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以顧客主導邏輯輔助區塊鏈數位生態系統之利害關係人價值結構設計

Value Configuration of Blockchain-based Digital Ecosystem Stakeholders: A Customer Dominant Logic Perspective

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重回校園的兩年時光很快又過去了，在研究所期間認識了很多厲害的人，接觸了很多新領域也拓展了自己的視野。回顧這兩年，首先最感謝的是苑守慈老師。當時雖然懷抱著對服務科學的熱誠，但其實對於一切都懵懵懂懂的，在加入 SSRC 之後，經過每個禮拜的 Paper Reading 和 Meeting 也漸漸了解到了服務體驗、設計與管理的觀念及核心。也很感謝苑老師在我們撰寫這本論文的時候，以無條件的支持與開放的態度，讓我們能夠在熟悉區塊鏈的同時給予我們指導與建議，而完成了 BlockFarm 的實作和開發經驗的累積。這過程中所給予我們的鼓勵，真的是我們可以不斷努力的最大動力。

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摘要

在後數位化時代，有無數的數位服務生態圈在爭奪著有限的市場。而要贏得這場競爭最好的方式就是遵照服務設計的理論來滿足顧客的渴望。本研究期望運用科技化的輔助方式來幫助服務設計者建立一個以顧客主導邏輯為基礎的區塊鏈服務生態系統。在這個方法裡面，我們必須要解譯服務設計者的服務價值主張，並且找出與之相關的價值活動來作為之後服務設計的樣本。最後透過服務渴望度、創新度以及利害關係人認可程度三個面向來衡量整個價值結構設計是否可行並有發展潛力。

關鍵詞：區塊鏈生態系統，服務渴望度，服務創新度，利害關係人協議

Abstract

In the post-digital era, there are countless digital ecosystems to fight for the limited market share. Using service design theory to fulfill customers' desire is the best way to win the competence. This paper proposes a technology facilitating approach to help service designers configure their blockchain-based service ecosystem with customer-dominate logic. We rephrase the service value proposition inputted by service designers and filtering related value activities as the model of designed ecosystem. To make the decentralized ecosystem become a destination, we have to examine the value configuration from three different perspectives which are desirability, disruption, and consensus. These three dimensions provide service designers with a method that can help assess if a configuration is making sense or not. After all, this paper is aimed to support service designers to create a digital destination ecosystem by recommending activities and evaluating score of ecosystem configuration.

Keywords: destination, service desirability, service disruption, stakeholder consensus, blockchain-based ecosystem

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Chapter 1 Introduction

1.1 Background and Motivation

In the post-digital era, there are 3.4 billion people have used internet (International Telecommunication Union, 2016) and countless digital ecosystems are introduced every day. However, only a few ecosystems can survive and not every people satisfies received service value. It is because of designed services might have missing links in the design stages (Goldstein et al., 2010). In order to diminish the gap between service and users, previous studies have provided lots of tools and methods. For example, customer journey aims to find the insights from reviewing every steps in service encounters (Nenonen et al., 2008). Nevertheless, service designers may have to do many efforts to go through the double diamond design processes – Discover, Define, Develop and Deliver (Council, D., 2005) with the introduced design facilitating tools.

On the other hand, most of proposed design tools are based on Service dominate logic (SDL). Even though SDL has shifted focus from goods provided to service exchange (Vargo and Lusch, 2004a), it is still a provider centric perspective. Service designed with SDL would be misled to the destination of service providers. Avoiding this situation, customer dominate logic (CDL) is proposed to redirect service designers to customer perspective (Heinonen et al, 2010). CDL sets customer as the focal stakeholder and designs service around them. With the guidance of CDL, a digital ecosystem of customers' destination can more possible be implemented. This type of ecosystem will take a huge part of customer share for high desirability and satisfaction.

To make ecosystem more efficient and closer to customers' destination, unnecessary stakeholders need to be reconsidered whether they suitable in new

service ecosystem design. Intermediary, for example, could no longer be essential because the transparency brought by new IT technology. In this paper, we adapt blockchain as the implementation of digital destination ecosystem for its automatically workable feature. Smart contract of blockchain includes roles of stakeholders and smart properties which produces values. Once the stakeholders agree the roles and properties needed to provide, the smart contract will be committed automatically. As a result, not only the importance of intermediary diminish but transparency of information increases via property sharing. Meanwhile, without extra payment to unnecessary stakeholders the satisfaction of customer will raise up, too.

In order to speed up the design processes and land on correct destination of customers' mind, we propose a stakeholder configuring recommendation by data collecting and analyzing. The transformed data can reflect trend of society and shape of customers' desirability. With this given information, service designers can save effort from conducting market research, studying stakeholder characteristic, etc. Furthermore, we implement a configuring support system and expects it can accelerate the service ecosystem develop steps.

1.2 Research Question

The concept of destination is most defined in tourism. A destination should have characteristics such as attraction, accessibility and activities (Buhalis, 2000). In digital ecosystem, this concept can be applied and demonstrated. However, there is a huge difference between building a digital destination and geographical destination – scalability. Thanks to the advance of technology, digital destination ecosystem nowadays can possibly connect every people in the world. Thus, unlike geographical destinations put more effort in self-improvement and enhance the experience of local

culture, digital ecosystem has to consider whole customer journey of all kind of possible customers.

Designing an ecosystem, service designers might have their ambitions and destined value proposition and go through the service design processes. The four stages of double diamond model can be recursive but sequential. Nevertheless, traditional design approaches in discover stage need to collect information, do brainstorming and exchange opinions. The tedious time consumed in insight discovering might cause the well-defined value proposition lose its first mover advantage in the competitive environment.

On the other hand, compared to normal ecosystem architecture, blockchain based ecosystem has more flexibility to welcome stakeholders. Each blockchain based ecosystem has one or more smart contract which specifically describe the roles and duty of stakeholders via smart property exchanges. Even though it is quite similar to traditional value network configuration, service designers have to focus on how to get the consensus of stakeholders. Only if the consensus become stronger, the effectiveness of ecosystem can increase.

To overcome this problem, we determine our research question as below:

"*How to facilitate service designers configuring a digital destination ecosystem under stakeholder's consensus consideration?*"

The following issues are essential to answer the question:

- What elements are important in build a destination ecosystem?
- How to use the elements to recommend the type of configuration? What is a good structure?
- How to evaluate consensus of stakeholders? How to judge the consensus score?

1.3 Research method

Since there is no any integrated approach to facilitate service design, many redundant works need to be conducted. Moreover, most service designing tools only provide a high level concept to service designers. To make service design much delightful, we aim to develop a blockchain based digital destination value configuration support system from customer dominate logic. This system is a sub-system of D^3 accelerator project which includes the other three systems presented by Kuo's, Chen's and Shih's paper (Kuo, 2016; Chen, 2016; Shih, 2016).

This system is constructed by three modules: value activities analysis module, stakeholder puzzling module and consensus measurement module.

Value activities analysis module receives value proposition of service designers and connects it to current trend of society by information collecting. Doing so the service design can draw a better scope of people's destination.

Stakeholder puzzling module tells designers what kind of roles could be considered as a stakeholder in the service ecosystem. Meanwhile, the guidance of interactions which advices designers to create value exchange activities will be provided in the module.

Consensus measurement module conducts the consensus evaluation of the whole configured ecosystem. The result will give service designers a new perspective of their value network to make it more possible to become a digital destination ecosystem.

1.4 Purpose and contribution

This paper is aimed to develop a new way to design service ecosystem and make it much easier to become a destination of people from a customer dominate logic. Three main contribution of our research as below:

(1). Providing a systematic approach to design service ecosystem via IT facilitating: we aim to ease the difficulties of designing a service ecosystem and help designers to cross the different industrial barrier.

(2). Recommending proper service activities and stakeholders via transforming the mindset of designers: To realize this, we need to use third-party's API to make it more precise for designer who only inputted their value proposition.

(3). Creating a measurement to evaluate the consensus of ecosystem: based on the measurement, designer can take actions which would affect the consensus of stakeholders (e.g. re-configure interactions, select different stakeholders, and increase exchanged value) to avoid failure in the design stage.

1.5 Content Organization

In chapter 1, we describe the necessaries of a systematic way to design service ecosystem by review research background and motivation. The research method and contribution is also defined in this chapter.

Chapter 2 will provide some theoretical supports (e.g. destination, consensus, desirability, and blockchain) to extend our study knowledge base by literature review.

In chapter 3, we provide the scope of D^3 accelerator project via overview its designing purpose, conceptual framework and system architecture.

In chapter 4, we propose our conceptual framework based on the theoretical

support from chapter 2. The detail of system architecture and the sub-modules will be introduced in this section.

An application working scenario of our research will be presented in chapter5. The new design processes and value of using our system will be better understood. Chapter 6 will elaborate the validation of our framework and the final chapter provides our contributions and the limitations of our research.

Chapter 2 Literature Review

In this section, we propose some methodologies and foundations as the theoretical base of our research. Our research aims to develop an integrated service design approach to facilitate designed ecosystems to become much closer to customer's destination in accord with the given value propositions. We will review existing service tools at first and discuss about what is a destination. Finally, the description of blockchain technology will be presented as our basic ecosystem infrastructure.

2.1 Service design tools

According the double diamond model proposed by Design Council 2005, there are four stages of service design: Discover, Define, Develop, and Deliver. Our research is aimed to facilitate insight discover, problem define to value configuration develop. Thus, this section will discuss some design supporting tools in the first three stages and elaborate the issues our research tries to overcome.

2.1.1 Empathy map

Since user would never know what they really need, the first thing service designers should do is to discover the user need. Empathy map provides an approach through collecting information of how users say to define the service, what users do during the service, how users think about your service, and how users feel of the service (Stanford dSchool). In the four parts of empathy map, designers have to conduct a lot of interviews with users and find the observations and their contradictions. These procedures are time consuming and interviewing skill needed which would cause

misunderstanding of users' original intention. The consumed time saving is one of our research purpose. We try to find an approach that can provide designers information they need and facilitate them bring out insights about value activities.

2.1.2 Customer journey

Customer journey, on the other hand, overviews all service encounters and connects them with timelines. It can help designers point out the peaks and troughs of customer experience. With its support, designers can understand which service should be improved or maintained. Moreover, because customer journey not only examines services in the ecosystem but the whole encounters start from customer turn on the computer. Designers have more things to do like partnership with stakeholders or integrated to make the journey even better.

The most common way to draw the customer journey is to go through the service once by designers themselves. However, the journeys went by different people and time will meet various situations. It makes the journey divergent and difficult to find the real problem when there are multiple problems. Our research attempts to provide rich information to help designers find the main path of customers and focus on the configuration design processes.

2.1.3 Service blueprint

Service blueprint explores service issues from supplier's point of view. There are four steps to design blueprint (Shostack, 1984): "Identifying processes", "Isolating fail points", "Establishing time frame", and "analyzing profitability". Through these steps designers define tasks and roles to compose the ecosystem. The benefit of service

blueprint is the clear presentation of service from system frontend to backend with timelines. When and where the roles and task should be ready for service can be arranged and adjusted easily. Nevertheless, designing an ecosystem in the beginning, designers have to undergo a hard time to think about related stakeholders and define their duty and profit share. Our research attempts to facilitate designers to do blueprint by recommending them possible stakeholders to ease their loading.

2.2 Destination

The concept of destination is widely used in tourism studies. Most of studies examined destination through image (Ahmed, 1991; Scott, 1978) and personal awareness (Baloglu, 1999). These studies provide some strategies that help local government and business to create a geographical destination. For example, a lifecycle stages examination of destination is presented by Buhalis in 2000. Each examination of lifecycle stage aims to improve the awareness of destination variables which are “Attractions”, “Accessibility”, “Amenities”, “Available packages”, “Activities”, and “Ancillary services”. If doing well in the six dimension, people would have better chance to select the place as the destination when they travel next time.

