INNOVATIVE SCHEME RESEARCH OF SHIMEN CITRUS' LIFE CYCLE BASED ON PRODUCT-SERVICE DESIGN THINKING

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ABSTRACT

Shimen County is famous for its citrus, but Shimen citrus is deadly unmarketable. Many research teams and government departments are trying new models of agricultural production and sales. They hope to find new ideas which fit Shimen' s conditions for agricultural development. The article tries to use sustainable product-service system design thinking to solve the problem.

Product-service system design (S. PSSD) considers the sustainability of an industry from the three dimensions of economy, society and environment. It attaches importance to the whole life cycle of the product.The article uses blueprint to analyse each step of Shimen citrus' life cycle first. Then the article uses service design method such as SWOT and Cluster to help with the design process.

Key Words: Shimen; citrus; life cycle; service

1. AGRICULTURAL DEVELOPMENT IN SHIMEN

Shimen is famous for its citrus, and citrus is the main source of income for residents of Shimen. However, because of the unsalable products,the income of residents in Shimen County is not high, and the income of some farmers is even difficult to maintain the simple processing of citrus.

2. PRODUCT-SERVICE DESIGN THINKING(PSDT)

Sustainable product-service design considers the sustainability of the industry's development from three dimensions of economy, society and environment. Product-service design includes product design and service design.The article will use Blueprint to analyze the life cycle of Shimen citrus,and use service design tool such as SWOT and Cluster to find solutions of the system.

3.CASE STUDY OF SHIMEN CITRUS

3.1 Product life cycle thinking

The article uses blueprint to analyze each step of Shime citrus life cycle from multi-dimensions[Figure 1] .

Value Chain of Agriculture	Prodution	Package	Storage	Transportation	Wholesale	Retailing	Consumption
Activity	Insecticide; Fertilization; Pick	Package	Storage	Transportation	Wholesale	Sell	Purchase
Key Stakeholder	-Famer -Pesticide Provider -Seed Provider -Worker	-Famer -Worker	-Farmer -Management -Government	-Farmer -Driver	-Wholesaler -Retailer -Costomer	-Retailer -Costomer	-Costomer
Touchpoints	**-Over-production** -Waste of water -Pollution of pesticide -High labor cost **-Non-differentiated fruit** -Yield lost during harvesting	-Plastic bag -Waste of package	-Warehouse -Yield lost during storage **-Waste of unsold fruits**	-High Transportation cost -Yield cost during transportation	-Over production -Waste of unsold fruit	-Fake product -BI-packaging -Waste of package -Waste of unsold fruits	-Waste of uneatn fruit -Waste of orange peel
Opportunity	**-Shared Machine** **-Shared information about market** **-Different types of orange**		**-subsidiary products** **-Making Fertilizer** -Shared warehouse (Maybe Provide by government or wholesale)	-Shared transport cars or trucks		-Farm tour **-Lucky Draw** **-QR code** -Extra info -Tutorial	-Tell Customer information how to saving

[Figure 1] use blueprint to analyze product life cycle

Production Problems are as follows: 1. Overproduction of citrus. 2. Waste of water. 3. Water, soil and crop pollution caused by insecticides. 4. High labor costs. 5. Single species. 6. Soil erosion. 7. High production costs . 8. Lack of resources in the same off-farming period. There are some possible solutions:1. Share production and processing machines to reduce the cost of machine and improve machine efficiency. 2. Find new ways to quickly share market information. 3. Plant different types of orange. It can improve the overall competitiveness of citrus.

Package The plastic bags used in the waxing and packaging process of orange products bring environmental pollution. But for the preservation of fresh fruit, bagging is an essential operation. After bagging, the carbon dioxide generated by the breathing increases,and the oxygen is reduced.So the aerobic respiration is gradually suppressed.

Storage The biggest loss in this part is the waste caused by the unsold fresh fruit, and the damage caused by improper storage conditions. The best way to solve it is to process some fresh fruits into subsidiary agricultural products such as canned food and dried fruit which can be easily preserved and transported. The rotten fruit can easily affect the quality of other fresh fruits. The best solution is to process the rotten fruit into fertilizers. In order to provide better storage conditions and to ensure scientific and efficient storage conditions at low cost, the government or contractor could provide a shared warehouse to store the fresh fruit in a unified standard.

Transportation The transportation costs of cold chain during transportation, as well as the high transportation costs including travel expenses, toll fees, and truck rental fees, keep transportation costs at a high degree. The shared transportation method that has been influential in the past years may reduce transportation costs in a way .

Wholesale In the traditional sales process, fresh fruit is delivered to the fruit wholesale markets in other places . Local fruit wholesalers, retailers and a small number of customers will go to the fruit wholesale market to buy fresh fruit. The losses are mainly caused by the damage caused by the terrible preservation of fresh fruit and the waste caused by the unsold fresh fruit.

