunday afternoon.

4. If supply is sufficient, when would you like to come to the traditional market?

- I prefer 4 p.m. on weekdays and 10 a.m. on Weekends. Because at that time, food is fresh for a family party at noon. Also, it won't be so early for me to get up.
- I prefer 7 p.m. on weekdays. Due to the evening peak and working overtime, I hardly have time to go to the food market on weekdays. So, I must prepare 7-day food on Sunday.

5. Why would you choose this market?

- Because this traditional market supplies the freshest food around my suburb. It is better to select the food by myself, especially the seafood. When I use online delivery of the market, I sometimes receive food that doesn't match the picture.
- I care about freshness and food diversity. This market is the biggest market near my home, and I can almost find every fresh vegetable and seafood I want to buy. There are some deli stores serving my favourite Peking duck.

6. Which numbers (from 0 to 10) do you think is more appropriate for your food freshness requirements?

- 10. It is important to have fresh and clean food. I like seafood and it needs a high quality of freshness.
- 8. Freshness is crucial, but since I only buy food once a week, I can accept the food is not the freshest.

7. Could you share your experience of the traditional market you often go to?

- One interesting thing is that some vendors here always suggest to me which ingredients are better and how many ingredients I should buy. They are always concerned about my needs instead of just trying to make my money. Some vendors are willing to give me green onions for free.
- The first time I came here looking for a deli, I got lost. Thanks to the many vendors who have been showing me the way, I finally find the deli at the corner. There was a fish vendor who even left his stall and took me the way to the deli.

8. As a consumer, are there any difficulties when you buy some food?

- It is hard to find a parking area around this food market. I always spend 10 to 15 minutes to find a parking space.
- It is hard to find a specific stall in this big market, and I don't have enough time to go through all the stalls, so I will miss some great ingredients or food.

9. What's your favorite place in this traditional market?

- Umm...there is no favorite place for me particularly. Every time I visit all the stalls because the ingredients are different every day and I can know which ones are new today.

- I like the deli, especially the Peking duck store. Sometimes I don't have enough time to cook, and deli meats help me save a lot of time. Come here with me! I'd like to share this stall with you! It has the most delicious Peking duck in this district and the price is reasonable. However, it is too far away from the gate, just on the corner here, so many customers cannot find its location. The most popular deli is the signatured roast duck. You must try it, and it won't let you down!

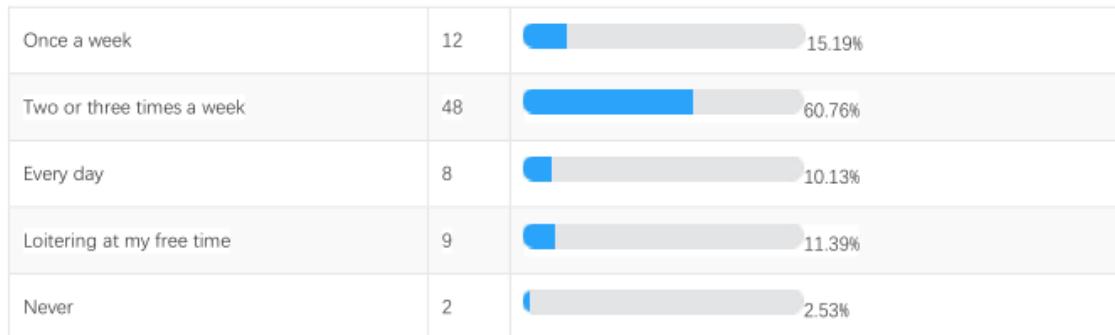
10. What services do you hope the traditional market will provide in the future?

- I hope all the stalls can display the source of their ingredients and the delivery procedure. Sometimes it is hard to say it is "fresh", even though the venders confidently tell you. For example, some deep sea fish was dead when it was sold, and it is hard to say when it was dead. And some food is made from frozen ingredients, which will cause health problems. Also, it would be better if vegetable vendors could provide brief descriptions of soil varieties for their vegetables. I am willing to purchase more for better source ingredients.
- I hope there will be a system to display a detailed map of this market. Within the map, it could show signature ingredients and today's new ingredients of all the stalls. Also, it would be better if I can buy at multiple stalls but only have to pay once when I leave the traditional market.