2.2.1 Digital destination

Since our research is focus on the digital platform, we have to rephrase the concept of destination. If a digital ecosystem could fulfill the six dimensions, it should be a service constellation that excels in particular field and make people select it subconsciously.

Amazon, for example, the biggest ecommerce platform nowadays selling billions of items worldwide with their well-known logistics service. The plentiful products makes it attract people to find items they want in their website as the geographical destinations attracting people with their natural or landmarks. Meanwhile, Amazon prime service provides customer with fast and free shipment creating the sense of loyalty to customers. It helps Amazon become customer's destination of online shopping in a desirability increasing approach.

On the other hand, Uber the world's largest taxi company owns no vehicles but provides disruptive service to attract people. Use the concept of sharing economic, Uber constructs a platform to match passengers and drivers who are unlicensed people. It makes people earn extra incomes and have a ride with lower fee. Uber also provides dynamic pricing algorithm and in app payment function to create better user experience. Doing so Uber becomes some people's destination of taxi transportation, and they keep in applying sharing economic concept in any possible field to enhance the sense of destination.

From Amazon to Uber, we can see the ways to become a digital destination could be disruptive or desirability. Both of the two approaches are based on the traditional concept of destination creating awareness, fulfill needs, and building image. Consequently, we adopt the desirability and disruption as our knowledge base to create a digital destination ecosystem.

2.3 Blockchain technology

Blockchain is a distributed database aims to solve security issues, ensures the data correctness, and provides a peer-to-peer connecting environment. To achieve its goal, blockchain applies a decentralized consensus mechanism (Wright and De Filippi,

2015). The overpowered central roles who takes charge of matching the supply and demand will be diminished in the future. The consensus mechanisms of blockchain make the concept of decentralized autonomous organization (DAO) possibly be implemented. DAO can exchange smart properties of stakeholders and record the transaction into blocks. The connected blocks turn out to be a chain that is traceable and unchangeable.

2.3.1 Smart property

After the semantic standard released by W3C, the web is going to internet of value from internet of people. The main difference between internet of value and internet of people is that assets and services could be exchanged and delivered automatically. People no longer need to seek for products or services. In other words, they just enjoy the benefit that internet brings with their consensus of the smart contract which will be described later. To meet this solution, the idea of smart property is essential.

With the protocol of smart contract, smart property could be everything no matter it is digital or physical (Swan, 2015). Once the property is open to blockchain, the ownership of this property could be exchanged and ensured only the latest buyer can control it. The concept of smart property realizes everything is changeable and the openness of blockchain lets the properties more widely accessible to people.

2.3.2 Smart contract

Smart contract is composed of smart property exchanges and stakeholders' role definition. Contract designers have to authorize stakeholders with proper power and ask for fair property exchange. Since the smart contract is programmed into

self-executable code, it can be triggered in certain situation or events. This characteristic could assist people to pay more attention to their life.

However, the smart contract is based on the consensus of stakeholders. Once the stakeholders do not feel comfort in the contract, the exchanges of smart property could no longer occur. Therefore, besides the technology skill, designers have to understand how to conceive a fair environment for stakeholders.

In our D^3 Accelerator project, we try to create a decentralized digital destination ecosystem. We find that ecosystems have some similar settings with smart contracts (e.g. stakeholders, interactions). Thus we believe the concept and technical support of blockchain can assist us to construct destination ecosystems that provides much value to stakeholders.

Chapter 3 D^3 Accelerator Project

As time goes by, goods or services that provided by companies are different from those we have known before. With the rising emphasis on user experience and user interface design nowadays, customer satisfaction is no longer determined only by functionalities, but also the user experiences during service. Therefore, a fluent, convenient, and memorable experience become principle effect of company's achievements. For service designers, D^3 Accelerator provides a model for design reference, which is based on the Customer-Dominant logic, offer an assistance for the designed service, that can press close to customer's demands and have chance to achieve the critical mass. This chapter aims to describe the framework and the procedure of our integrated research project—D^3 Accelerator.

3.1 Conceptual framework of D^3 Accelerator

D^3 Accelerator is an assistant design instrument for all designers who are going to create a new service or to optimize an existing service. This instrument is built to support the designed service to become the destination of digital ecosystem in its domain and constructed with the Customer-Dominant logic in service design. First of all, different from previous researches, which are more related to the Service-Dominant logic. D^3 Accelerator is sufficiently focusing on customer's requirements and feelings rather than a company-based view. With this foundation, D^3 Accelerator provides designers a useful, thoughtful, and helpful implement to devise a well-considered service.

- **Customer-Dominant Logic:**

Customer-Dominant Logic, emphasizing the primacy of customer, is a mindset that can be used in business, marketing and service design. Adopting this view means shifting the focus from how (systems of) providers involve customers in their processes to how customers in their ecosystems engage different types of providers. In other words, emphasizing how customers embed service in their processes rather than how firms provide service to customers (Heinonen, 2015).

Different from Customer-Dominant Logic, Service-Dominant Logic emphasizes the importance of value co-creation and customer involvement, in other words, this perspective focus on how customer can participate in the business process through the lens of service provider. Even though the SD logic has widened the scope of understanding the function of marketing, the view on SD logic is still very production and interaction-focused, i.e. service Provider-Dominant (Provider-Dominant logic), not Customer-Dominant (CD) (Heinonen et al., 2010). On the contrary, CDL does not emphasize the interaction between the customer and the provider/market. The focus is on the key stakeholder in businesses – the customer – and how customers embed service in their processes. This is in contrast to how (multiple) providers (and other institutional stakeholders) in service (eco)systems provide service to the customer, which is the basis of SDL (qtd. in Akaka et al., 2015). The following table is the difference between the mindset of Provider-Dominant logic and Customer-Dominant logic:

Table 3.1 Difference between Provider-Dominant logic and Customer-Dominant logic

Provider-Dominant logic	**Customer-Dominant logic**
Value creation is orchestrated by the service provider	The customer orchestrates and dominates value formation
Value creation is defined by the service provider	Value formation is determined by the customer relative to alternatives on multiple levels
Value is based on customer perceptions of company-created value propositions	Value is based on experiences of customer fulfillment

D^3 Accelerator aims to build a sustainable digital ecosystem, so as to provide a one-stop service and eventually becoming the destination to every customer. CDL focuses on customer logic and the customer's constellation of activities, actors and experiences and the role of providers in this context (Heinonen et al., 2010). After applying CDL to D^3 Accelerator model, it will be a lot easier to inspect customer's behavior, to find out the potential operants, and to have a comprehensive view on customer.

3.2 System architecture of D^3 accelerator

D^3 Accelerator is composed of four parts that are the elements of becoming the destination of digital ecosystem. D^3 Accelerator comes up with a three-dimensioned model including Stakeholder Value Configuration System, Value Network Empowering System, Linkware Flow Experience Maximization System, and a dimension of measuring the achievements - Nash Equilibrium and Adjustment System.

- **Stakeholder Value Configuration System:**

The first dimension puts forward candidate value activities that are best related to the service value proposition, also helps designers to configure their value network.

This system will give a service desirability score, service disruption score, and consensus level of the ecosystem to be a prediction of the ecosystem performance.

- **Value Network Empowering System:**

It receives the output of first dimension and examines the empowerment degree of each service operant and provides a guideline to facilitate each stakeholder's collective commitment toward shared goal within the ecosystem. Then makes some adjustments and suggestions to improve the degree of empowerment.

- **Linkware Flow Experience Maximization System:**

It obtains the given value network from second dimension, draws on the linkware of service operation, examines the degree of flow experience, and assists designer to design the linkware to integrate the whole service based on blockchain toward maximum flow experience.

- **Fulfillment Testing System:**

This system is to check on the fulfillment of the destination of decentralized digital ecosystem based on the fulfillment of critical mass and the network effect level, which accomplish the graduation of D^3 Accelerator or not. After these processes, D^3 Accelerator proposes a prototype of designed service, designers then can realize and inform the services base on the results.

3.3 The system flow of D^3 accelerator

Kelly is nominated to design a digital ecosystem about destination of living assistance for the people who have a sum of money and pursue a sustainable quality of life. However, Kelly is at a loss as to what to do. Thus, she can utilize our model to facilitate accomplishing this tough mission.

In the first stage, ***Stakeholder Value Configuration System*** provides the Puzzle

model to help Kelly construct the initial value network. When Kelly places the value proposition into the model, it shows the related context like ‘sustainable’ and ‘Affordable’. With these key words, it is going to break down into the second-layer context; for example, ‘Transportation’, ‘Health’, ‘Shopping’, ‘Communication’, ‘Residence’, and ‘Finance’.

Based on these contexts, our model searches for the related value activities individually and finds key stakeholders of those activities. After that, through examining the desirability score, disruption score, and consensus level provides an initial value network with the score level which lets Kelly know whether it is making sense or there is a suggestion for improvement.

In the second stage, ***Value Network Empowering*** provides the smart contract analysis module to examine the importance of resources, correlations between resources, accessibility of smart properties, and each stakeholder’s influence degree of value activities. And this information can be acquired by inviting the stakeholders to participate a collaborative design meeting. Based on this information, the smart contract empowerment module will provide three data to each stakeholder inside the ecosystem. The first one is the recommended available resource, which can be used to enhance the stakeholder’s capability and achieve their purpose eventually. Second, the recommended investing resources, which enable stakeholders to input certain resources so that they can receive an expected and ideal outcome. Last but not least, this system provide each stakeholder’s influence degree of the value activities occurred in the ecosystem so that they can know if their investments worth or not. In the final stage of this system, we will calculate the collective commitment level of each stakeholder in order to know their willingness to co-create, hoping to carry out the synergy among all stakeholders of the system.

In the third stage, ***Linkware Flow Experience Maximization*** draws on the

linkware of service operation, examines the flow experience, and assists designer to design the linkware to integrate the whole service. First, Kelly needs to identify the sub-service of the given value network and to decompose this sub-service into five customer-introduced variability. Then, she could follow the recommendation we provide to decides the strategy for each sub-service of each variability. Second, our module would suggest the suitable elements used in existing database. Kelly could keep track of the degree of completion for each flow elements. Third, we provide the Linkware Design Deployment as a representation of linkware to guide Kelly. Now, she could observe which one is relatively low and she wants to deal with it first. Therefore, she could design a linkware, for instance, a linkware that transfers the price more instantly between Agency and the other buyer or seller. Moreover, she could evaluate the costs when adding or integrating the linkware. Besides, by our module that provides the current degree of linkware flow experience, Kelly could adjust the variable through other modules if the degree is low or is not be satisfied.

In the last stage, ***Fulfillment Testing System*** assists Kelly in checking on the effects of each above stages and in monitoring the condition of service design, which accomplishes the graduation of D3 Accelerator or not. This sub-model attempt to find a balance point between above three stages and examine by measuring the fulfillment of critical mass and network effect level. Accordingly, Kelly is aware of the variables which are the negative effects and needs to adjust the corresponding stage above to reach critical mass.

In summary, our model facilitates designing a destination of digital ecosystem through four stages based on the given value proposition.

Chapter 4 Methodology

Beginning with the conceptual framework, we will propose our methodology which assists service designers to create a decentralized digital destination ecosystem with the CDL perspective in the chapter. And following are our system architecture description and the system modules design specification.

4.1 Conceptual framework

In this section, we demonstrate our research conceptual framework. There are five constructs: voice of customers, activities association, service desirability, service disruption and ecosystem consensus level (See Figure 4.1).

