A customized delivery service platform to meet the users' needs from different restaurant

Yu-Shuo Fan [a,1], Ming-Chuan CHIU [a]
[a] *Department of Industrial Engineering and Engineering Management, National Tsing Hua University, Taiwan*

Abstract. In today's business model, many restaurants provide their own delivery service. But sometimes, some restaurants that consumers want to order don't provide delivery due to the cost issue. Or maybe, customers want to eat A restaurant's food and drink B restaurant's drink. In the existing restaurant delivery model, the above consumer behavior is hard to be met. In addition, we often use vehicles to transport between the two places and the traffic routes may be overlapped with the meal delivery routes. This also means that the value of the food delivery the customer needs can be met by the vehicle owner. Method of modern internet based technology can help to connect vehicles owners and customer. An Integrated databased model will help to collect information and integrate orders from different restaurants. This paper will develop a platform for customers and vehicle owners, the customer can enjoy the delivery service and get the products from different restaurant; the vehicle owner can earn some extra income.

Keywords. Platform Economy, Sharing economy, Ridesharing

1. Introduction

Platform Economy is an internet technology based business strategy, it provides service to connect customers and seller by a product, a task, or any valuable goods or activities. The Platform allows customers directly interact with sellers, thus, the cost of transactions can be reduced. Customers can sellers can access to the functions of the platform anytime and anytime as long as they have the internet. The platforms are divided into four types due to their difference between key functions. Innovation platforms are the platforms which developer can offer service or product of business solution, such as Oracle, Windows. Transaction platforms allow sellers and buyers to match and complete transaction activities. Integration platforms provide both innovation and transaction function such as Google, Facebook. Investment platforms provide invest function or other financial service. Platform economy has been a successful business model which can revolute the industry. The influence should not be underestimated. In this paper, a transaction platform will be established to connect between customer who need to order products from different restaurants in an order and the vehicle owner whose traveling route has overlapped with the food delivery route. The users can both satisfy the need.

[1] Corresponding Author: andy1204andy1204@gmail.com

Sharing economy often used to describe economic activity involving online transactions. Originally growing out of the open-source community to refer to peer-to-peer based sharing of access to goods and services . [1] The sharing economy has gained popularity in recent years and the success of Uber, Airbnb and other cases are widely known. Sharing economy is based on the development of platform economy. A platform plays a key role in the sharing economy, sharing economy needs a platform that built by a third-party, the internet information sharing techniques are used to collect, storage and sharing the information of the market. People use the platform to exchange goods with low utilization, or share some service or knowledge, experiences. In sharing economy system, the value of usage is emphasized, the transaction activities are also based on the transfer of the right of usage. Figure 1 [2] shows the basic relationship between service/ product provider, user and platform. Service/ product provider provides service/ product on the platform, the user also get access on the service/ product on the platform. Transaction costs can be transparent and low-cost transfer through the platform. This paper will apply the concept of sharing economy. The vehicles supplier can offer their service by their low usage space on vehicle to carry the products from different restaurant ordered by the customer. The vehicle suppliers can share the value of traveling from site A to site B. Originally, there was no added value in the movement between the two places. Through the establishment of the platform, the vehicles supplier can create value through transportation behavior and share with customers.

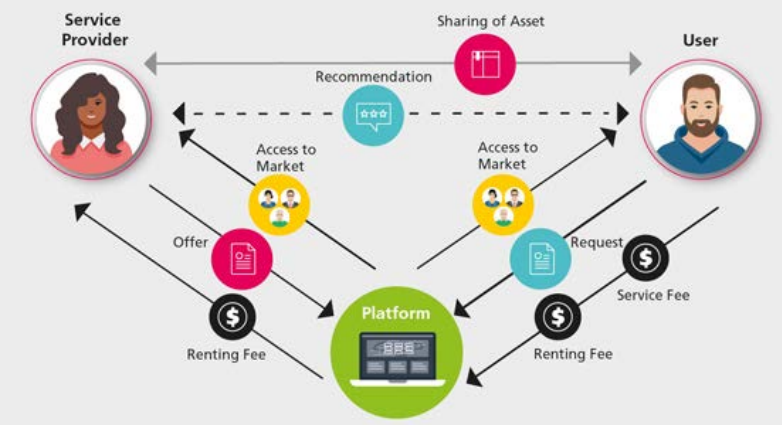


Figure 1. Relationship in sharing economy

Ridesharing is a traffic behavior model related to sharing economy. Passengers sharing their vehicles because they have the same destination or on the same way. The behavior is defined as peer-to-peer ridesharing precisely. The applications of ridesharing are also highly relying on the Internet techniques due to the information transfer issue. The vehicle owner provides seats which are not be utilized to the passenger. They can share the travel, the passenger can get to the destination by lower cost, and the driver can get some earnings from the passenger. In this paper, a platform will be developed and vehicle supplier can carry the product to the customer during his transportation.