Retailing Small-scale fruit shops sell fresh fruit to the fruit wholesale market ,and then sell it to customers, or other retailers. Customers often need to identify whether the Shimen citrus sold in the fruit shop is really produced in Shimen, or whether it is of high quality. Some fruit shops may repack the fresh fruit to have a better appear-

ance,and bring waste and pollution. But the main is the waste of unsold fresh fruit.The system considers selling fresh fruit locally through agricultural tourism, and solve the problem of storage and waste of fresh fruit. In addition, the fruits will be packaged with QR codes in the primary plantation. It provides a platform for information and feedback.

Consumption Rotten fruits and peels bring much waste. The system will take into account the preservation and peel reuse information after the fruit is sold.

3.2 Service design thinking

3.2.1 Analyze based on SWOT

Strengths are sweet taste and low retail price.

Weaknesses are limited sales channels, single planting structure, lack of money for advanced processing equipment,high transportation cost, lack of product diversity,lack of brand, outdated processing technology, and limited market information.

Opportunity is subsidiary products.

Threats are as follows: 1. Many other inferior fruits on the market are sold as Shimen Citrus, which damages the reputation of Shimen Citrus. 2. The same harvest season of the same species leads to the fierce competition between farmers. 3. Labour and transportation costs are rising. 4. Inflation will influence the fruit market. 5. Export policies limit exports.

3.2.2 Analyze based on Cluster

The problems are mainly concentrated on production, package, storage,transportation and platforms.The article uses the Cluster method to classify all the key points found in SWOT into production, package, storage,transportation and platform. Then gather the similar points and get a new point. The members of the research team then score each point to determine the priority.

Production 1. Plant different types of oranges to reduce the competition between farmers. 2. Produce different types of subsidiary agricultural products to reduce overproduction, and create more employment opportunities. 3. Make rotten fruit into fertilizer to reduce waste. 4. Use shared machines and unify production standards to improve production efficiency. 5. Promote the development of tourism in Shimen through agricultural tourism,which drives the local diversified production and enhance the interaction between producers and consumers.

Packaging 1. Found the brand of Shimen Citrus and enhance the competitiveness in the domestic and foreign markets. 2. Apply QR code to the orange product as an electronic ID card. Customers can query information of the orange product.And it can carry additional information like the story of the Orangery, fresh-keeping coups, do-it-yourself(DIY) tutorials, etc., bringing added value to the orange products. 3. Use recyclable package.Use environmental friendly materials, or the package that can be formed into other tools to bring secondary use value. 4. Sell mixed fruit boxes to guide consumers to buy a variety of orange products. And consumers' feedback on different orange products can guide farmers to adjust the production scale of Shimen Citrus.

Storage and transportation 1. Use a shared warehouse to reduce storage costs. 2. Shared traffic like UBER can reduce transportation costs. 3. Unify distribution, unify management, and unify transportation. 3.Establish an online mall to retail the Shimen orange products. to reduces the middlemen in the retail process.And the online mall is also an information platform for feedback.

