Design Method that Leverages Accessible Technological Strategy to Implement Ideal Values

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Abstract: The concept of product-service systems has been introduced as an ideal customer solution, yet there are still incompletion in exiting tools. First, they lack of ways to recognize the potential of innovation. Second, they are barely broken down into detailed actions, and subjects get less feedback while operating. Third, the evidence of innovative value proposition in industry sectors is rarely seen. This research proposes a new customer-oriented method that can transform their dissatisfaction to create ideal values beyond expectation, and construct a systematic procedure with detailed steps and guidelines to design combinations of accessible products and services with the systems that support them. The outputs could develop into business models since several tools of service design have been introduced. The feasibility and the applicability are also verified through different phases of test, discussion and modification, in which the participants are from multi-disciplinary backgrounds or from industry sectors. The method starts from gathering customer's negative feelings of existing service. Those feelings can be turned into an ideal model with accessible technologicals strategy. In result, we find that the method not only helps industries to propose solutions to meet customers' needs, but also construct a new pattern of innovation. It could also be introduced into human resources system to help training employee with creative thinking.

Key words: product-service system, customer-oriented, value proposition

1. Introduction

In the era of service economy, customers require a business model and an organizational change model to serve as an effective solution instead of focusing on the technical capabilities. Such shift led the emergence of service science toward a systematically understanding of service and service innovation [20], and the definition of service has been gradually identified. Levit [8] indicates that all kinds of industries could be seen as service industries. It is the ratio of service elements to product elements that makes them different. Shostack [18, 19] points out that most of economic entities in the market are combinations of service and product, and propose the scale of elemental dominance to show the relationship between product and service. Based on Shostack's research, the concept of product-service system has been introduced. Product-service system, or PSS, refers to "a marketable set of products and services capable of jointly fulfilling a user's need" [2, 14]. PSS is thought to benefit product manufacturers, service providers, customers and the environment at the same time, and be able to develop complete business model and customer scenario. Generally speaking, PSS is a marketing strategy that integrates tangible products and intangible services to achieve the goal of satisfying customers and delivering values.

Traditionally, products and services are treated as two different entities in market. But in recent year, "Servitization of Products" or "Productization" is commonly seen. It shows that the close link between products and services is well noticed, and the PSS can be thought as a result of co-evolving of both product manufacturing and service providing to adopt the economic shift.

From the perspective of customers, PSS and Service are of same intent, which is to meet the needs. Through PSS, the value is co-created with customers by not only services, but also appropriate addition of products [2]. From the perspective of industries, PSS delivers values through both tangible and intangible ways, which means more flexibility for competition [14]. Mont indicates that a PSS should include combination of products and services, service at the point of sale, different concepts of product use, maintenance services and revalorization services [14]. It shows that instead of product-oriented or service-oriented, PSS design is system-oriented, targeting on a more integral goal. Meanwhile, there are barriers of applying PSS. Reviewing concerned literature [2, 14], the changing of customers relationship and the shift of provider s' organization [2] are two most important barriers. "How to create ideal value propositions that can attract customers, fulfilling their needs" and "How to propose systematic solutions that are advanced yet accessible for industry itself" become the main challenges.

However, considering the profits PSS can deliver, tools and methods of PSS design have been gradually proposed. To design a PSS, the product part and the service part should be concerned at the same time [1, 7]. Loughborough's Institutional Repository [9] has analyzed 6 existing PSS design tools, including Designing Eco-efficient Services (DES) [3], Austrian Eco-efficient PSS Project (AEPSS) [4], Methodology for Product Service System Innovation (MEPSS) [21], The Kathalys Method [10], The Design Exploration Process (DEP) [15, 16] and The Service System Design (SSD) [6]. The result points out that PSS design process commonly covers 7 phases, which are Project Initiation, Analysis, Idea Generation & Selection, Detailed Design, Prototype the Service, Implementation and Evaluation. Yet, not all of them cover these 7 steps, and it shows three problems in exiting PSS design tools. First, most of them are generic processes, lack of ways to recognize the potential of innovation. Second, they barely break into detailed actions, and users get less feedback to confirm the performance while operating. Third, the evidence of innovative value proposition in industry sectors is still rarely seen, [12, 17] even though vivid appliance cases have been identified [5].