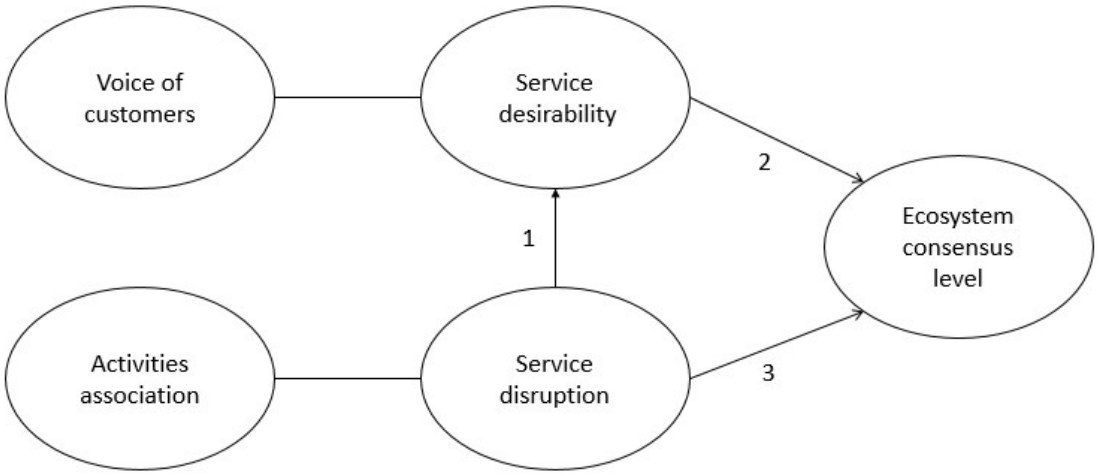

Figure 4.1 Conceptual framework diagram

- *Voice of customers*: As aforementioned, we aim to assist service designers to build a CDL perspective ecosystem. Thus, we adopt voice of customers to help us create a desirable ecosystem. In our research, we use search volume index to represent the voice of customers. Search volume index is the number about times people search for a target in a period. We believe that people search things out of

needs or interest. As a result, the collection of high search volume index represents great focus from people.

- *Activities association*: To become a comprehensive service ecosystem, service design must be well-considered in each activities and encounter points all around. Nevertheless, service designer must have extreme knowledge to the entering area when designing a destination service ecosystem. The activities association can give a helping hand for those designers without the complete knowledge. Through the suggestion of activities association, designers can get insights about what are the other relevant activities all around the planned service.
- *Service desirability*: Service desirability could be represented in many ways. In this study, we define it as the stakeholders' preference of this service ecosystem. Once the desirability increased, there will be much more stakeholders willing to join the ecosystem. This kind of situation could create a strong reinforcing loop and attract other stakeholders. Thus, we choose service desirability as a critical construct in building a service ecosystem. On the other hand, to create a CDL perspective ecosystem, we have to put more focus on customers in terms of the coverage of their intended value activities. So, we adopt voices of customers as an index of service desirability. In this study, the voice of customers is represented by search volume index which is the number about times people search for a target in a period.
- *Service disruption*: Besides desirability, service disruption is another important element in service ecosystem construction. In this study, service disruption refers to the innovation and difference from other services. In other words, designers can not only fulfill users' satisfaction but try some new combination of service activities. By doing so the brand awareness could be raised for the extraordinariness. Hence, the service ecosystem can have a step closer to

destination out of customers' attention. In our research, we try to use service activities associations to find a proper way to represent service disruption. The associations between activities will be defined by semantic and co-occurrence dimensions. We believe it would inspire service designers more innovative service configurations.

- *Ecosystem consensus level*: In the win-lose conflict table, we have four types of situations, which are win-win, win-lose, lose-win and lose-lose. From the service science perspective, we try to create more value through collaboration and accommodation. Just as we know, both of them are needed in the win-win situation. Consequently, we use ecosystem consensus level to examine the interactions between each stakeholder to check how the collaboration and accommodation going are. The ecosystem will have higher successful rate with the higher level of consensus.
- Arrow 1: Because of the sense of freshness which comes from service disruption, the service desirability is argued to be increased. However, this kind of effect might also be negative when the disruption is excessive.
- Arrow 2: With higher service desirability, the service ecosystem could attract more customers to use it. This would make other stakeholders have interest to join the ecosystem and create more interactions. These added value created by interactions between stakeholders will increase the total consensus level of ecosystem.
- Arrow 3: Service disruption is another factor that will affect the consensus level. If the disruptive service cannot set up the proper roles to stakeholders, they would not make consensus to the ecosystem configuration. Thus, we believe if the more incremental the service disruption is, the easier for stakeholders to make consensus. Because, most of stakeholders are familiar with their role and

understand what they need to do.

4.2 System Architecture

This section will provide our system architecture that aims to diminish the service designers' obstruction in creating their service ecosystem. In order to help designers to build their CDL perspective decentralized digital destination ecosystem, the system architecture design is based on our conceptual framework in previous section 4.1. Since our system intends to relieve the difficulty of service ecosystem design which requires the CDL characteristic and an equitable environment to make it more possible to be successful. The system architecture contains three modules: value activities analysis module, stakeholder puzzling module and consensus measurement module (See figure 4.2).

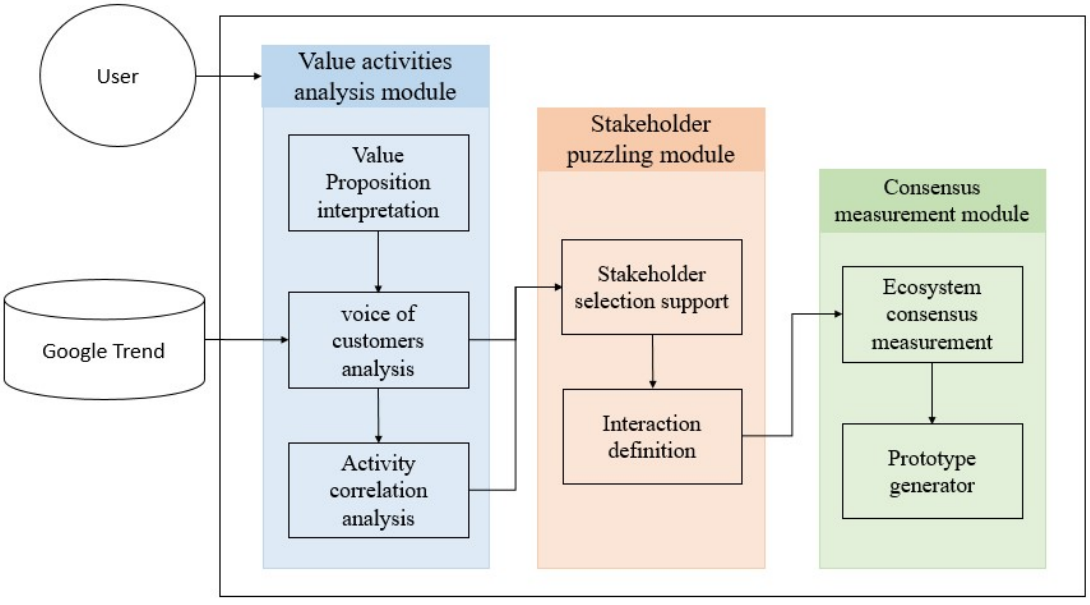

Figure 4.2 System Architecture

Value activities analysis module: As the beginning of system, value activities module plays an important role in specify service activities and data and collecting.

First, value activities analysis module will convert the value proposition inputted by service designers into certain service categories combinations. If designers accept the suggestion of categories combinations, the module will conduct the following procedures. Secondly, according to the designated combination, this module collects data about the related service activities. Then use two of the submodules –voice of customers analysis and activity association analysis to make a step closer to customers.

Stakeholder puzzling module: Even though service designers could be effort-saving with the recommendation of previous module, they need to define the scope of their ecosystem and design service activities by themselves. Since there is still a gap between service activities and service stakeholders, stakeholder puzzling module is settled for assisting designers in service value network creation. Stakeholders are one of the operant resource in an ecosystem, so service designers have to carefully assign their roles to make the configuration much more efficient. Stakeholder puzzling module not only gives the advice about stakeholder selection but guide designers create activities interactions. However, the result of service constellation might be out of designers' control. Thus designers would go back and forth between value activities analysis module and stakeholder puzzling module.

Consensus measurement module: Because our objective is to build a CDL perspective decentralized digital destination ecosystem, our system has to give more specific advices to designers to let them know the achievement possibility. In our conceptual framework, the achievement possibility depends on the consensus level of the ecosystem. Consequently, consensus measurement module evaluates the interaction effect of each stakeholder to see whether every stakeholder is taking care or not. Finally, we carry out a prototype generator to convert the ecosystem design into pseudo code of blockchain-based smart contract & DAO (Decentralized

Autonomous Organization). Hence, the implementation of service ecosystem can be accelerated. The whole system working processes is as the following figure 4.3. And the terms comparison table of ecosystem and blockchain is shown as table 4.1.

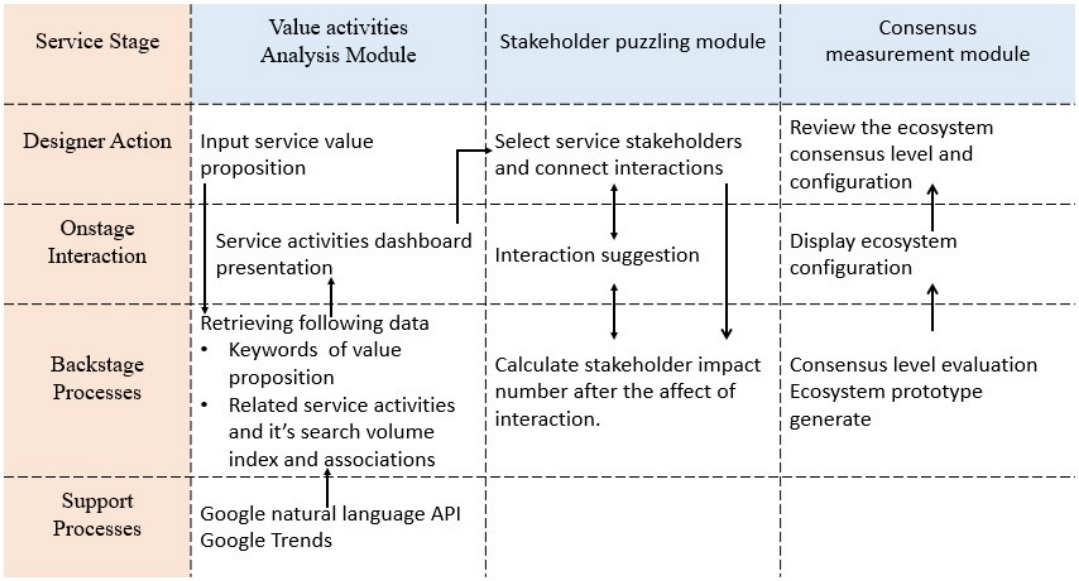

Figure 4.3 System working processes

Table 4.1 Terms comparison table of ecosystem and blockchain

Ecosystem	Blockchain	Explanation
Value configuration	Smart contract	For a designed service, value configuration and smart contract manifest the whole service setup and value exchanges.
Interactive value creation	Smart property	Since blockchain is realizing the internet of value era, everything (tangible or intangible) could be exchanged toward value creation through the internet. The interactive value creation in the ecosystem can be realized in terms of the transfer of smart properties specified in smart contract.
Stakeholders	Roles	Smart contract needs to define roles involved like ecosystem having to realize what stakeholders are necessary. Each role and stakeholder has its' rights and obligaions.

The sections below will depict these three modules in detail and use some demonstration to make it more understandable.

4.3 Value activities analysis module

To build a smooth path to become a destination digital ecosystem, value activities analysis module aims to collect customers' voice which will be linked to interpreted value proposition from service designers. This module will go through three processes (See figure 4.4).