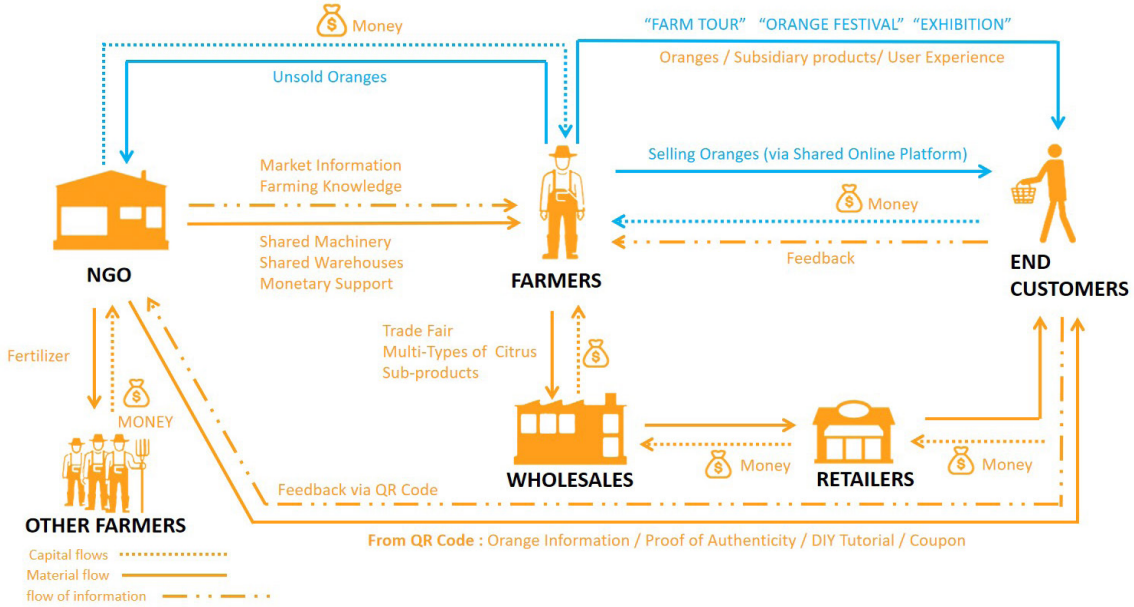
4. INNOVATIVE DESIGN OF SHIMEN CITRUS PRODUCT SERVICE SYSTEM

The new system takes System Map from PSDT as the logical base.It improves the value chain of Shimen citrus by adding sales channels and increasing the diversity of orange products.

4.1 Increase sales channels[Figure 2]

Usually, wholesalers from other places seek local agents to purchase fresh fruit, and then transport to designated markets. The new system has a non-governmental organization(NGO) established by companies . NGO assists farmers in large-scale production. The new system combines online and offline sales to expand sales channels. In the online sales pattern, the company builds and manages the online mall of Shimen Citrus. The sales information is displayed on the official website. Consumers can purchase products on the official website and give the feedback on it. NGO purchases orange products from farmers for sale, and it reduces middlemen. So farmers have gained more profits.

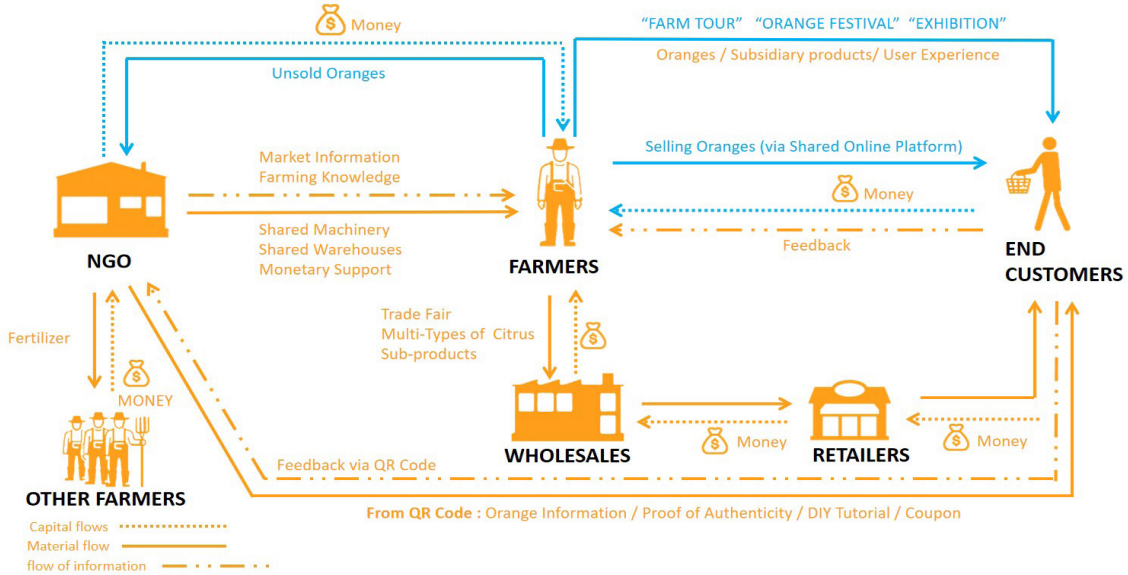
There are two methods to sell offline in the new system. First, wholesalers from other places go to Shimen to wholesale orange products, and then transport them to other cities for retail. Second, in the form of farmhouse party , the system promotes the experience system in the orchard. Tourists nearby could enter the orchard to pick fresh fruit and enter the workshop for DIY . The Orange Festival and the Orange Products Exhibition will be held to attract tourists to the local area for experience. Unsold oranges will be processed by NOG to produce fertilizers.



[Figure 2] increase sales channels

4.2 Promote products diversity[Figure 3]

Increasing the diversity of products is mainly considered from the three aspects of planting, processing and waste disposal. Based on feedback from online platform and offline wholesalers, NGO demands different types of orange products and made acquisitions to guide orange farmers to grow different types of fresh fruit and produce diversified subsidiary agricultural products. The planting and processing zones are planned through agricultural tourism maps designed by NGO. Different types of fruit are planted in different orchards in Shimen Agricultural Zone. Visitors can pick the fruits they want in designated areas according to the guidelines of the map. The agricultural tourism area also contains jam workshops, dried fruit workshops, and canned products workshops,etc. Visitors can purchase ready-made subsidiary products in the workshop, or they can make their own fresh fruit into subsidiary agricultural products. In the agricultural tourism area, there are waxing areas, bagging areas, storage areas, fertilizer production areas, etc. Visitors can check the production process.