This research proposes a new customer-oriented process that can transform the dissatisfaction to create ideal values beyond expectation, and combines it with a systematic method to propose combinations of accessible products and services. Since several tools of service design will be introduced, the outputs are supposed to develop in complete business model. The proposed method aims to cross the barriers of exiting PSS tools by creating value that satisfy customers most, and building a system that is constructed of accessible solutions for industry at the same time.

2. New Method

The ideal innovation should beyond customer's expectation, and current design process is focusing only on reducing dissatisfaction. To create ideal value proposition that is most desired yet never be imagined, designers should generate the negative experiences into positive ones. This research continues the above concept and constructs a detailed PSS design procedure. The structure of the new method is showed as Figure 1. The goal is to allow subjects to propose a PSS that fits industry and is with ideal customer values, which are two main

barriers of PSS design according to the literature review. The procedure of the method is divided into two parts, Value Creation Part and System Strategy Part, outlined as follows.

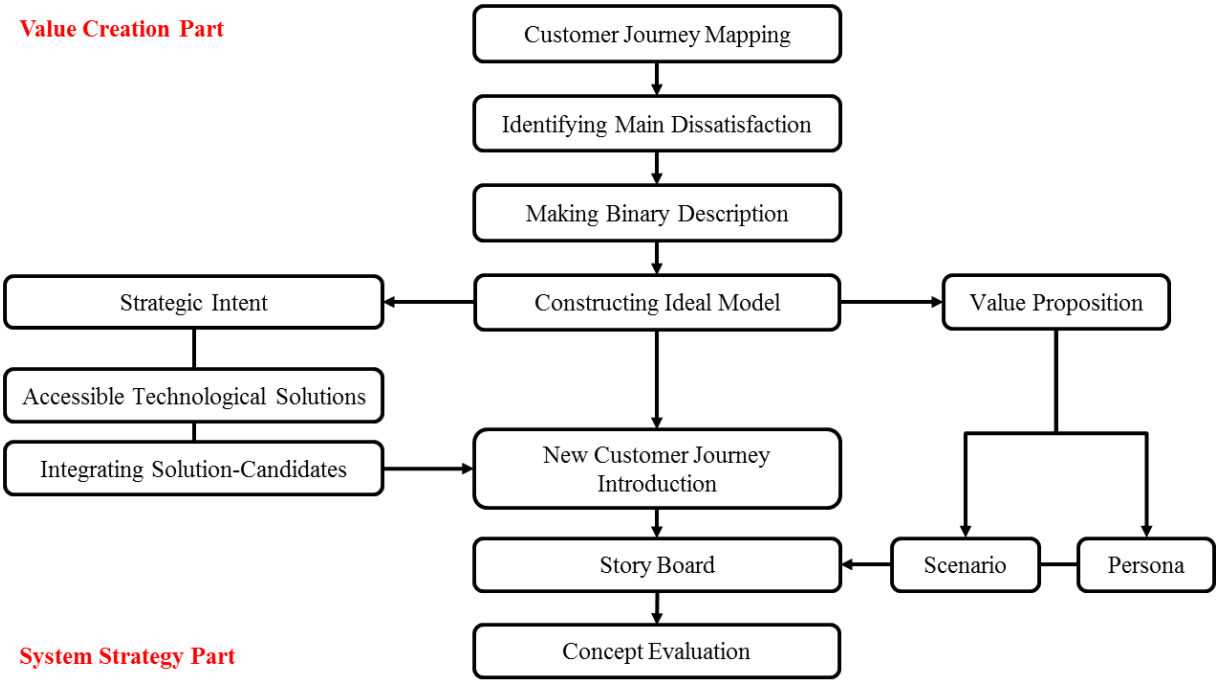

Figure.1 Structure of New Method

2.1 Value Creation Part

This part starts from gathering customer's negative feelings of existing experience, and then generates the feeling into value proposition and strategic intent.