The platform developed by this paper is expected to satisfy the voice of customer in the “Potential Demand” level. Discovering potential needs is not only can stimulate innovative ideas, but also can develop some considerable business opportunities. The

benefit of the vehicle suppliers come from the percentage of commission or charging usage fee on every order.

2. Literature review

This section will review the literature and some cases related to the topic.

2.1. Platform Economy

Nowadays, we can see many successful stories in platform economy. Kenney Martin and Zysman John [3] have discuss the rising of platform economy and how the application of modern techniques will change the structure of the economy. They divided platforms into several types: Foundational platform: Provide infrastructure and tools, such as google, apple. Platforms that make digital tools available online and support the creation of other platforms and market places. Retail Platforms: the key functions of the platform are retailing and transaction, such as eBay, and Service-providing platforms which connect service providers and service users. They said that the platforms can rest the entry barriers and may cause the revolution of existing organization or economy activities.

2.2. Sharing economy and ridesharing

Many papers have discussed about sharing economy. G Zervas, D Proserpio, and JW Byers [4] have talked about the successful of Airbnb and how it impacts the hotel industry." *In Austin, where Airbnb supply is highest, the causal impact on hotel revenue is in the 8%–10% range*" Besides to the impact of different location, they also talk about the impact of different price hotel, and the low-priced hotels with fewer business travelers are more affect by Airbnb. There is a similar concept, crowdsourcing, which are rottenly compared with sharing economy. Araz Taeihagh [5] has discussed about similarities and differences between crowdsourcing and sharing economy. There are four differences between crowdsourcing and sharing economy listed by Araz Taeihagh. They are accessibility, anonymity and reputation systems, crowd magnitude and nature of the crowd. Juho Hamari, Mimmi jöklint, and Antti Ukkonen [6] have discussed about people issue, why people are willing to participate in the sharing economy ecosystem. They separated the people by their gender and age, the key factors which influence people to join in sharing economy are defined as sustainability, enjoyment, reputation and economic benefits, and find out the attitude to the factors and their behavior intention.

Uber is one of the most famous sharing economy platform and has been the most success case in ridesharing. Uber has changed the traffic industries a lot, so it has been referred to as Uberisation. Uberisation is a term to describe that a company has concepts that can be used to improve the whole industries and cause a magnificent change. Judd Crame and Alan B. Krueger [7] have talked about the case of Uber, which cause disruptive change in the taxi business. They mentioned four key factors that cause the Uber's success and the drivers tend to choose Uber rather than taxi: 1. Uber's more

efficient driver-passenger matching technology 2. The larger scale of Uber than taxi companies 3. Inefficient taxi regulations. 4. Uber's flexible labor supply model and surge pricing more closely match supply with demand throughout the day.

3. Methodology

In this section, the existent issues will be found out by 5W1H method, and the possible solutions will be found out by a business process reengineering (BPR) tool – value stream mapping(VSM). In VSM part, as-is model and to-be model have been drawn and the analysis has been done. After BPR analysis, this paper simulated the as-is model and to-be model by Analygic. Finally, the website's detailed functions will be introduced. The whole processes in this section are shown as Figure 2 below.

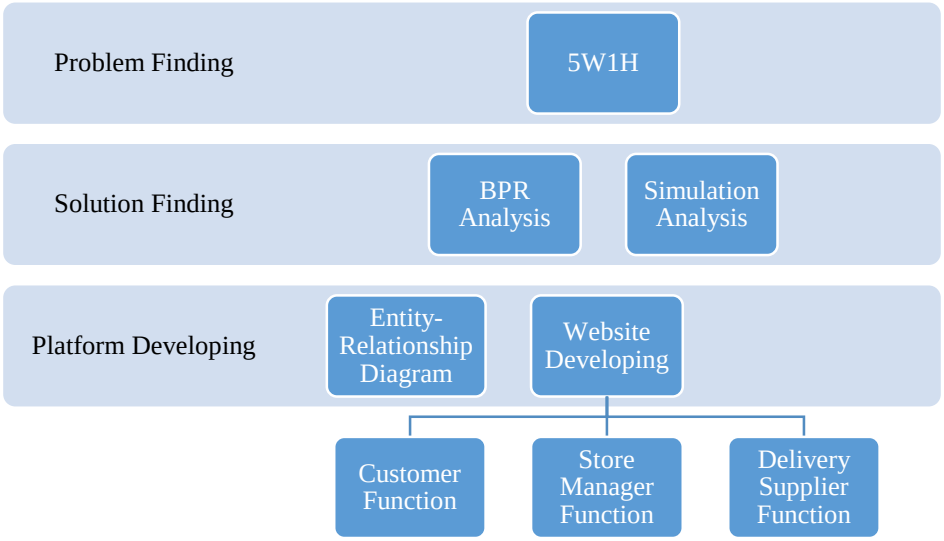


Figure 2. Process of problem solving part

3.1. Problem Finding

5W1H method, also known as Five Ws and one H method is a method to help people to sort out the information related to the issue, and 5W1H method is also a good way to start a project due to the fact that it guides people from a different point of view the phenomenon of one thing. This paper separated the existent issue into "What is the existent issue?" " Where does the issue happen?" "When does the issue happen?" "Who is involve in the issue?" "Why does the issue happen?" and "How to solve the issue?" The results of the 5W1H method are show as Figure 3 below.