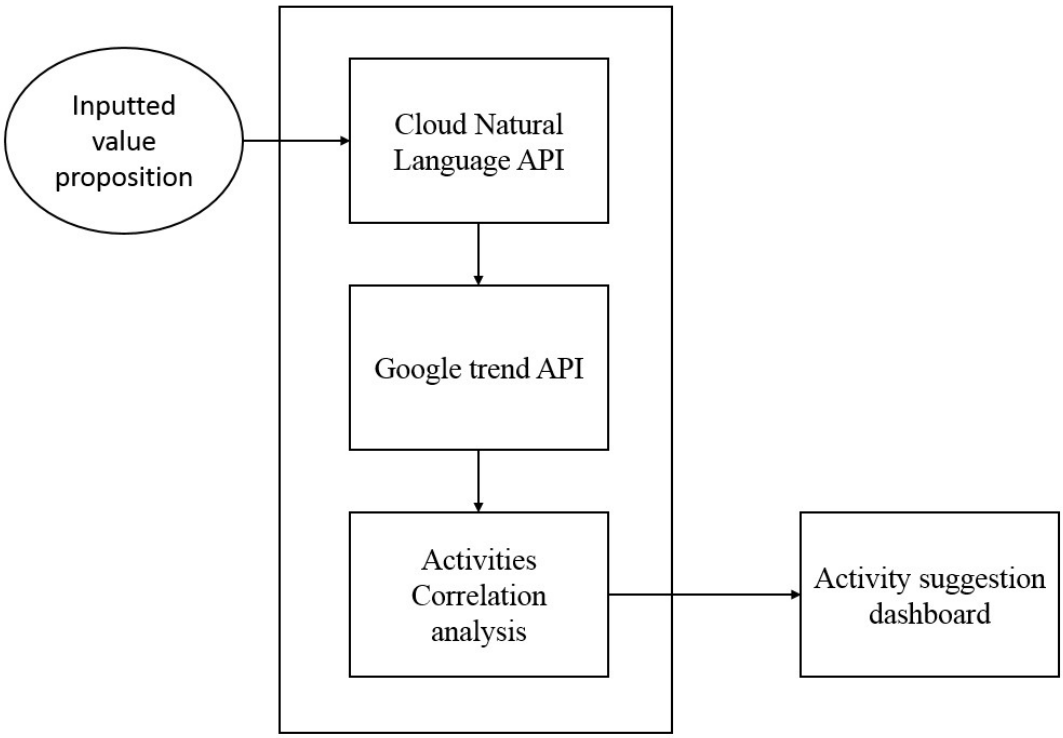

Figure 4.4 Value activities analysis module

The first step is to make our system understand the service designers' value proposition. By doing so, the result of configuration will more close to what the designer's mindset. In value activities analysis module, we call Google cloud natural language API to figure out important part of the inputted value proposition. Figure 4.5 shows a simply dependency parse tree of a sample inputted value proposition which is "Assisting people to make an affordable, sustainable and meaningful life." from could natural language analysis. We can see that the dependency parse tree contains each

word's relationship and part of speech. Analysis starts from the word has the most associations with others, then connecting to other words in order to form an expression. It is worth to mention that priorities of nouns and adjectives are higher than verbs and adverbs, last are conjunctions, prepositions and determiners. With these information, we can get affordable life, sustainable life and meaningful life these key words from the inputted value proposition and start the second step in this case.

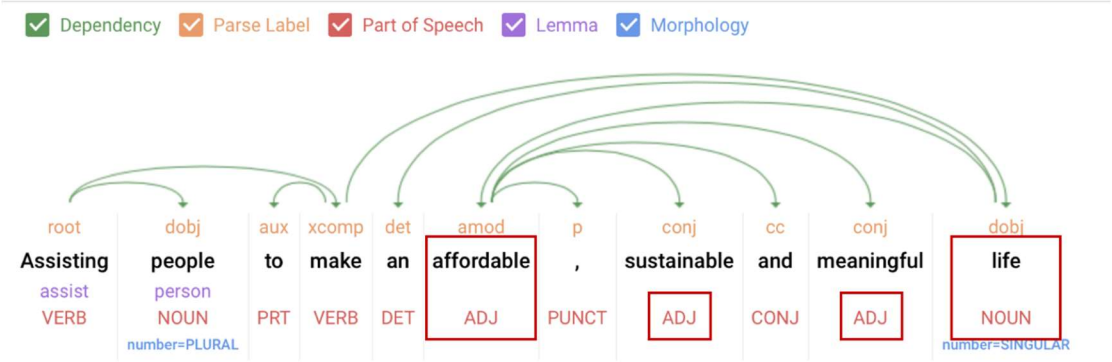

Figure 4.5 Dependency parse tree of cloud natural language API

After the interpretation of cloud natural language, we now have some key words about what the service designers want to do. However, it is still hard to construct a CDL perspective digital destination ecosystem only with the designers' mindset. In other words, the service activities constellation can hardly satisfy customers in most of the service encounters out of considering customers demand. This ecosystem would lose attention or merely become partial choice in the customer value-creation journey. Thus, the following steps are discovering the activities of related voice of customers and analyze the association of these activities. In our research, we adopt search volume index to represent the voice of customers for people would search for what they want and interested in.

We use another Google service - Google trends, one of the best search volume

index interpreter based on innumerable data from Google search. Google trends provides us an efficient data collecting method which contains related topics and search data of our inputted keyword Fintech, for example, Google trend gives us topics like “blockchain database”, “bitcoin” or “crowdfunding” (See Figure 4.6). Since the purpose of our system design is to arouse service designers’ imagination by activities suggestion, we have to reconfigure the outputted data into two different types: service activities and service stakeholders. The service activities category is mainly about the actions related to our inputted keywords. On the other hand, service stakeholders are some roles correlated with our searches. By doing so, we can suggest service designers a list of service activities and gather the possible stakeholders for next module.

Figure 4.6 Google Trend result of Fintech search

To inspire service designers, the other thing to do is defining activities association. In this study, we apply DISCO (extracting DIStributionally similar words using COoccurrences) method (Kolb, 2009) to find the emotional relationship between service activities. DISCO provides words analysis methods DISCO1 and DISCO2 based on co-occurrence and semantics analysis. DISCO1 provides co-occurrence information of targeting words through a series of analysis methods. On the other hand, semantics analysis method called DISCO2 compiles the word vectors which represent the using context of the word to examine the relations

between words.

However, DISCO could only find relations between single words. Thus, we have to abstract or simplify service activities' concept to a single word. For example, go hiking could be simplified to hike, take a bus could be abstracted to transport. Doing this kind of transformation, DISCO can give us semantics and co-occurrence score perfectly. We argue that the associations of service activities will be much clear by inspecting these two scores together. If both the two dimensions are low, an opposite relation between the two activities appears. In contrast, high semantics and occurrence might represent these two activities are close and similar. And there is another association called complementary located between contrast and similar (See Figure4.7). Complementary association means the two activities might own some advantages that can overcome the other one's weakness. Since similar association refers to activities having something in common or sequential related, yet contrast association present a conflict feeling or hard to connect between activities. These three types of associations can possibly bring about incremental and disruptive innovation. Having this judgement, service designers can try more disruptive combinations as they wish.

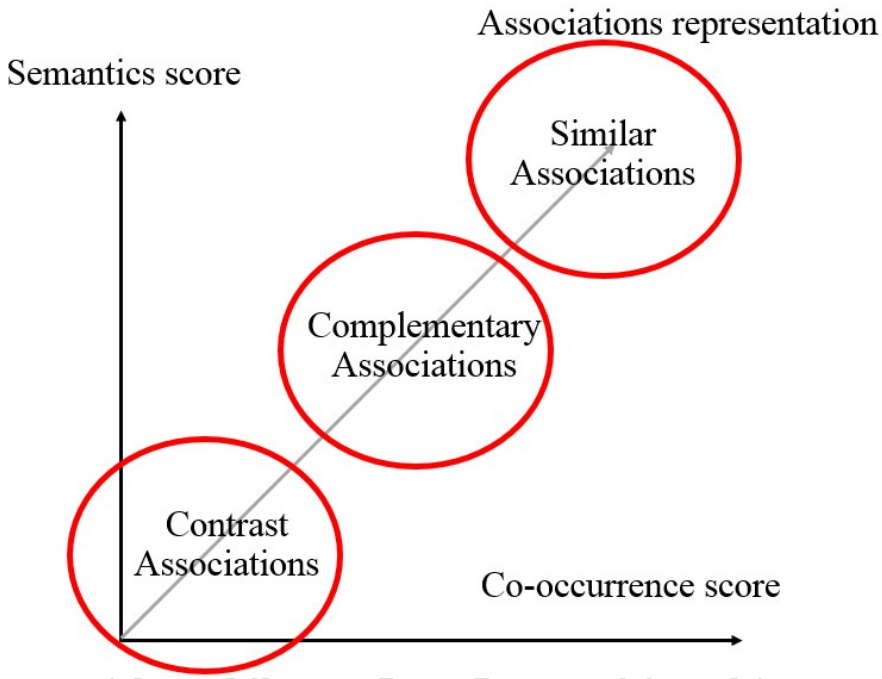

Figure 4.7 Associations representation

4.4 Stakeholder puzzling module

Stakeholder puzzling module aims to help service designers configure their ecosystem via stakeholders and interaction suggestion (See Figure 4.8). Service designers need to think about what service activities are essential to the ecosystem after value activities analysis module's linking their value proposition to the voice of customers.

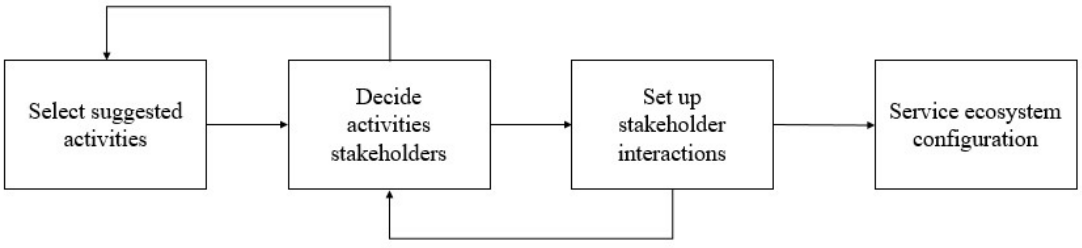

Figure 4.8 Stakeholder puzzling module

Since value network perspective can enhance the integration of stakeholders and marketing (Lusch, Vargo, & Tanniru, 2010), we adopt value network to help service designers consider interactions and stakeholders' role playing in the ecosystem.

Stakeholder puzzling model will show designers required role in their selected value activities as a remainder. Service designers can find out the importance of stakeholders from the suggestion list and give an impact number to each selected roles. Impact number of stakeholder is ranged from 1 to 10 and assigned by service designers reflecting the gravity of the stakeholder in designers' service activities configuration. In the end of system design, service designers can point out the priority between stakeholders through the impact numbers. After the roles are settled, service designers have to make some effort to contemplate the interactions between each stakeholder. According to the Service-dominate logic (Vargo and Lusch, 2004a), service interaction can be divided into tangible and intangible. In order to make it easier to see the ecosystem revenue, we highlight the monetary from the tangible interactions (See Table 4.2).

Table 4.2 Interaction types in Stakeholder puzzling module

Interaction types	**Definition**
Monetary	The payment and money income between stakeholders.
Tangible	Goods and service distributed from supply to demand side.
Intangible	Benefits that is not directly received via the formation of money or products. It might be some abstract concepts like loyalty, membership or the number of contacts.

Even though our module provides the types of interaction, service designers need to configure each interactions and the effect upon. Furthermore, the interaction effect has positive and negative types. Positive effect means this interaction will benefit the stakeholder, but negative one represent will weaken the linked stakeholders. Since service ecosystem is dynamic, the interaction effect will change the impact number of the connected stakeholders (See Figure 4.9). According to different connections of

interactions and their assigned effects, there may exist various kinds of results for the same value network configuration. Service designers should make a comprehensive consideration in designing interaction in order not to overlook or overrate.