(1) Customer Journey Mapping

By listing out customer journey, the subjects will be able to gather the information on situations that the customers encounter. The customer journey includes activities, motivations, complains (being discontent after activities) and questions (being confused during activities). Through customer journey map, the customer's needs and purpose of each action will be found.

(2) Identifying Main Dissatisfaction

Analyzing what makes customers discontent and confused most within customer journey, the subjects can identify main dissatisfaction of whole process. Urgency and importance is used as two parameters to help subjects evaluating what first priority is. The urgent ones should be adopted prior to important ones because customers basically feel them more intensely.

(3) Making Binary Description

Each of customer's activities can be rewritten as a sentence with a character, a moment, a place, an object, and an event. Using words with their antonyms, subjects can describe customer experience in binary sequence. For example, subjects can use "may-may not", "need -do not need", or "can – cannot" as a set of keywords. Using only one set in each sentence is highly recommended.

(4) Constructing Ideal Model

By simply replacing keywords with the opposite ones, descriptions of ideal model for customers are constructed.

(5) Value Proposition and Strategic Intent

Value proposition comes from the description of the ideal model. By checking between main dissatisfaction and ideal model, subjects can find the most powerful value with the ideal customer journey. Strategic Intent is the concept for industry to deliver such value proposition. It could be few words to help imagining how new system will be.

2.2 System Strategy Part

In previous part, a new value proposition that customers want it most is created, and the ideal model shows the pattern of new system. Meanwhile, the strategic intent is identified. By adding following design process, a complete product-service system can be built.

(6) Accessible Technological Solutions

Based on the value proposition, existing technological solutions will be proposed. The solutions should follow the strategic intent, fulfilling the proposed ideal model. According to subjects' knowledge domains, the solutions could be composed of learning from different fields of expertise.

(7) Integrating Solution-Candidates

The solution-candidates will be evaluated by cost and effectiveness, to judge whether or not to implement. Effectiveness will be prior to cost since the cost could be reduced when the business scale reaches upon a certain degree. If one candidate can fulfill another, it should be integrated to increase the possibility of execution. Effectiveness and cost could vary from one industry to another because core technology, alliance and competitor are also different.

(8) New Customer Journey Introduction

Now a new customer journey can be constructed including the following information: supporting technological solution, interface, backstage, and activity. The new customer journey will be later on used for test running.

(9) Storyboard of Scenario and Persona

A storyboard is made to test the new customer journey. It is composed of a character and several scenes, which are the persona and the scenario. Choosing a second-to-the-most -challenging customer for the new journey will make a persona. It will be able to represent majority of the customers. If such customer can be satisfied, the new journey will be sufficient enough to meet the customers' needs. A scenario will be chosen upon where customers' activity will happen.

(10) Concept Evaluation

Based on storyboard, the performance of new journey will be evaluated to determine if the ideal model will need to be revised. Again, it is evaluated based on the cost and the effectiveness to judge if the PSS concept is feasible or not. The effectiveness is still with higher priority. Once the ideal model shifts, the following steps should be reviewed and re-evaluate because it could lead to different result when ideal model is modified.

3. Verification

To verify the effectiveness of proposed method, this research hosts a workshop. Subjects are carefully chosen from service innovation, engineering, marketing and management fields, etc. They are divided into three different groups, and in each group an experienced facilitator is added as an interpreter and assistant. Facilitators also record all the process and situations that groups have faced. The details of verification are outlined as follow.

3.1 Workshop

The schedule of the workshop follows the process of proposed method, showed on Table 1.