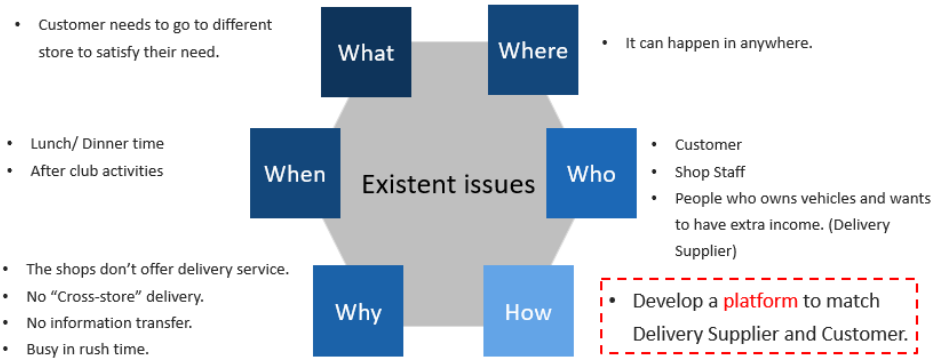


Figure 3. The results of 5W1H method.

3.2. Solution Finding

3.2.1. BPR Analysis

The Value Stream Mapping is a visualization tool used to describe material and information flow within the process from customer to the end of the business process. All the actions in a business process will be shown in a VSM diagram, so it is more easy to find out the problems. All actions will be divided into value added activities and non-value added activities in a VSM diagram, and then we can focus on the nonvalue added activities and find out where to be improved. After we list the problems that we found in the as-is VSM diagram, we can start to brainstorm the possible solutions of the problems and draw the to-be model again. The as-is VSM is shown as Figure 4 below.

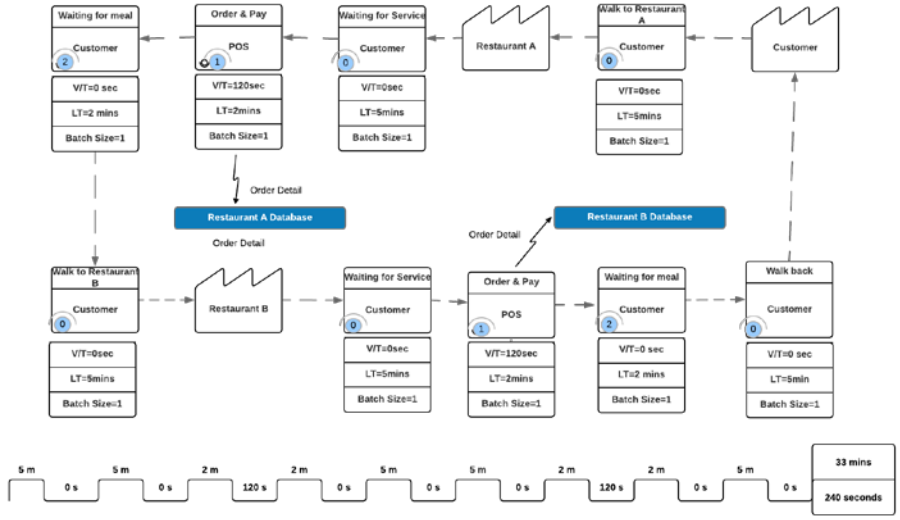


Figure 4. The as-is VSM diagram.

After drawing as-is VSM diagram, we found some problems in the business process.1. Customers spent a lot of time traveling, 33 minutes totally. 2.Customers have to go to different store to buy different product. 3. Need Waiting time. 4. Can't integrate order information from a customer in the existent model. 5. Low Activities ratio. (12.1%) After finding the problems, we listed some possible solutions to each problem which are listed in Table 1. Then, we finished the to-be VSM diagram is shown as Figure 5 below. The comparison between as-is VSM and to-be VSM are listed in Table 2 below.

Table1. The problems found in as-is VSM and the possible solution

ID	Problems	Possible Solutions
1	Long time for traveling.	Deliver products to customer.
2	Customers have to go to different store to buy different product.	Integrate different product from different stores in an order.
3	Need Waiting time.	Deliver products to customer.
4	Can't integrate order information from a customer.	Create a centralized DB.
5	Low Activities ratio.	Transfer customer's traveling activities to delivery supplier.
6 (New)	Centralized DB Confidentiality issues.	Permissions management.