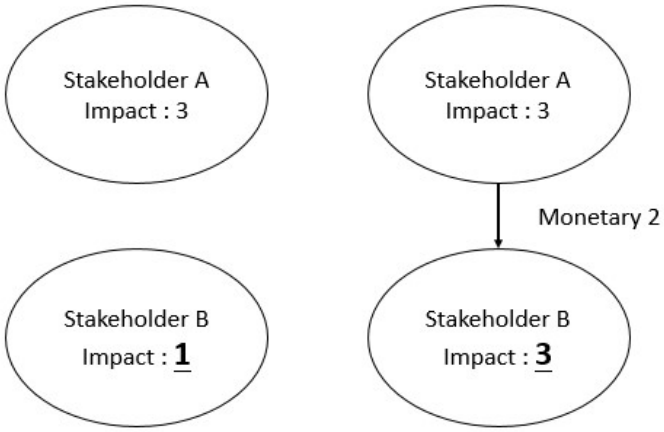

Figure 4.9 Interaction effect on stakeholders

Besides value network configuration, stakeholder puzzling module provide another evaluation about service desirability and service disruption. According to the selection of suggested roles from value activities analysis module, we can know which activities the operant comes from and understand the search volume index of the original activities ranging from 0 to 100. We propose two formulas to evaluate desirability and disruption respectively based on this information.

$$(1)\ \text{Service desirability} = {\sum SA_{svi}}\Big/{\sum SA} \times PR$$

$$0 \leq \text{service desirability} \leq 100$$

SA_{svi}: Search volume index of selected activities

$\sum SA$: Total number of selected activities

PR: the percentage of stakeholder roles picked from the list of suggested stakeholder roles of the selected activities (i.e., number of selected roles / total number of suggested roles)

Formula (1) computes the service desirability through getting the average search volume index of service activities, which represents the voice of customers. Since the higher voice of customers will increase the desirability, the average search volume index can make us understand how desirable the ecosystem is. However, if the designers select the activities only and puzzle the stakeholder configuration disorderly, the desirability score will be trustless. Thus, we put the PR number in the formula to review the selected activities' degree of completion to avoid the disorganized situation.

$$(2)\ \text{Service disruption} = 1 - \min(MA, CA)_a$$

$$0 \leq \text{service disruption} \leq 1$$

MA: main activity

CA: combined activity which is picked for producing new value activities

a: association of MA and CA

From our conceptual framework, we see that if the designed service activities is combined from two or more activities without causal relationship, it would have more chance to be disruptive. Consequently, in formula (2), we find the service disruption via checking the min association distance of service activities in the ecosystem. The association distance means the measurement based on the semantics and co-occurrence scores between every two selected activities. We believe that once the distance increases the service combination will be more disruptive. To realize the most disruptive degree, we have to overview the associations and pick the furthest distance as the formula (2). Table 4.3 below shows a simple example.

Table 4.3 Activities' stakeholders list and association scores

Selected activities	Saving money	Shopping
Search volume index	5	67
Stakeholders	Moneybox Borrower **Saver**	**Shopping store** **Shopper**
Association scores	Semantics: 0.168 co-occurrence: 0.492	
	Distance: 0.519	

In this case, service designer selected “saving money” and “shopping” as the new service activities combination. We can find the search volume index, suggested key stakeholder list and association distance in the table and start to evaluate desirability and disruption. Given the scenario that designer only selected “Saver”, “Shopping store” and “shopper” as stakeholder.

(1) Desirability:

$\sum SA_{svi} = 5 + 67 = 72$, $\sum SA = 2$, PR = 3 / 5

$$\frac{72}{2} \times \frac{3}{5} = 21.6$$

(2) Disruption:

Since there are only two activities, the min association distance is the number they have, which is 0.519.

1 – 0.519 = 0.481

The purpose of desirability and disruption evaluation is to make designers realize whether their value network configuration is close to customers and divergent with existing service ecosystems or not. In the case above, the desirability score is low and the disruption score situates in middle level. It means that the combination of

activities might not be eye-catching for the improvable selection. Service designers need to redo the activities selection to raise the performance. The other fact affects the success of ecosystem is consensus. Higher consensus level means the stakeholders have more intention to join the ecosystem. Thus, the network effect will become stronger and increase the desirability and disruption power. The evaluation of consensus is depicted in next section.

4.5 Consensus measurement module

In this section, we are going to introduce the fianl module of our system – Consensus measurement module. Unlike stakeholder puzzling module focues on the envirmental competence, we concentrate on the stakeholder relationship measurement in ths module. Furthermore, we provide a portotype generator converting the designed value network configuration into blockchain smart contract to accelerate the decentralized digital destination ecosystem's deployment. Once the service designers does not stastify the result, they can go back to previous module to reconfiguration. Below is the module process (See Figure 4.10).

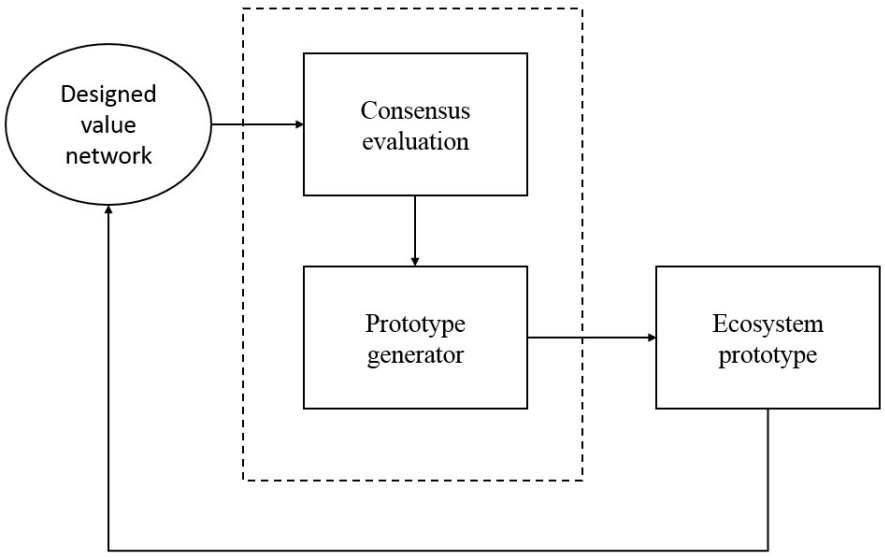

Figure 4.10 Consensus measurement module

If the ecosystem wants to survive and sustainable sustainably expand, the stakeholders involved should satisfy their role and willing to put more resources into the ecosystem. We believe the win-win situation is the best way to convince stakeholders staying. As a result, our consensus measurement is to figure out whether every stakeholder is situated the benefit proposition. The evaluation formula is presented below.

$$(3)\text{Consensus level} = \sum S_i I_j^+ + \sum S_i I_j^-$$

$S_i I_j^+$: Stakeholder i's j^{th} number of positive effect interaction

$S_i I_j^-$: Stakeholder i's j^{th} number of negative effect interaction

Both $S_i I_j^+$ and $S_i I_j^-$ come from the stakeholders interaction of value network configuration. To evaluate consensus level, we need to review the configuration to calculate every stakeholders' consensus. Figure 4.11 displays a simple case of stakeholders' interactions. Stakeholder X will receive money income and the population growth from the other stakeholders in the smart contract. However, there might be a stakeholder Y playing a role that will replace stakeholder X sometimes leading to weaken stakeholder X. And interest expense is another factor that will affect the satisfaction of stakeholder X. There are two positive effects (member number +5, Monetary +2) and two negative effects (Partial replace function -2, Interest expense -4). As formula 3, we can get the consensus level of stakeholder X is (5 + 2) + ((-2) + (-4)) = 1.

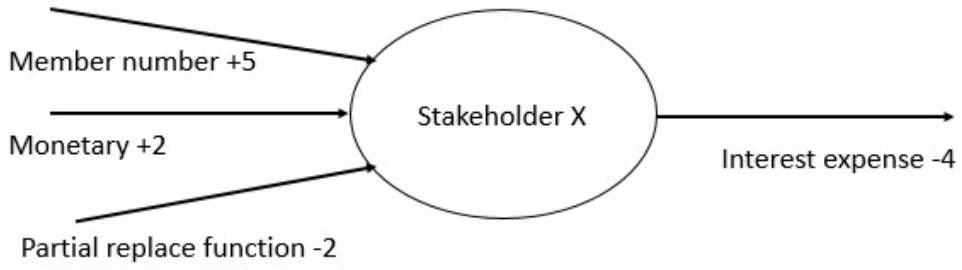

Figure 4.11 example of stakeholder consensus

From the evaluation, we can summarize a total consensus score of the ecosystem by obtaining the percentage of satisfied stakeholders whose consensus situated at positive level out of all smart contract stakeholders. We set three intervals to judge the ecosystem configuration is suitable or not (See Table 4.3).

Table 4.3 Consensus level index sheet

Score	**Judgement**
0 to 50	This configuration is too biased to some stakeholders. It would cause the unbenefited part of stakeholders do not enter the ecosystem and make service activities dysfunctional.
51 to 80	There is some space to improve the interaction design. Try to increase come rewards or decrease to cost of stakeholders to raise up the score.
81 to 100	It is a feasible configuration. Start your decentralized digital destination ecosystem now!

On the other hand, the prototype generator processes the value network transformation at the same time. Since we aim to help service designers to create a blockchain based decentralized ecosystem, prototype generator will provide a pseudo code version smart contract. The other purpose of the generator is to specify the smart properties in the smart contract. Smart property in blockchain is the property owned by stakeholders and its ownership is exchanged via the smart contract agreement. Service designers can convince stakeholders to join the ecosystem with the clear

playbook telling each roles' pros and cons from smart property exchanges. Following are the transformation steps:

Step 1: declare roles of smart contract

Because we take the whole service ecosystem as a smart contract, we select the ecosystem stakeholders as the roles in the contract.

Step 2: define the smart property

Due to the sharing characteristic of blockchain, everything could be recognized as smart property. We think the interactions between stakeholders surely are smart property exchanges.

Step 3: activity function packaged

Becoming easier to read and maintain, we will gather the related exchange together and settle them in the functions.

Through the whole process of the three modules, we believe service designers can relieve from the hard work of insight discovering and stakeholder configuration. Next section will propose a scenario to present the design steps.

Chapter 5 Application and Scenario

As a service designer, we desire to create a digital ecosystem that can make the society become better and better. We believe the core value of information technology is to implement services in order to improve the world. Accordingly, our value proposition:

"Solving present problems to improve people's lives and reach a better world."

From the very beginning of the digital ecosystem design, we follow the proposed guideline of D^3 Accelerator begins at the starting point of value activities analysis module. The module receives our value proposition and begin to analyze. The first step to configure ecosystem helping us to find the key words of the value proposition are "improve" and "improve lives". With these two key words, system starts to show related activities and their search volume index which represents the searched times by people. Unfortunately, we cannot find any inspiration of these keywords on google trend, therefore, we decide to use another terms of "present problems".

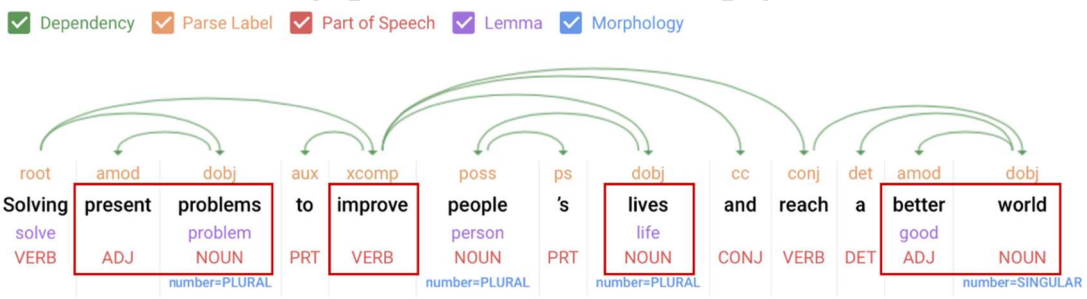

Figure 5.1 analysis result of google cloud natural language API

When talking about the present problems of the world, we might instinctively connect to crime, violence, war, disease, climate, or economic situations. However,

when searching for the result of "world problem" in google trend, we got a correlative word out of our expectations – **poverty** (Figure 5.2). Based on the arising level of basic living standard, more and more people has strength to spare on paying attention to the one who is under the level. There are many people who needs help or even if there are no changes happened will take away their lives. Moreover, poverty is also the first problem published in "The 10 Biggest Problems In The World According To The EU" in Business Insider. Due to these reasons and the result of share of voice, we decide to find out a straightforward solution to poverty.