Table 1. Schedule of the Workshop

	Day1	Day2
09:00-09:20	Reception	
09:30-12:00	**Lecture I** Introduction Examples (1)	**Lecture II** Examples (2) Case Study
		Progress confirmation
12:00-13:10	Lunch Themes walk-thorough	Lunch
13:10-15:00	**Practice I** Customer Journey Mapping Identifying Main Dissatisfaction	**Practice III** Proposing Obtainable Technical Solutions Integrating Solution-Candidates
15:10-17:00	**Practice II** Making Binary Description Constructing Ideal Model Value Proposition and Strategic Intent	**Practice IV** New Journey Mapping Making Storyboard of Scenario and Persona
17:00-17:30	**Exclusion Lecture** *How to abstract ideas?* Q&A	**Presentation** Concept Evaluation Q&A
17:30-18:00	Progress confirmation	

3.2 Themes of Workshop

The existing industry and business are chosen to be the themes of the workshop. 3 categories of themes are chosen, listed as follows.

- Restaurant：N.Y. BAGELS, an American food restaurant.
- Publics Service：U-BIKE, the bike rental system in Xinyi District, Taipei.
- Local Service：Post Office.

All 3 themes are located near the area that the workshop is held. The subjects are allowed to observe or experience these industry and business during the workshop.

3.3 Evaluation

The subjects will present the result of using proposed method orally or by slides show, and then evaluate the concept through group discussion. Anything related to workshop, including lecture, practice, discussion, presentation and evaluation are recoded to verify the proposed method.

4. Result

One of the outcome records of workshop is used as an example to show how subjects use the proposed method on themes. The following is how subjects use the proposed method on the U-bike theme.

(1) Customer Journey Mapping

The customer journey is outlined by subjects as Table 2 shows.

Table 2. Customer Journey (U-BIKE)

Activity	Motivation	Question	Complain
To register. (Using mobile phone number)	Registration is required. Free trial with registration.	Is non-Taipei resident allowed? Or Foreigner? Any other discount?	Unfriendly for non-local people. It's hard to understand the process. The interface is not well-designed. Only specific carrier is allowed.
To find the point of service.	To access the service.	Why aren't there points near destination? Where can I access details?	There're no points near the destination. There're no available bikes during rush hour.
To rent a bike.	Need transportation. Need a bike.	Where to rent? What's the condition of the bike? Any bike is available?	There's no information of the condition.
To ride.	To save time. To save energy.	Is it different from a normal bike? What if it rains?	Bike itself is not well-designed There're no gears for rain.
To pause. (On the way)	With other task. Need to get off the bike.	Can I pull it over anywhere? What if it was stolen? Or Broken?	There's no user's guide of the bike. Traffic jam. Something is going wrong. I can do nothing when it breaks.
To return the bike.	Destination arrived. Afraid of being stolen.	How much time may it take ? Is that complicated?	There's no time alert. There's no parking space in the point. It's hard return the bike. There's no information about where I should park and how far I should go.

(2) Identifying Main Dissatisfaction

The following is main dissatisfaction of U-BIKE that is identified by subjects out of the above customer journey.

- No parking space when needed.
- No available bikes when needed.
- Only phone of specific carrier is allowed to register.
- I have to take responsibility if the bike is stolen.

(3) Making Binary Description

Table 3 is the binary description of U-BIKE that is written by subjects.

Table 3. Binary Description (U-BIKE)

Binary Description
1. I have to use the phone with specific carrier.
2. I have to go to specific point of service.
3. I cannot use the bike anytime.
4. I have to take responsibility if it is stolen
5. I have to return it when it is broken.
6. I have to pay when looking for parking space.

(4) Constructing Ideal Model

The binary description is transferred into ideal model as the keywords have been replaced, outlined as Table 4.

Table 4. Ideal Model (U-BIKE)

Ideal Model
1. I don't have to use the phone with specific carrier.
2. I don't have to go to specific point of service.
3. I can use the bike anytime.
4. I don't have to take responsibility if it is stolen
5. I don't have to return it when it is broken.
6. I don't have to pay when looking for parking space.