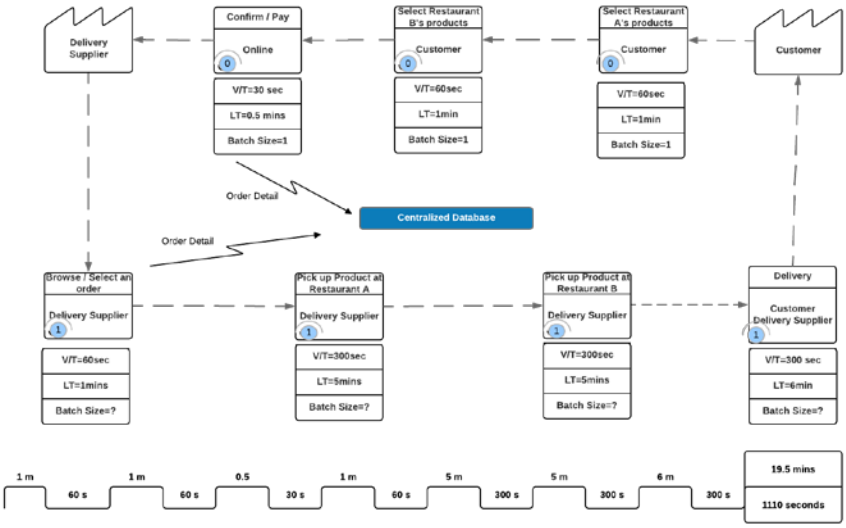


Figure 5. The to-be VSM diagram.

Table2. The VSM comparison

	AS-IS	**TO-BE**
Total Lead Time	33 minutes	19.5 minutes
Activities Ratio	12.1%	94.9%
Information Integration	No	Yes
Order (from different store) Integration	No	Yes
Value creation for vehicle owners	No	Yes
Batch Size	1	≥1 (if on drivers way)

3.2.2. Simulation Analysis

Anylogic is a simulation software. When a problem occurs in real life, although we have some possible and feasible solutions but we cannot acclaim whether the solutions are good to have a positive results or not. In this section, as-is and to-be model will be built to verify the feasibility of the solution through Anylogic simulation. In order to check if the solution will benefit the customers and delivery supplier in the system, the satisfaction of the customers will be take into consideration. The as-is Anylogic simulation model is shown in Figure 6 and Figure 7.

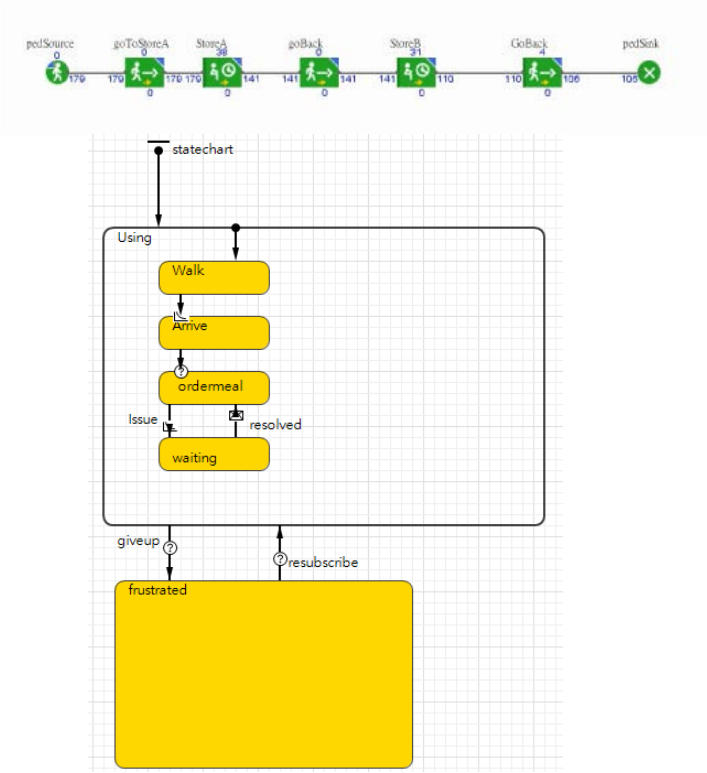
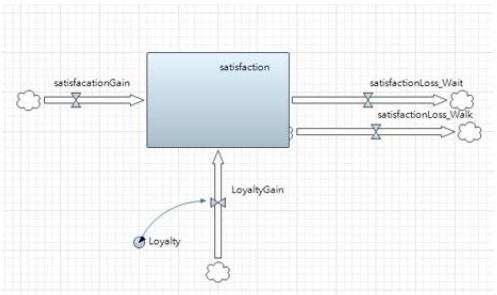


Figure 6. The as-is Anylogic flow model.
(Top: general process. Down: State of process.)



State	Satisfaction
Walk	-1.5
Arrive	+1
Order meal	0
Wait	-1
Not Frustrated	Loyalty

Figure 7. The as-is Anylogic satisfaction model.

We simulated the situation that customers traveled to two different stores to buy different products. Figure 6 shows the whole process that a customer will experience in as-is model. The customer will have different state and cause different emotions that lead to different satisfaction increase or decrease results. The satisfaction simulation mechanism is shown in Figure7. The customers' satisfaction will increase when arrive at the store and decrease when walking and waiting. If the customer is not in frustrated, he will gain royalty and accumulate to improve satisfaction. We found that unsatisfied customers will more than 50% after 15 minute, which is shown in Figure 8.