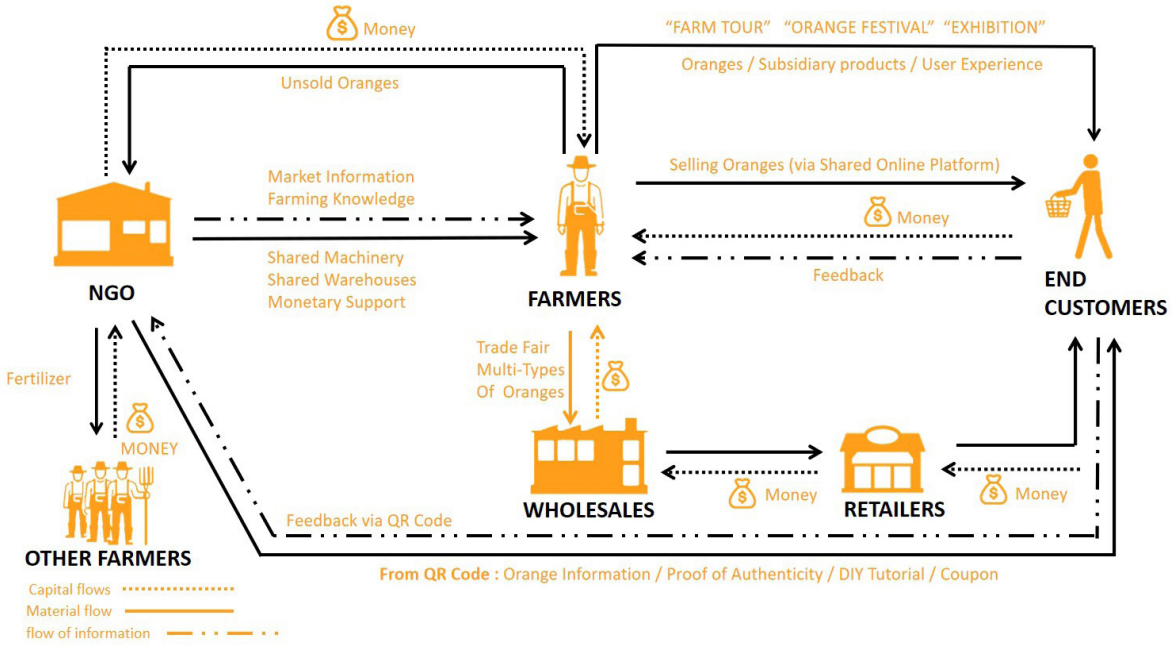


[Figure 3] promote products diversity

4.3 New pattern of Shimen Citrus product-service system[Figure 4]

At beginning, the government and investors build the brand of Shimen. NGO assists the government in the development and management of Shimen agriculture and tourism. NGO provides farmers with scientific knowledge of agriculture, and lease production machines and shared warehouses.It organizes farmers' cooperation, and unifies production. The unsold fresh fruit will be processed into fertilizer by NOG. NGO manages online malls.It purchases agricultural products from farmer households, and adjust production,according to the feedback. NGO also contact other wholesalers to develop offline wholesale-retail channels. NGO provides technology and equipment for farmers, as well as production guidance. And farmers provide high-quality products for NGO to manage and sell. With the help of the government, NGO plans the planting area in Shimen, and the whole county will become an agricultural tourism area. Tourists visit and travel there according to the guidelines of tourist maps, pick and buy

fresh fruit on the spot, and experience their own production of subsidiary products . Farmers also grow and process products according to the planning of tourist maps. Shimen can also hold orange exhibitions and other activities in the harvest season to attract tourists to pick fresh fruit, reduce the picking pressure of orange farmers, and speed up the sales of orange products.



[Figure 4] new pattern of Shimen Citrus product-service system

5. FEEDBACK

The article evaluates three dimensions of society , economy and environment in the new system . In the social dimension, the new system brings advanced technology and equipment for local agriculture. The living standards of local farmers can be significantly improved. Meanwhile the new system has strengthened the link between orange farmers and consumers. In the economic dimension, the value of local products is enhanced by the influence of the brand. And the income of the orange farmers has increased.In the environmental dimension, the new system reduces the waste and pollution of unsold fruits. And the utilization of local resources has increased.

But the system still has some problems that need tradeoff . On the one hand, increasing sales channaels and the types of products needs more manpower and capital investment, and the management model is complex.So operability needs to be tested . On the other hand, the system relies on the support of NGO, but in the long-term development, NGO relations are not stable.So the system needs to be constantly adjusted according to the actual situation.

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