(5) Value Proposition and Strategic Intent

Value proposition comes from the description of the ideal model (Table 5). By checking between main dissatisfaction and ideal model, subjects find the most powerful values. They are:

- **It's anytime and anywhere.**
- **It's safe, and it saves the money.**

Table 5. Value Proposition (U-BIKE)

Ideal Model	Value Proposition
1. I don't have to use the phone with specific carrier.	It's anytime and anywhere.
2. I don't have to go to specific point of service.	
3. I can use the bike anytime.	
4. I don't have to take responsibility if it is stolen	It's safe, and it saves the money.
5. I don't have to return it when it is broken.	
6. I don't have to pay when looking for parking space.	

Strategic Intent is the concept for industry to deliver such value proposition. It could be few words to help imagining the form the new system will be. The subjects identify the strategic intent as:

- **Mobile Bike, on your way anytime.**

(6) Accessible Technological Solutions

Based on the value proposition, existing technical solutions are proposed according to subjects' knowledge domains, outlined in Table 6.

Table 6. Accessible Technological Solutions (U-BIKE)

Ideal Model	Obtainable Technical Solutions
1. I don't have to use the phone with specific carrier.	Multiple carriers are supported.
2. I don't have to go to specific point of service.	Increasing the amounts of points.
3. I can use the bike anytime.	Increasing the amounts of points. Accessing bikes directly with mobile devices.
4. I don't have to take responsibility if it is stolen	Being tacked with GPS. Bike Insurance.
5. I don't have to return it when it is broken.	Being tacked with GPS. Roadside & breakdown assistance.
6. I don't have to pay when looking for parking space.	Increasing the amounts of points. Adding traffic volume control.

(7) Integrating Solution-Candidates

To increase the possibility of execution, the solution-candidates are evaluated to judge whether or not to implement. The above solution-candidates are integrated in to 3 categories, showed as follows.

- **Increasing the amounts of points.**
- **Being tacked with GPS.**
- **Internet and mobile devices.**

(8) New Customer Journey Introduction

A new customer journey of U-BIKE is constructed including supporting technical solution, interface, backstage, and activity. The new system is called "Mobile Bike".

Table 7. New Journey (Mobile Bike)

Supporting Technical Solution	New Customer Journey
Being tacked with GPS. Internet reservation. Apps on mobile devices.	A customer accesses to Mobile Bike website to search the nearest spot. Then, a bike can be reserved, and the location will be showed on mobile devices. The customer can choose the way of the payment.
Use streetlights as points of service. Add display on the bike.	The customer goes to the nearest streetlight to access the bike that is reserved. It shows on the on-bike display if the bike is reserved.
Accessing bikes directly with mobile devices. Apps on mobile devices.	The customer uses the mobile device to unlock the bike. The information including distance, fee charging, etc. will show on the app.
Add display on the bike. Being tacked with GPS.	The bike will be locked and remain reserved if the customer pull it over. If it's been stolen, the HQ will track it by GPS and arrange another bike for the customer immediately.
Accessing bikes directly with mobile devices. Apps on mobile devices.	The bike is open for reservation again when the customer chooses to end the route. How much it charges shows on the app.

(9) Storyboard of Scenario and Persona

The storyboard is made by subjects to test the new customer journey of Mobile Bike. It is composed of the persona and the scenario. In this case, the persona is set as Table 8 shows, and the scenario is within the description of the storyboard, outlined as follows.

Table 8. Persona (Mobile Bike)

Name	**Age**	**Gender**	**Career**
Young	33	Female	Secretary
Specialty & Interest	The customer goes to the nearest streetlight to access the bike that is reserved. It shows on the on-bike display if the bike is reserved.		
Living Habits	The customer uses the mobile device to unlock the bike. The information including distance, fee charging, etc. will show on the app.		
Consuming Habits	The bike will be locked and remain reserved if the customer pull it over. If it's been stolen, the HQ will track it by GPS and arrange another bike for the customer immediately.		
Interpersonal Relationship	The bike is open for reservation again when the customer chooses to end the route. How much it charges shows on the app.		