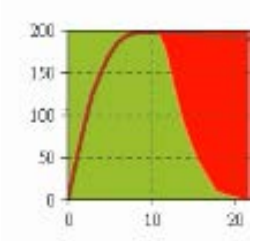


Figure 8. The as-is Anylogic satisfaction result.
Red= Ratio of unsatisfied customer. Green= Ratio of satisfied customer

Then, a to-be model has been simulated. The customer only need to spent 2.5 minutes to complete an order from different restaurant using the platform, and enjoy their time to wait for the delivery service. The process of customers in to-be model is shown as Figure 9 in below.

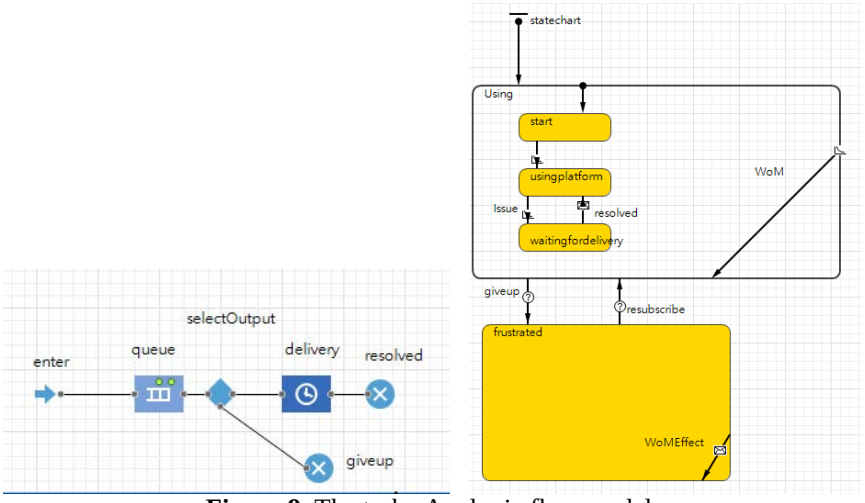
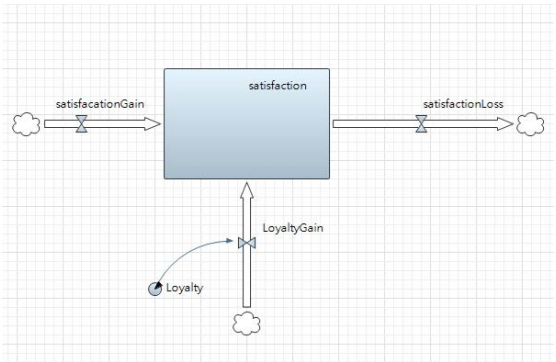


Figure 9. The to-be Anylogic flow model.
(Left: general process. Right: State of process.)

In to-be model customers only have to enter the system and wait for delivery, we supposed that the drivers are less than the customer, so a customer segment has to be imported. We aimed the main users of the platform are high-tech user or young people. Therefore, some customers will be given up. As same as as-is model, a satisfaction model has been built as Figure 10 and we assumed that user will gain satisfaction when using platform and decrease satisfaction when waiting for delivery. Also, loyalty has been considered and we supposed that people will increase satisfaction during the good user experience in the platform and the effect of reputation will also increase the satisfaction. The simulation result is shown in Figure 11. We can observe that the satisfaction will higher than 90% in the long run.



State	Satisfaction
Using Platform	+1.5
Wait for Delivery	-0.5
Not Frustrated	Loyalty
WoM	+3

Figure 10. The to-be Anylogic satisfaction model.

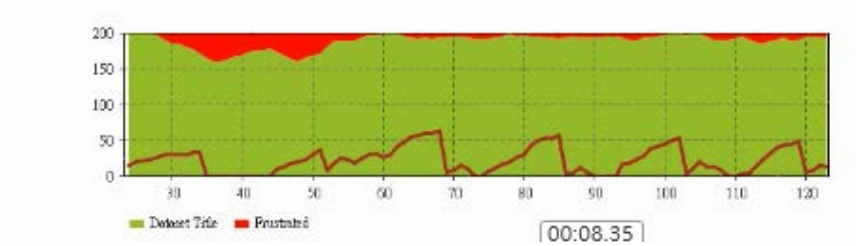


Figure 11. The to-be Anylogic satisfaction result.
Red= Ratio of unsatisfied customer. Green= Ratio of satisfied customer

3.3. Platform Developing

After proving that the platform can create benefits and be feasible, we developed the platform. In this section, an Entity-Relationship Diagram (ERD) and functions of the platform will be introduced.

3.3.1. Entity-Relationship Diagram

The collection, storage and transfer are the important issue in a platform. Entity-Relationship Diagram (ERD) can clearly present the relationship between the various information in the database. As this paper needs to integrate the order information from different restaurants into a single order, so an centralized base data base has to be constructed, and the permission has to be set up due to the privacy issue across the stores. The ERD is shown as Figure 12 below.