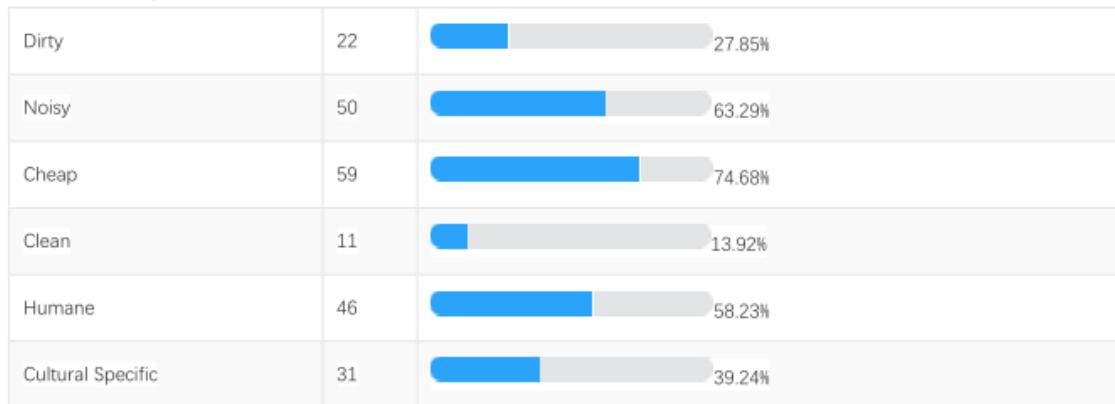
Appendix B

Research on user demand in traditional market

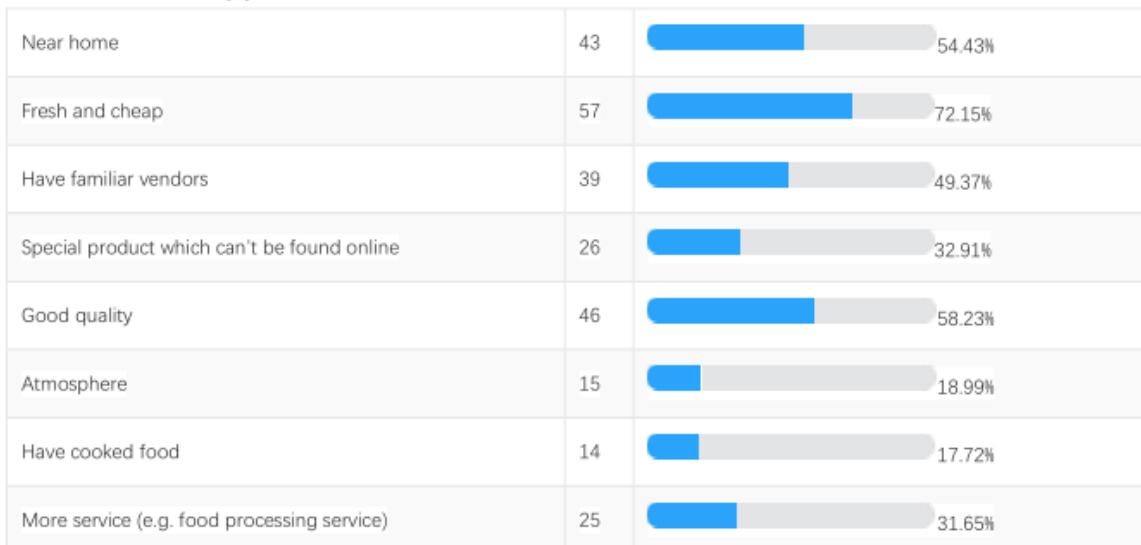
1. How often do you go to the traditional market?



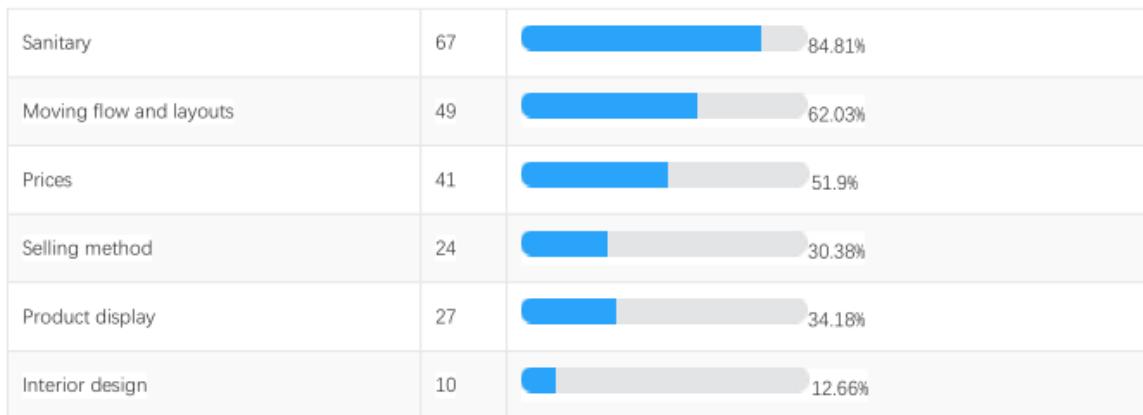
2. What is your impression of the traditional market?