According to our initial value proposition and combine with the direction to alleviate poverty, we have strong ambition to make the world filled with happiness and try to narrow the gap between rich and poor. Consequently, we extend the concept of happiness measurement index – Gross National Happiness (GNH) to our research, attempt to set up a general direction of poverty solution. GNH is an index of development philosophy indigenous to the country of Bhutan, which is used to measure the collective happiness in a nation. It attaches importance to sustainable and equitable socio-economic development, environmental conservation, preservation and promotion of culture, and good governance (Source: Wikipedia). We extend its concept to our development and contemplate upon the probabilities of the causes of poverty and finally determine to choose the cause of "**unevenly allocated resources**" which we think is the most possible to be improved by information technology, then come up with a bartering system to fulfill reducing poverty and increasing average level of GNH.

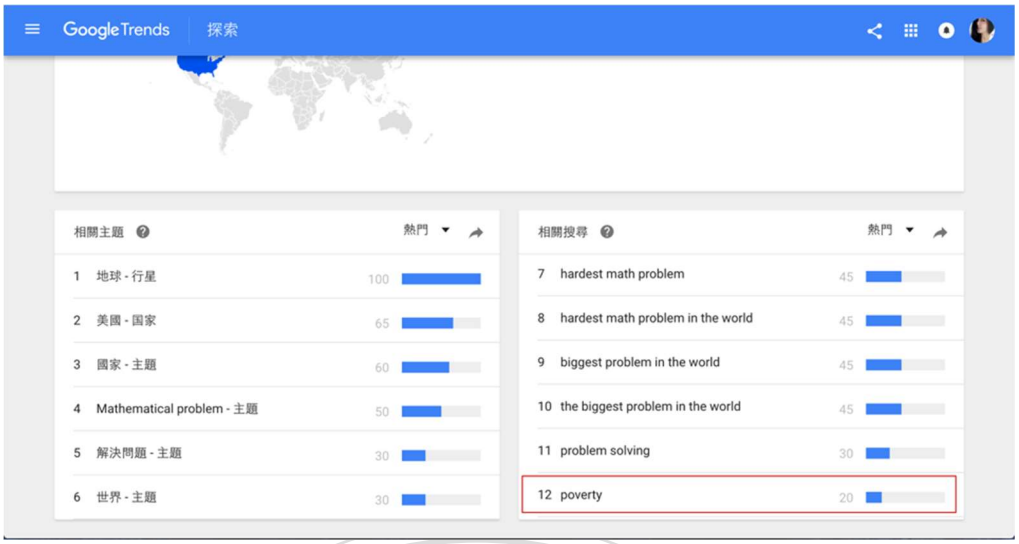

Figure 5.2 result on google trend of "problem in the world"

Resources allocated unevenly means some resources are not delivered to the one in need and some are wasted by the one who owns too much. We think the situation will get worse by reason of the Matthew Effect, which apply to economic domain interprets the phenomenon of growing wealth disparity. In order to alleviate this problem, we try to design a mechanism that can maximum the perceived benefit of every stakeholder in the ecosystem. Besides, because our fundamental instrument of development is blockchain, our bartering system is characterized by decentralized, consensual, trustworthy, and so on. These characteristics are the superiority value-added to the bartering mechanism, which is also the main reason why we choose to implement bartering transactions on the blockchain instead of platform.

Moreover, we had a great discovery that it is worthy to be mentioned while we are searching for the inspiration on google trend. We got a stimulation of solving problems with a gamification prospective subsequent to the search result of "better world". We tried every composition according to our value proposition and we got a relation share of voice of "gaming can make a better world" (shown in Figure 5.3 as below). Owing to the inspiration, we decide to develop a farming game which involves a bit of healing purpose and entertainment, also allows users to simulate

abnormal property bartering contrary to traditional transactions, and furthermore to realize the gamification solution of resource allocated problems and to achieve the vision of improving poverty.

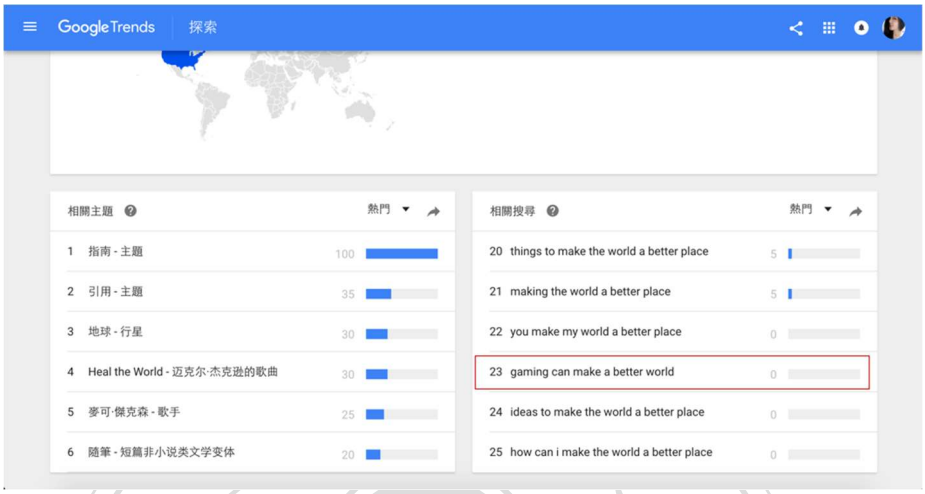

Figure 5.3 result on google trend of "better world"

In addition to the search volume index, we refer to the popularity ranking of searching result of google trend in the meantime. Popularity ranking of searching result contain the concept of time and show us a message about the latest trending searches within a period, more than the volume of searching. Combine with these two reference index we can better know the real thoughts of our potential users. Therefore, we calculate the average popularity ranking of this year, integrated with other information and shows in Table 5.1 at below.

Table 5.1 Examples of recommended activities and key stakeholders

Activity(search volume index)	Popularity ranking	Key stakeholders
Alleviation of Poverty (100)	51.36	Charity, Consultant, Foundation
Barter System (100)	83.68	Owner, Receiver
Online Game/ Free Game (40)	57.8	Designer, Developer, Deliverer

After the activities are selected, the stakeholder puzzling module takes over the supportive tasks. In this stage, we review the stakeholder list presented in Table 5.1

and decide the importance of stakeholders which are owner, receiver, designer, developer, and deliverer. Next we give each necessary stakeholder a score to show its impact in the ecosystem, in this case, stakeholders relative to game (like game designer, develop engineer, and service delivery) are all the members in D^3 Accelerator project team. Following the impact number decision, we then start to consider interactions between stakeholders to facilitate value exchanges of ecosystem. In this application, the main participants that will engage in the core activity of bartering is only our game player, which can play the role of owner and receiver at the same time. When designing the interactions of stakeholder, we have to try our best maximizing the benefit of every property could possibly create in order to increase the value of ecosystem to be exchanged in the configuration.

Meanwhile, since each interaction can benefit or diminish stakeholders, we have to make a come up with an initial beneficial framework at the interaction effect on both side. For instance, when configuring interactions between farmers who are the owner and receiver in the meantime, we define the bartering interactions between them as “Ownership transfer”. Since both owner and receiver can exchange crops they desired by supply excess production crops, we assume “Ownership transfer” will create a positive five point of impact number to each other. Besides, the alignment mechanism operating based on two stakeholders “Guard” and “Thief”, thieves will gain extra bonus by virtue of stealing crops from other players; and guards will gain extra bonus by virtue of successfully guarding others farm. These two interactions may benefit thief and guard themselves, but they would make inroads on the other stakeholders. For example, farmer will lose half of their crops when he is stolen, thus we set the interaction of stealing crops has negative four point of impact number on farmer’s side. Another interaction such as interrupt stealing, guard will make thief’s steal rate decrease and generate a negative six point of impact number. Accordingly,

we think up our value configuration show in Figure 5.4, stakeholder puzzling module and consensus measurement module can evaluate three indexes of the ecosystem that are “service desirability”, “service disruption”, and “ecosystem consensus level”.

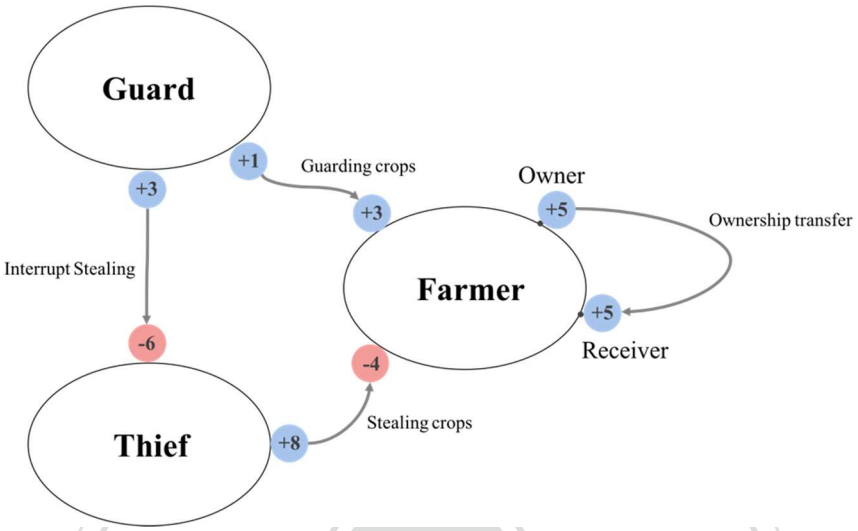

Figure 5.4 configuration of farming bartering system

The service desirability evaluating formula shown below is defined in section 4.4 and the evaluation process is shown below:

$$\text{Service desirability} = \sum SA_{svi} \Big/ \sum SA \times PR$$

$$\sum SA_{svi} = 100 + 100 + 40 = 240,\ \sum SA = 3,\ \text{PR} = \frac{5}{8}$$

$$\frac{240}{3} \times \frac{5}{8} = 50$$

Service disruption:

According previous section 4.4, service disruption is measured by the min association distance of the concepts extracted from selected activities. Table 5.2 shows the association distances between the concepts which are poverty, barter and game. Now, we can check the service disruption score.

$$\text{Service disruption} = 1 - \min(MA, CA)_a$$

$$\min(MA, CA)_a = 0.004$$

$$\text{Service disruption} = 1 - 0.004 = 0.996$$

Table 5.2 Association distance of selected activities

	Poverty	Barter	Game
Poverty	n/a	0.015	**0.004**
Barter	0.015	n/a	0.008
Game	**0.004**	0.008	n/a

Ecosystem consensus level:

From Figure 5.4, firstly, we sum up the impact numbers of each stakeholders. The evaluation processes and result listed below:

- Farmer: 5 + 5 + 3 – 4 = 9
- Owner: 5
- Receiver: 5
- Guard: 1 + 3 = 4
- Thief: 8 – 6 = 2

Table 5.3 Stakeholder consensus level

Farmer	Owner	Receiver	Guard	Thief
+9	+5	+5	+4	+2

We can see that all stakeholders there can meet the consensus status in Table 5.3, even we particularly pick out owner and receiver from farmer there will be no exception of the result. Consequently, the consensus level of ecosystem = 5 / 5 × 100% = 100%

Finally, we get our ecosystem configuration with three dimensional judgements with three module's support above. Next we will start to consider about how to deliver the ecosystem to stakeholders or re-configuring the value network to improve those computing scores. It is worth to be mentioned, those modules are also suitable for supporting configuration adjustment of existing ecosystem or even after the digital ecosystem is launched.