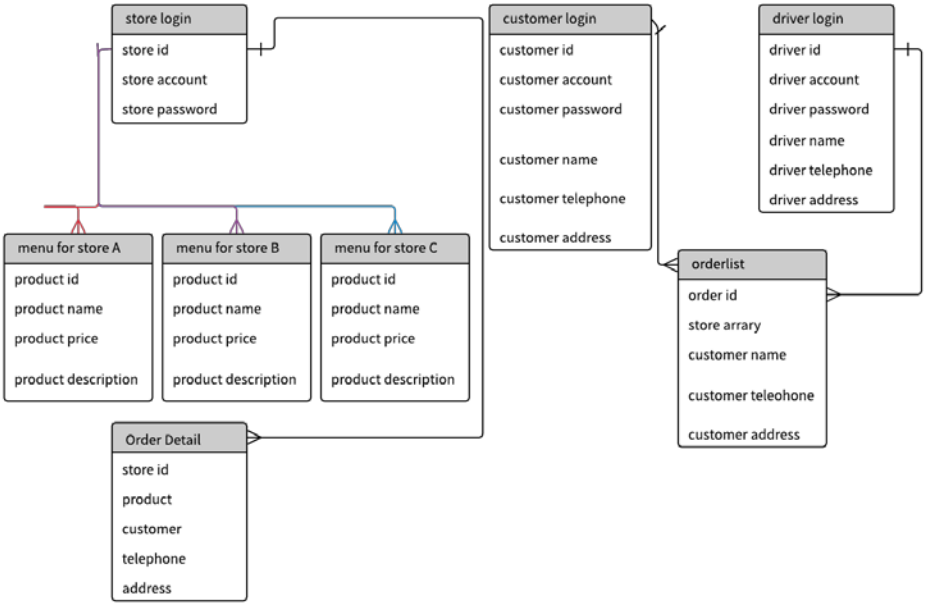


Figure 12. The ERD of the platform

3.3.2. Website Developing

The platform URL: http://140.114.54.94/group3/106034541_finalproject/

3.3.2.1. Customer Function

To start the shopping function, a customer need to sign up in advance, and after they finishing their register, the customer data will fill in database, and then the customer can login. The demonstration pictures are shown as Figure 13 and Figure 14.