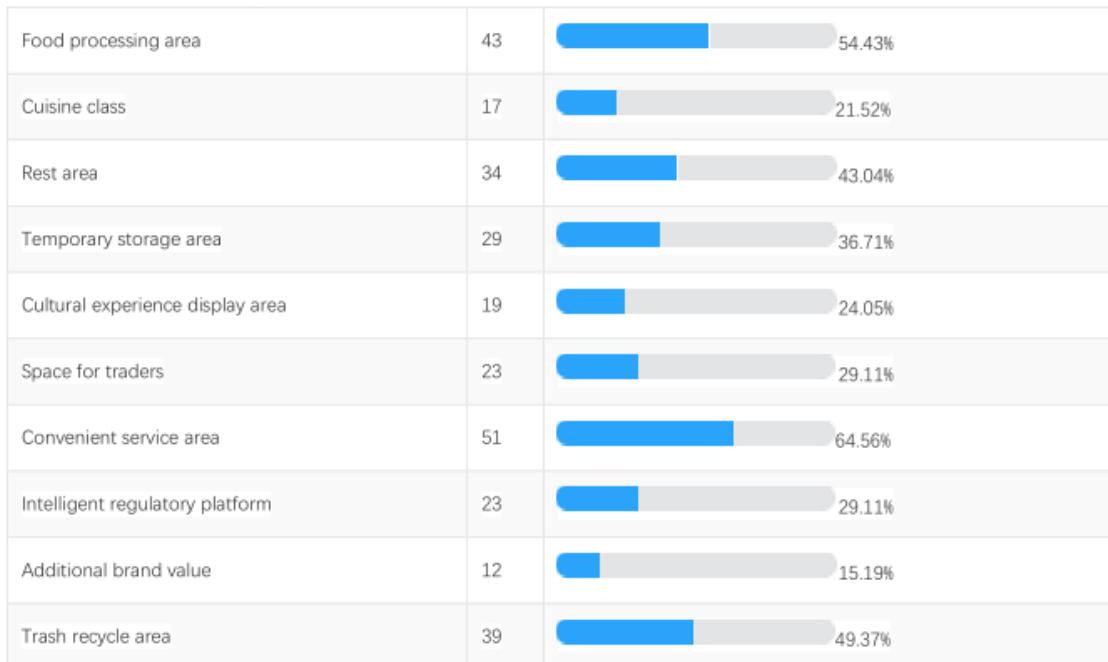
3. The reason why you choose traditional market?



4. What do you think should be changed in traditional market?



5. What function do you think can be added to the traditional market?



Appendix C- Raw data of Collaboration Promotion Scales

	participant1	participant2	participant3	participant4	participant5	participant6	participant7	participant8	participant9	participant10
I think I'd like to communicate with regular customers.	4	5	2	4	2	4	3	5	1	4
I have no impulse to communicate with regular customers.	2	1	3	1	1	3	2	2	5	2
I think it's easy to talk to regular customers.	3	5	2	4	2	4	2	5	1	4
I think I need more encouragement to talk to regular customers.	2	1	4	1	3	2	3	1	4	2
I think there is a friendly atmosphere among customers.	4	5	2	4	3	3	4	5	2	4
I would love to use this system frequently.	3	5	3	3	3	5	3	5	2	5
I think this system is very helpful to my shopping experience.	5	4	3	4	3	4	5	5	3	5
I encountered difficulties in using the system.	1	1	2	2	1	2	2	1	3	1

Appendix D- Observation

(The timestamp is timed from the start of the task)

Participant 1

4:20 The participant found a regular customer and he went up to ask the regular customer if he could take him to area A.

4:58 The participant arrived in area A. During the journey, the participant had some communication with the regular customer (the communication time was no more than 50% of the journey time)

4:59 The participant asked the regular customer if he could take him to the next area (their first three tags were in the same colour order)

5:32 The participant arrived at area B. During the journey, there was more communication with regular customers than in section A.

5:33 Participants asked whether the regular customer could take him to the next area.