Chapter 6 Evaluation

In this chapter we are going to illustrate our evaluation which is designed for examining the proposed framework and mechanism for service designers. In order to ripen into a digital ecosystem that is desirable and disruptive to better achieve customers' expectations, we design the evaluation model by simulations and observational case study according to the design science research evaluation method (Von Alan, March, Park & Ram, 2004). We actually developed a simulated application – Blockfarm based on proposed guideline and expected to collect user's data from both system operation and questionnaires' feedback. Introduction and design-thinking track of system simulation has illustrated in Chapter 5, Chapter 6 will be our propositions, reference and designed logic of questionnaire, measurement and result.

6.1 Propositions

Following propositions are on purpose of justifying the proposed contention mentioned in conceptual framework (see in Chapter 4) and testifying the connection of the proposed factors and their influences on the consensus of destination digital ecosystem among involved stakeholders. That is the reason that those propositions are composed of the assumption and the interactions between desirability, disruption and the consensus level of ecosystem.

- *Proposition 1. Service disruption has positive influence of making the service more desirable.*
- *Proposition 2. Service disruption has positive influence of increasing the*

stakeholder's consensus level.

- *Proposition 3. Service desirability has positive influence of increasing the stakeholder's consensus level.*

6.2 Assumptions

- *Assumption 1. Users are willing and trusting to do the properties transactions with others.*
- *Assumption 2. Users are willing to give us authentic feedback of their actual response to our system.*
- *Assumption 3. Users are willing to contribute for improving the whole ecosystem.*

6.3 Questionnaire Design

According to the conceptual framework and research propositions, the verification of this research will focus on two domains, which are desirability and disruption. This chapter we will illustrate how our research testify proposed theory and what concepts of questionnaire we chose referring to others researches. The design logic of verification will be clarified as follows, besides, the measurement and variables mapping to our system will be demonstrated in section 6.5.

When talking about desirability of service including various of perspectives and will differ according to distinct characteristics of people, however, the aspects of service that are most desired by customers refer to the tangible elements of the facilities and intangible construction of service; the attitudes and abilities of service deliverers; the cost of participation; and also programming and scheduling of the services provided (Afthinos, Theodorakis & Nassis, 2005). The above-mentioned

phases of service desirability are all related to perceived value and sensation of service delivered interactions. Attaching importance to the experiential value perceived from customers is now be thought of as a top priority in the digital ecosystem design, which is surely the most important determinants of consumers' behavior (Abedi, & Rostami, 2012; Jia, He Michael, et al., 2012). They cause either large or small impact on the quality of services that has already become a key strategy concept of service management and is already validated to be a greater significance of service desirability (Abedi & Rostami, 2012).

Disruption of service is an emotional sense and instinctive correlation which can be reflected on word-of-mouth. Customers often spread more word-of-mouth about originality and usefulness of new services, in order to attract more attention, a disruptive service should be novel, unusual, and even unique (Moldovan, Goldenberg & Chattopadhyay, 2011). Moreover, in current value-based economy, service providers compete to others so as to meet customers' expectation by adding various types of value to products and services. In this way, the combination and appropriateness of these new ideas gradually become one of competitiveness achieve success. That is, expanding new ideas of service disruption and creativity shows relevance to customer behavior, and it had fully understanded the impact of service disruption on customer attitudes and purchase intentions (Horn & Salvendy, 2006).

Synthesize the mentioned perspectives and concept above, we proposed fifteen questions in our questionnaire which can be found in appendix to verify the proposed theory. For instance, "Our match-making mechanism can help you exchange crops you really want." is to testify the concept of service quality. Another example "The gaming mechanism of Blockfarm is unique and irreplaceable" measures the disruption score.

6.4 Case Study of Experiment

Attesting to our conceptual framework, we follow the guidance and bring out a match-making mechanism. In order to attract more users to try out the mechanism, we further use the gamification concept to create an application - Blockfarm as the promoting channel. Besides the basic farming function, we offer character options to players for enriching the ecosystem. The designed mechanisms are illustrated below.

- Match-making Mechanism

  Following the scenario proposed in Chapter 5, we want to improve people's lives and create a better world. We believe one of the things that we can do is to maximize every properties' value. To accomplish the mission, we elaborate a mechanism called match-making to realize value maximization via properties exchanges. Before starting match-making mechanism, firstly, we ask players to show their preference of properties in Blockfarm by setting up property ratings. Then match-making will find the property people want most and the eagerest player as the start point of this round. According to the system data, match-making will find the next player who can provide this kind of property to the start point and check what this player wants. After this step, the second player becomes a new start point to let match-making search the other candidates till we reach the very first start point. Finally, for the transparence, the processes and result of match-making will be published to blockchain to let players check the details. Doing these steps, we believe match-making can realize the value maximization based on people's desire and become essential to people.

- Character Options

  In the original prototype of Blockfarm, there is only one character farmer. To expand and enrich the application for making Blockfarm much more fascinating, we introduce the other two characters thief and guard into Blockfarm. First, thief is the character who can visit and steal other farmer's crops to satisfy their own desire. We think thief will stimulate some users' motive to join Blockfarm out of excitement and the connection of other users. However, the present of thief would prevent farmers from planting crops. Consequently, guard is the character to stabilize this situation. They can discourage thief from steal by decrease the stealing rate when they are watching the crops. Once the guard completes their mission, they will receive some crops from farmer as reward. At this time, these three characters would make an equilibrium and it is helpful to achieve the consensus level of the ecosystem.

Using match-making and character mechanism, Blockfarm is ready to be our case of experiment to testify our conceptual framework proposed in chapter 4. We will elaborate our measurement and data collection in next section.

6.5 Measurements and Data Collection

In the design stage of Blockfarm, we have integrated the element of desirability and disruption into the system. In other word, Blockfarm is constructed by the concept of desirability, disruption and consensus level. Hence, we use Blockfarm as our study case and publish it to collect data. In this case, we launch a two-phase plan to collect data and monitor each user's behaviors for one week. Phase 1 is the prototype releasing stage. In this stage, we not only collect data via the questionnaire proposed

in Blockfarm, but conduct focus groups interview. Then, we use the collected data to improve Blockfarm and start phase 2 which gather data by questionnaire only. After our experiment, we receive 74 feedbacks (35 in phase 1 and 39 in phase 2). In the following section, we will testify our conceptual framework by comparing the scores of desirability, disruption and consensus level illustrated in Chapter 5 and collected data. The detail data and verification of our conceptual framework will be presented in the following section.

6.5.1 Verification of Disruption

Since the dimension of disruption will affect desirability and consensus level, we will elaborate this dimension first. Figure 6.1 depicts the phase 1 result of questionnaire. We find that the result 3.6 point is far lower than our disruption score 99.6% evaluated in Chapter 5(See formula below). To realize why the deviation occurs, we received two main questions about disruption from the focus group interview.

1. What is blockchain and how it works?
2. How does Blockfarm apply blockchain?

From these two questions, we discover that our instruction is not clear enough to let users understand blockchain itself and Blockfarm's mechanism. Consequently, we tried to simplify the introduction and add some explanations in phase 2.

$$\text{Service disruption} = 1 - \min(MA, CA)_a$$

$$\min(MA, CA)_a = 0.004$$

$$\text{Service disruption} = 1 - 0.004 = 0.996$$

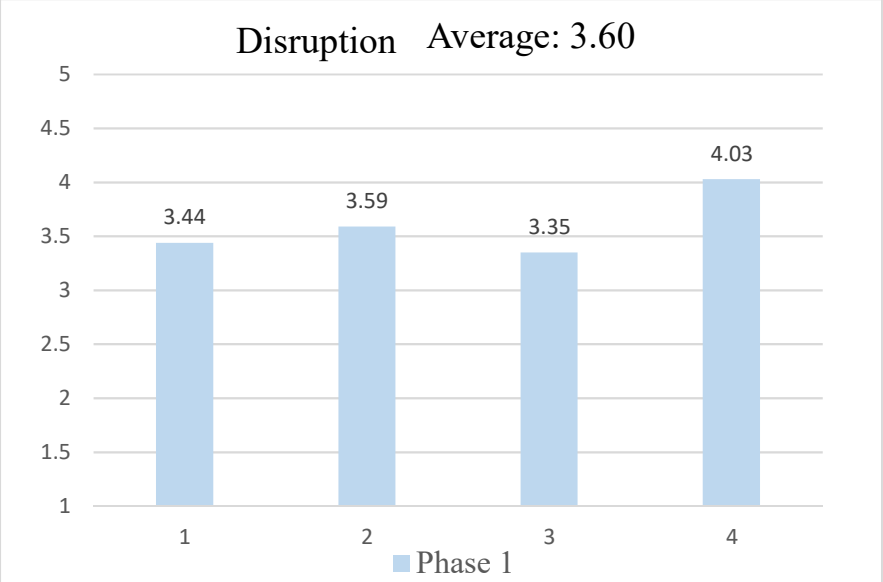

Figure 6.1 Phase 1 result of disruption

At the end of second week, we finished the phase 2 and gathered another 39 feedback. The comparison of the two phases is depicted in Figure 6.2. We can see that the result of disruption in phase 2 has increased 9% to 3.94 point. Unfortunately, it is still far lower than the evaluated score of our framework. Because of the experience of phase 1, the improper service delivery may be one of the reasons that enlarge the difference besides the tolerance of the disruption formula. In the focus group interview, we explain our mechanism of blockchain and how does Blockfarm mechanism connect to it. After our elaboration, most of users can feel the sense of disruption of Blockfarm. However, since Blockfarm is a simulated farming game, users would not perceive the transparence and characteristic and the transaction efficiency of blockchain as intuitive as real world. In simpler words, people would not concern about how does data be stored or whether the match-making results is fair or not as much as the balance number of their bank account. Therefore, the missing connection between Blockfarm and blockchain implies the gamification mechanism does not touch user's life. For these aspects, we think that is the reason why our expected disruption score has the error to the result of our experiment. And the

difference might be smoothed by adding some new elements to immerse users in Blockfarm. For example, we can introduce the contribution degree with social function. Doing so, the result of match-making and the numbers of crop had been provided does matter to users much than before.