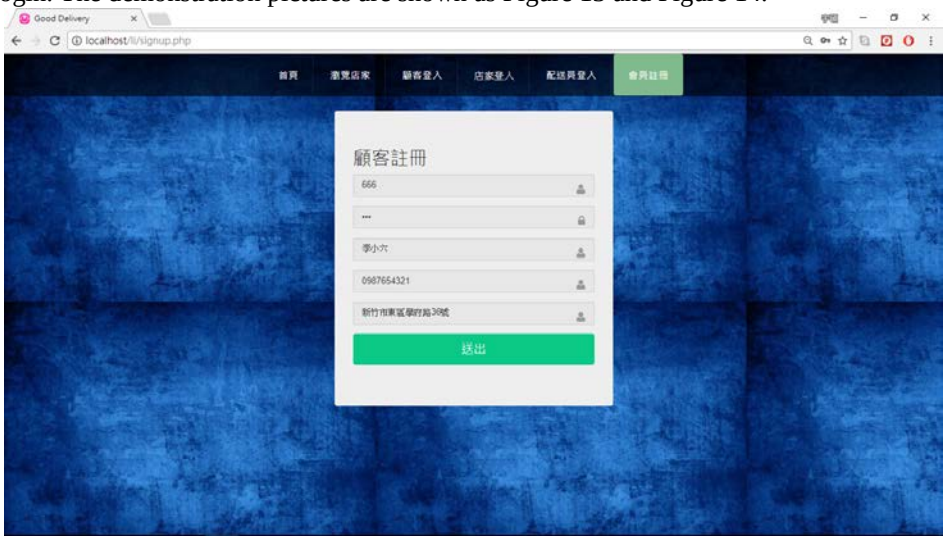


Figure 13. The sign up page

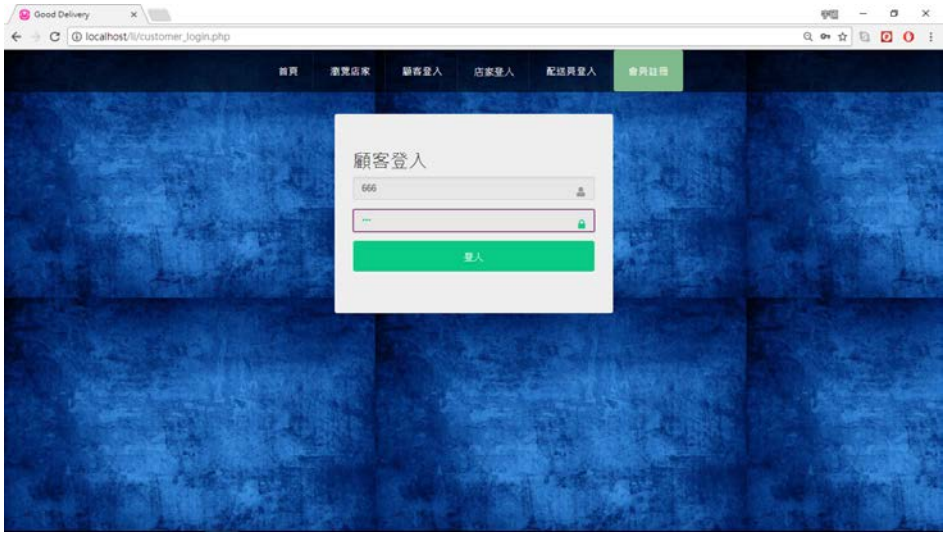


Figure 14. The login page

After login, the customer can select the first restaurant that he will like to order, as Figure 15, and he can add some products into his shopping cart, as Figure 16.

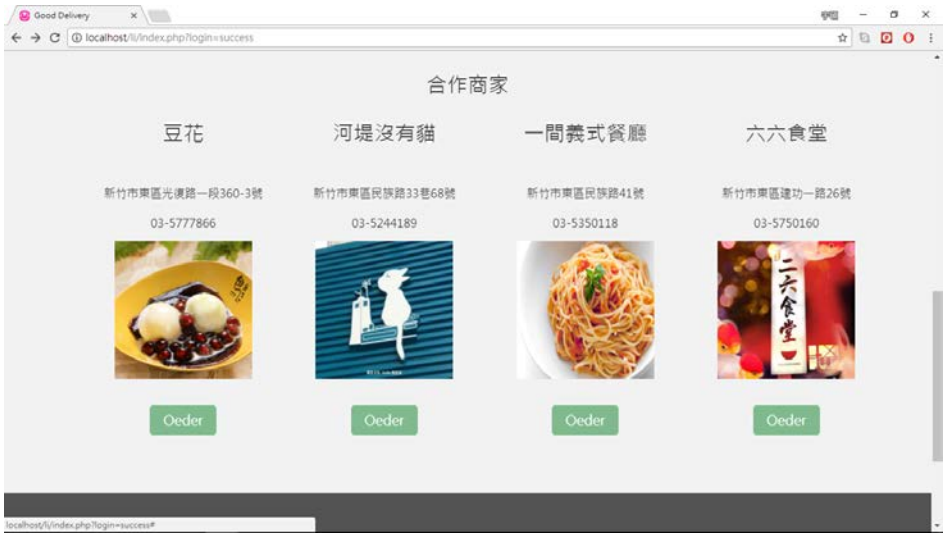


Figure 15. Select the restaurant.

Figure 16. Add the products into shopping cart.

After adding the products from first store, the customer can choose another restaurant and repeat the process, the products from different restaurants will be collect in one shopping cart as Figure 17. The customer can choose to browse more products or confirm and pay in the shopping cart page. After payment, the order details will transfer into database.

Figure 17. Plenty of products from different stores are added into the shopping cart.

3.3.2.2. Store Manager Function

When the cooperative stores sign contract with this platform, this platform will charge some fee and give the password. After several orders are established, the store manager can login to check the order of his store and start to prepare the products. The store manager cannot view the order detail from other stores although the data are storage in the same database, as Figure 18.

Figure 18. The orders of the store “cat”.

3.3.2.3. Delivery Supplier Function

As same as the customer, the vehicle owners have to sign up to start the delivery service, as Figure 19. After registering, the vehicle owners can login and start to use the platform, as Figure 20.