6:46 The participant arrived in area C. During the journey, he had a little communication with the regular customer, and the level of communication was about the same as that in section A. After talking with the regular guest, then the participant began to look for another regular customer.

8:08 The participant found a regular customer. He came forward and asked the regular customer if he could take him to area D.

9:01 Participants arrived in area D and finished the task, talking about the same number of times as in section A.

Participant 2

5:03 The participant found a regular customer and he went up to ask the regular customer if he could take him to area A.

6:30 The participant arrived in area A. During the journey, the participant had some communication with the regular customer (the communication time was more than 70% of the journey time)

6:31 The participant asked the regular customer if he could take him to the next area (their first two tags were in the same colour order)

7:03 The participant arrived at area B. During the journey, the participant had some communication with the regular customer and the level of communication was about the same as that in section A. After the talk with the regular guest for some time, then the participant began to look for another regular customer.

8:11 The participant found a regular customer. He came forward and asked the regular customer if he could take him to area C.

9:25 The participant arrived in area C. During the journey, he had a little communication with the regular customer, and the level of communication was about the same as that in section A.

9:26 The participant asked the regular customer if he could take him to the next area.

10:01 Participants arrived in area D and finish the task, talking about the same number of times as in section A.

Participant 3

4:38 The participant found a regular customer, he just follow the regular customer without communication.

5:11 The participant arrived in area A.

5:12 The participant follow the customer to the next area

6:38: The participant arrived in area C.

7:46 The participant found a regular customer. he just follow the regular customer without communication.

8:33 The participant arrived at area B.

8:34 The participant follows the customer to the next area

9:33 The participant arrived in area D.

Participant 4

4:07 The participant found a regular customer and he went up to ask the regular customer if he could take him to area A.

4:56 The participant arrived in area A. During the journey, the participant had a lot of communication with the regular customer (the communication time was more than 70% of the journey time)

5:30 The participant found a regular customer. He came forward and asked the regular customer if he could take him to area B.

6:03 The participant arrived at area B. During the journey, the participant had some communication with the regular customer (the communication time was no more than 50% of the journey time). After talking with the regular guest, then the participant began to look for another regular customer.

6:31 The participant found a regular customer. He came forward and asked the regular customer if he could take him to area C.

7:57 The participant arrived in area C. During the journey, they barely any talking.

7:58 The participant asked the regular customer if he could take him to the next area.

9:02 Participants arrived in area D and finish the task. During the journey, they barely any talking.

Participant 5

4:23 The participant found a regular customer and she went up to ask the regular customer if he could take her to area A.

4:56 The participant arrived in area A. During the journey, the participant had some communication with the regular customer (the communication time was no more than 50% of the journey time)

4:57 The participant asked the regular customer if he could take her to the next area (their first two tags were in the same colour order)

5:28 The participant arrived at area B. During the journey, the participant had some communication with the regular customer and the level of communication was about the same as that in section A. After talking with the regular guest, then the participant began to look for another regular customer.

6:30 The participant found a regular customer. She came forward and asked the regular customer if he could take her to area C.

7:23 The participant arrived in area C. During the journey, he had a little communication with the regular customer(the communication time was no more than 50% of the journey time)

9:26 The participant asked the regular customer if he could take him to the next area.

9:57 Participants arrived in area D and finish the task, talking about the same number of times as in section C.

Participant 6

4:20 The participant found a regular customer, he just followed the regular customer without communication.

4:51 The participant arrived in area A.

4:51 The participant follows the customer to the next area

5:58 The participant arrived in area B.

6:32 The participant found a regular customer. he just followed the regular customer without communication.

8:02 The participant arrived at area C.

8:03 The participant follows the customer to the next area

9:02 The participant arrived in area D.

Participant 7

5:12 The participant found a regular customer and he went up to ask the regular customer if he could take him to area A.

6:40 The participant arrived in area A. During the journey, the participant basically did not talk with regular customers.

6:41 The participant asked the regular customer if he could take him to the next two areas (their first three tags were in the same colour but not in the same order)

7:13 The participant arrived at area B. During the journey, the participant basically did not talk with regular customers.

9:25 The participant arrived in area D. During the journey, the participant basically did not talk with regular customers.

9:26 The participant found a regular customer. He came forward and asked the regular customer if he could take him to area C.

10:01 Participants arrived in area C and finished the task, talking about the few times as in section A.

Participant 8

4:15 The participant found a regular customer and she went up to ask the regular customer if he could take her to area B.

5:01 The participant arrived in area B. During the journey, the participant basically did not talk with regular customers.