The storyboard with scenario:

[1] Young accesses to Mobile Bike website to search the nearest spot around her office. She reserves a bike, and the location is showed on her phone with navigation. With the app's help and a short walk, Young finds her bike under the streetlight near her office.

[2] Using her phone, Young unlocks the bike and starts the route. The information of distance and fee charging shows on her phone. The bike is chosen according to her height, so it fits her well.

[3] Young pulls over the bike under the streetlight near a café to buy a cup of coffee. She taps "Pause" within the app to pause the route and fee charging, then the bike is locked and shows reserved again.

[4] Unfortunately, the bike is stolen when Young returns. But with the app's help, Young can report to the HQ of Mobile Bike immediately. The HQ then starts to track the stolen bike with GPS, and arranged another available bike for Young

[5] Young keeps on going with a new bike, and the distance counting is resumed. After she arrives at the destination, she parks the bike under the streetlight and taps "End" to end the route. The bike is locked again, and the information of distance and fee is showed on her phone. It charges $25 NTD in total, and is paid from Young's account, which was already set when her reserved.

(10) Concept Evaluation

Based on storyboard, the performance of Mobile Bike is evaluated to determine if the ideal model will need to be revised. In workshop, the concept evaluation is executed through group discussion.

5. Conclusion

This research aims to propose a design method that could cross the barriers of exiting PSS tools by approaching the Innovation from both customers and industry's perspective, which are creating value proposition that satisfy customers and building a system that is constructed of accessible technology. From the result of workshop and the record of group discussions, the following conclusions can be drawn, which are divided into 3 aspects.

5.1 About the scope

1. For industry with multiple categories of service, the early evaluation of competitiveness should be executed to identify which category is the most potential one. Take “Post Office” as an example, it divided into two main categories of service, the postal service and the banking service. Since the postal service is the unique service that only the post office can provide, it’s easier for subjects to approach innovation thorough proposed method. On the other hand, the banking service is provided by not only the post office but also other banks, so the value proposition will be forced to face more competitors.
2. Subjects often encounter the problems about policy and law during the workshop. Since some themes, such as U-BIKE and Post Office, are highly related to policy and law, the subjects couldn’t sure whether the idea is acceptable or not. In a case of innovation, the legality is often the most unchallengeable part. So the early study of themes is highly recommended, including the related policy and law.

5.2 About the procedure

1. In a customer journey, an activity with multiple motivations happens. A subject should review customer’s activity and motivation as one to find out what the deepest purpose is.
2. This research find that a framework with a character, a moment, a place, an object and an event could help subjects to organize their ideas in different steps, such as customer journey mapping, dissatisfaction identifying and new customer journey introduction. The framework will be integrated into the proposed method to optimize its effectiveness.
3. The most frequently asked questions are how to generate the value proposition from the ideal model and how to generate the strategic intent from the value proposition. To answer above questions of subjects, this research adds the exclusive lecture to help subjects abstracting the values. Several examples of ideation and design are introduced.

5.3 About the performance

1. The experts are welcome for they can evaluate the concepts more practically. But such experts should be with potential of challenging existing patterns, and be willing to approach innovation. The recommended way is to hand the outcomes of the proposed method to the experts after subjects building a new system. It is believed to help experts to think further, beyond what they have learned.
2. The proposed method combines customer-oriented procedure with manufacturer-oriented and provider-oriented ones. It shows the possibility to integrate the entire economic chain. But in industry sectors, the cost, the revenue and the exact profit that the new business model can make are also important. For this goal, more tools of evaluation and management could be introduced in the future.
3. The result shows that the proposed method not only helps subjects to design an ideal PSS for customer with accessible technology, but also provides them a new pattern of innovation. For industry sectors, the most important concern is not only to be innovative, but also to train people who can help them to be innovative. The proposed method could also be introduced into human resource system to help companies training employees with high innovative energy, which are even more helpful for innovation.

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