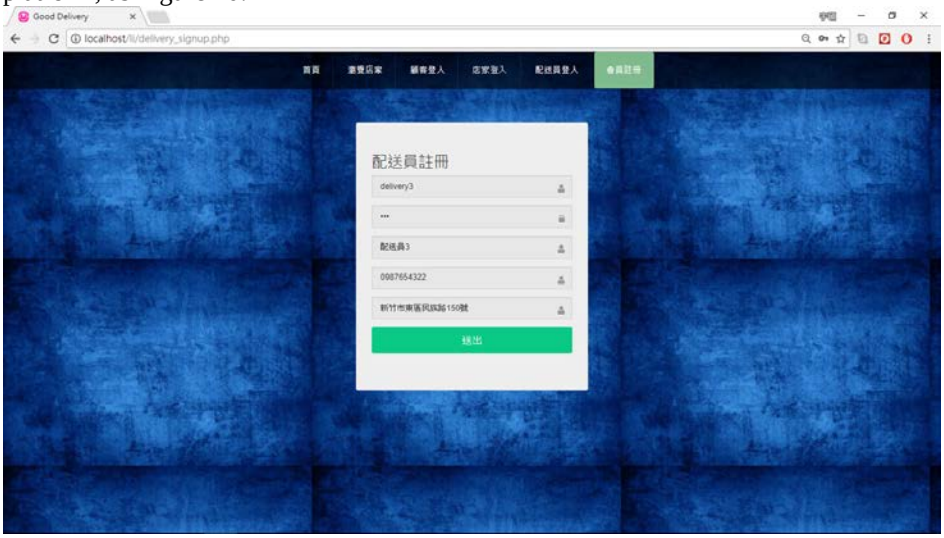


Figure 19. The delivery supplier's sign up page

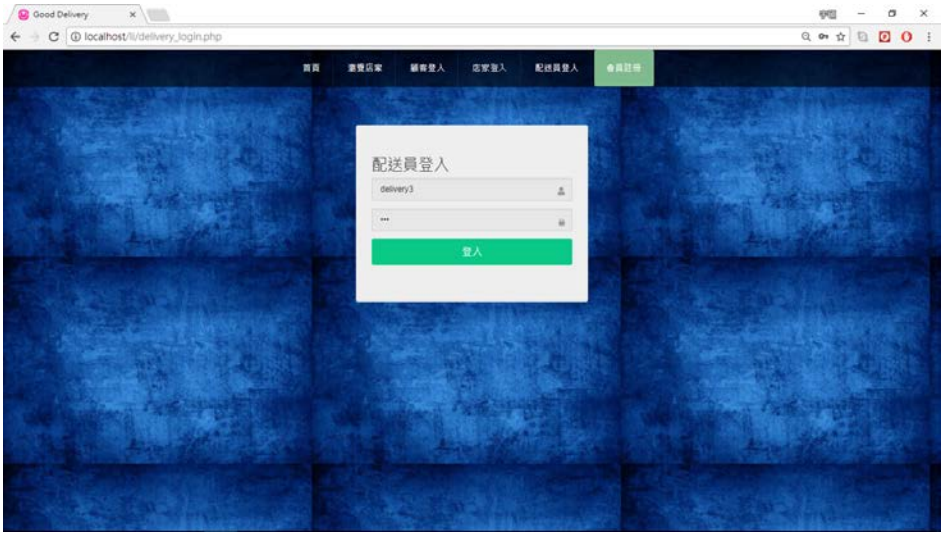


Figure 20. The delivery supplier's login page

After login, the delivery supplier can view how many orders are waiting for delivery, as Figure 21, and the delivery supplier can decide to take the order depends on his plan of traveling. If the route has the same or similar destination, the delivery supplier can take the order.

Figure 21. The delivery supplier's taking order page

After taking the order, the information of the order will automatically fill up in the blank. The delivery supplier can view the route planning and the estimated delivery time in this page, as Figure 22. After confirming the delivery, the database will update and the orders waiting for delivery will change, as Figure 23.(The order 3 in Figure 21 has been delivered.)

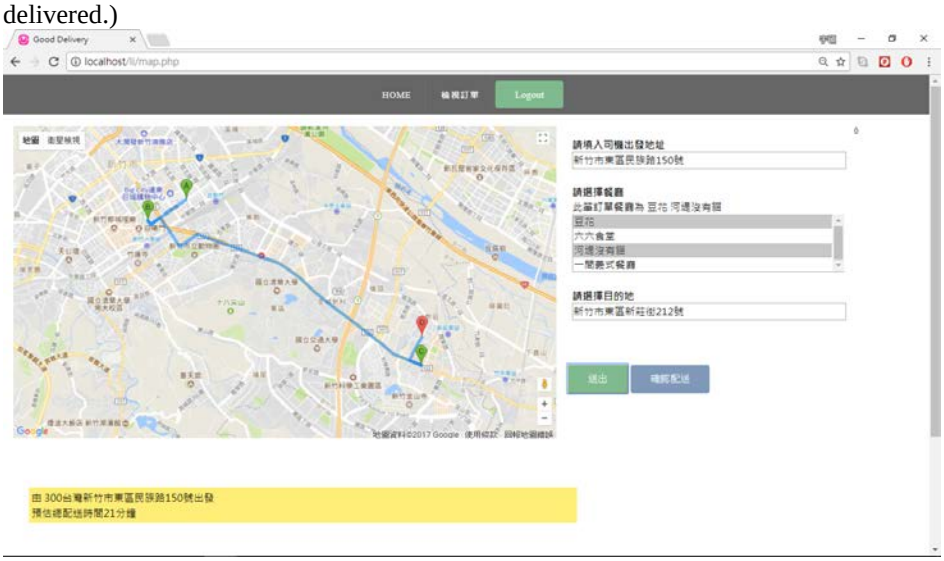


Figure 22. The delivery information page.

Figure 21. The delivery supplier's taking order page after the delivery supplier's delivered.

4. Conclusions

This platform can make a significant contribution to the delivery industry and food business. We often want to enjoy a snack or a drink after a meal, or we cannot be served in one restaurant. With this platform, the potential needs of customers can be met, customers can easily enjoy meals from different restaurants with only a movement of fingers. After customers get better service, they will increase satisfaction, and also increase the platform usage rate. The shop owners can also gain earnings because of joining the platform and get more business opportunities. For vehicle owners, they can get the chance to get extra income due to providing the delivery service. After all, the new business model provided by this paper can benefit those who participate in this system.

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