5:02 The participant asked the regular customer if he could take her to the next area (they have two tags in the same colour order)

5:52 The participant arrived at the area C. During the journey, the participant basically did not talk with regular customer. After little talking with the regular guest, then the participant began to look for another regular customer.

6:25 The participant found a regular customer. She came forward and asked the regular customer if he could take her to area A.

7:02 The participant arrived in area A. During the journey, the participant basically did not talk with regular customers.

7:04 The participant asked the regular customer if he could take her to the next area

8:01 Participants arrived in area D and finished the task, talking about the same number of times as in section A.

Participant 9

4:17 The participant found a regular customer and she went up to ask the regular customer if he could take her to area B.

4:58 The participant arrived in area B. During the journey, the participant had some communication with the regular customer (the communication time was around 50% of the journey time)

4:59 The participant asked the regular customer if he could take her to the next area (they have two tags in the same colour order)

5:52 The participant arrived at area C. During the journey, there was more communication with regular customers than in section B. After talking with the regular guest, then the participant began to look for another regular customer.

6:23 The participant found a regular customer. She came forward and asked the regular customer if he could take her to area A.

7:02 The participant arrived in area A. During the journey, she had a little communication with the regular customer, and the level of communication was about less than that in section A.

7:03 The participant asked the regular customer if he could take her to the next area

9:01 Participants arrived in area D and finished the task, talking about the same number of times as in section A.

Participant 10

5:03 The participant found a regular customer, he just followed the regular customer without communication.

5:49 The participant arrived in area C.

5:50 The participant follows the customer to the next area

6:48 The participant arrived in area D.

7:59 The participant found a regular customer. he just followed the regular customer without communication.

8:40 The participant arrived at area B.

8:41 The participant follows the customer to the next area

9:13 The participant arrived in area A.

Appendix E - Interview Excerpt

The interviews are all in Chinese. After translation, we will try our best to retain the original meaning in the process of translation, but there may still be some unintentional misrepresentation. Please understand.

Q: What motivates you to chat up regular customers?

"Sometimes customers will stop while they are shopping, and if I wait for them silently they will waste my time."

"I think it takes less time and more direct to ask regular customers to lead the way than to follow silently."

"It was a little strange to keep a distance and follow him all the time, and it was even more inappropriate to get too close to him without talking to him, so I thought I might as well explain my situation directly to him."

"I think it is very impolite to follow others silently"

"I thought I might come back in the future, so I thought I could get some information about the vegetable market or help from regular customers by chatting. "

"I want to learn how to bargain from regular customers."

"I have been told by my family that I can't pick things when shopping, but I really won't. I think regular customers should know a little bit of this. So talk to them and learn. "

Q: Why didn't you talk to regular customers?

"I don't think it's necessary, because you can accomplish a task without talking."

"I'm not used to communicating with strangers because you don't know what kind of persons they are."

"Because I don't even know him, I don't know what hobbies he has. I don't know how to find a topic. It's so embarrassing."

"I'm not a sociable person, and I think now is good."

Q:What do you think of being disturbed by new customers in the shopping process?

"I think it's all right. I may be disturbed sometimes and spend extra time showing them the way, but I think it's all right on the whole. Because when I take the test, the new customer just follows me silently, so I don't think this kind of new customer accosting will always happen."

"The interference does exist, because sometimes you don't necessarily buy it in that place, you need to compare, and it's troublesome to take care of new customers at this time."

"I don't think so, because most of the time I go shopping after work. I have to hurry and go back to cooking. It's too troublesome for someone to lead the way at this time. I hope he won't come up and talk to me and disturb me."

"It's not bad, anyway, shopping is a leisure process for me, and it's nice for someone to talk to me."

Q:Do you have any difficulties in using the system?

Q:What do you think our system can improve?

"I think everything is fine, but it is too difficult to find regular customers. The market is so big and there are so few regular customers"

"I may be old, I'm not very good at operating that tablet. I hope if there is a manual, or that a tablet system can be a little easier, it will be better."

"The black basket is so hard to find that it is not conspicuous at all"

"The colour tag is a little small, to be honest."

"And the colour tags in such a row are so dazzling that they can easily be confused with the surrounding environment."

"It would be better to have baskets of different colours like this, but I prefer bags"

"The bag is convenient to carry."

"I like baskets. If there is more space in the basket, things will not be crushed so easily."

"Sometimes the regular customer is walking too slow for me to keep up with, but this doesn't seem to be easy to promote lol."