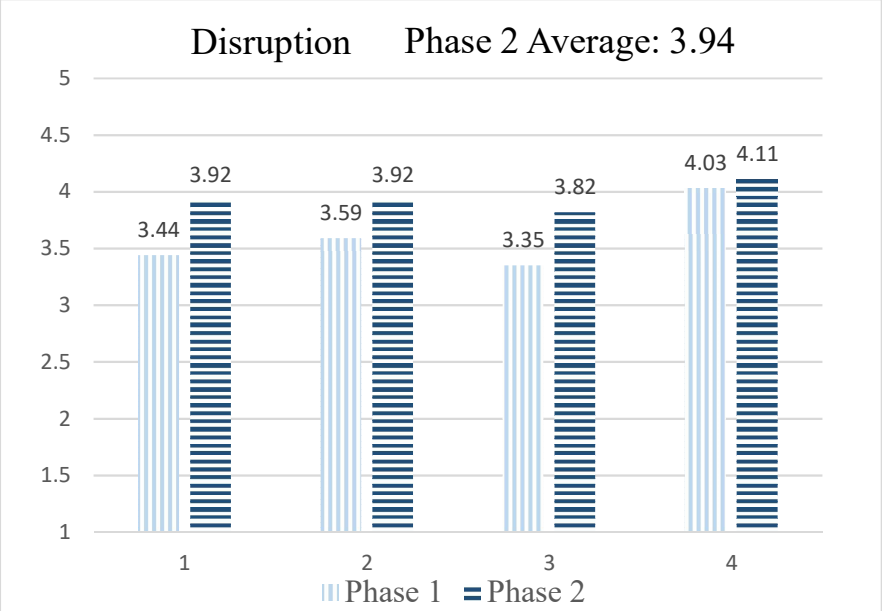

Figure 6.2 Comparison of two phase disruption results

6.5.2 Verification of Desirability

To measure the actual desirability score of Blockfarm, we proposed five questions to get users feedback. The phase 1 results of each questions related to desirability can be find in Figure 6.3. We get the average 3.42 point in our questionnaire. To compare with our desirability score evaluated in Chapter 5, we normalize the point 100 percentage. Doing so, we get 68.4 percent which is higher than our expected desirability score 50 in Chapter 5(see formula below). One of the reason that the result is better than expected is the dimension of disruption will increase the desirability score according to proposition 1 which will be testify in section 6.5.4.

$$\text{Service desirability} = \sum SA_{svi} \Big/ \sum SA \times PR$$

$$\sum SA_{svi} = 100 + 100 + 40 = 240,\ \sum SA = 3,\ \text{PR} = \frac{5}{8}$$

$$\text{Service desirability} = \frac{240}{3} \times \frac{5}{8} = 50$$

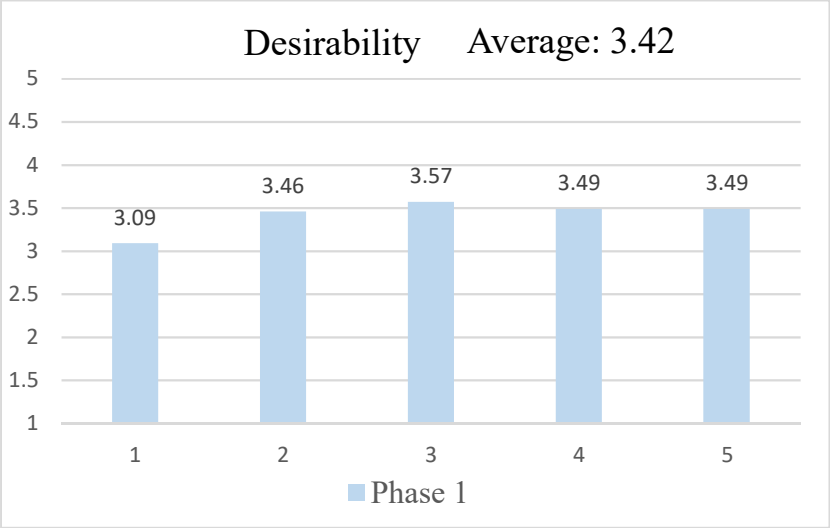

Figure 6.3 Phase 1 result of desirability

To discover the disadvantage of Blockfarm, we sort out the feedback of focus group and obtain some observations and give them share of voice scores by the percentage of user responses (see Table 6.1). Because of the pressing schedule and limited resource, we could only pick two observations which are waiting time and bugs fixing to conduct improvement. At this moment, we can evaluate a new desirability score for new voices of users have been added (see formula listed below).

Table 6.1 Observations of Phase 1 focus group interview

Observations	Share of Voice
The match-making waiting time (30 mins) is too long.	**100**
Chatroom or other social functions could be added in the game.	50
Some bugs do affect the user experiences.	**90**
If there has Cross-browser and mobile version will be more attractive.	10

Tutorial is not clear enough.	70

$$\text{Service desirability} = \sum SA_{svi} \Big/ \sum SA \times PR$$

$$\sum SA_{svi} = 100 + 90 = 190$$

$$\sum SA = 2, \text{PR} = \frac{5}{8}$$

$$\text{Service desirability} = \frac{190}{2} \times \frac{5}{8} = 59.38$$

Since we did not adjust the configuration, the desirability score can only be improved slightly. After the minor improvement, match-making waiting time is shortened to five minutes and some fatal bugs are fixed. Then we can see the outcome from the result of phase 2 (see figure 6.4). The average point of phase 2 is 3.9 which is 78% of total score. To compare the expected desirability score and questionnaire results of two phases clearly, we illustrate Table 6.2 to display the values and differences. We find that the growth rate of expected score and questionnaire result are almost the same from the difference of each other. Consequently, we believe that our formula of desirability has co-relation with the actual user's feedback.

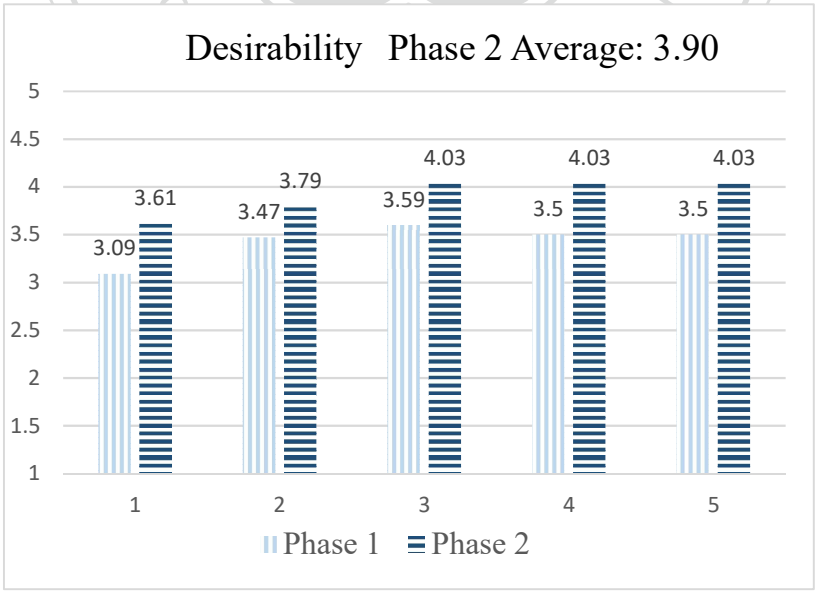

Figure 6.4 Comparison of two phase desirability results

Table 6.2 Expected desirability score and results of two phases

	Phase 1	Phase 2
Expected desirability score	50	59.38
Result of questionnaire	68.4	78
Difference	18.4	18.62

6.5.3 Verification of Consensus level

In this section, we will testify the consensus level dimension which expected to reach 100 points in our scenario of Chapter 5. After the two phases of experiment, we illustrate the results of questionnaire in Figure6.5. We get 3.36 points and 3.75 points in phase 1 and phase 2 respectively. It is regrettable that even though the result of phase 2 had been improved 11%, the average point is only reached 75 (3.75 / 5).

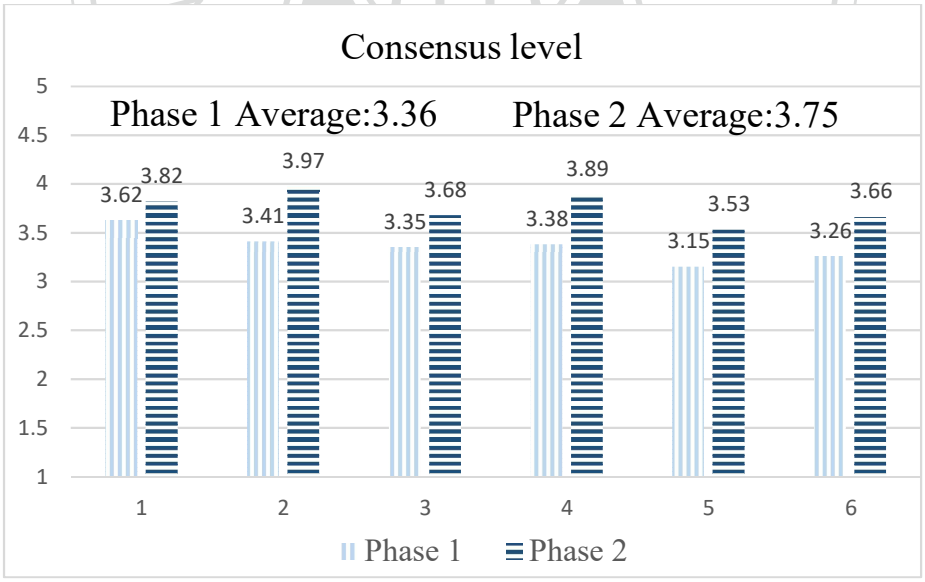

Figure 6.5 Comparison of two phase Consensus level results

To find the reason why users cannot make consensus in Blockfarm, we conduct an investigation by explore our system data and review the user's feedback. After the examination we detect two aspect might be the interference factor of the result which

does not meet our expectation.

First, in the total of 168 users of Blockfarm, there are only 28 users who had upgraded their jobs level. It means the character mechanism in Blockfarm does not bring into full play. This may cause the interaction effect of our value configuration would be influenced and lead to the decline of consensus level. We inquire some users to figure out what is the problem of the mechanism. And most of feedback are the tutorial is beyond their comprehension. Consequently, we think the service delivery is need to be improved and affect user's consensus level.

Secondly, as aforementioned in 6.5.2, we discovered some observations in focus group interview. We selected two of the observations to revise Blockfarm and improved the user experience accordingly. We assume it is the reason why we acquire the extra point in phase 2 despite we do not make any modification to our value configuration. Meanwhile, in addition to the selected two solved observations, there are many other observations and feedback need to be improved. Thus, the user experience of Blockfarm is still a far way to perfection that would produce dissatisfaction of stakeholders.

6.5.4 Verification of Propositions

After the verification of three dimension's measurement, finally, we will testify our propositions proposed in section 6.1. To testify propositions, we adopt the t-test to examine our 74 questionnaire feedback. In this study, we use the statistic tool smartPLS to compile our data. We, firstly, input 60 feedback for some users turn in questionnaire in both phase. Then we set the number of smartPLS bootstrap subsample as 5,000 and start to conduct the t-test. The result of the t-test is illustrated in Figure 6.6 and the reliability and validity analysis data of the t-test is displayed in

Table 6.3. Next, we will elaborate the meaning of the result to each propositions with the verifications in previous sections.

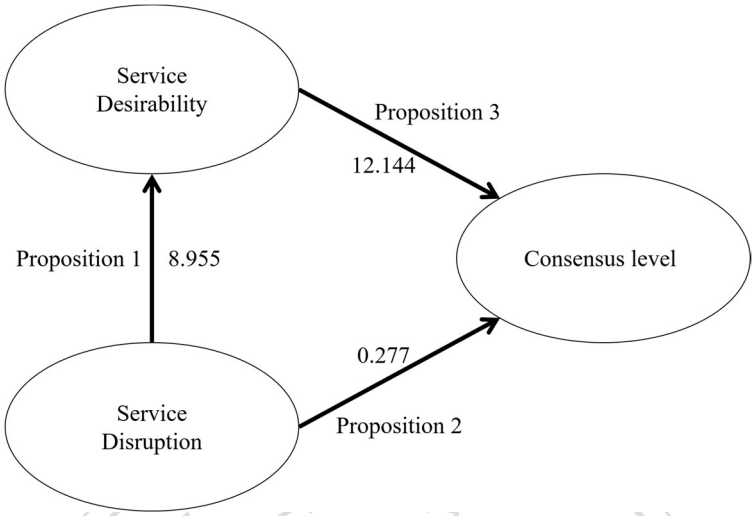

Figure 6.6 experiment result of t test

Table 6.3 Reliability and validity analysis data of the t-test

	Average Variance Extracted	Composite Reliability
Consensus level	0.684354	0.928404
Desirability	0.700263	0.920547
Disruption	0.731428	0.915862

Proposition 1. Service disruption has positive influence of making the service more desirable.

The t value of proposition 1 is 8.955 which is statistically significant for the t-test is reliable and valid with the average variance extracted values are greater than 0.5 and composite reliability values are greater 0.6. Consistent with the t-test, users deepen their interest in playing Blockfarm after them received our instructions in focus group interview. As aforementioned in section 6.5.1, the instruction does help users feel the sense of disruption. Hence, we believe the service disruption has positive affect to service desirability.

Proposition 2. Service disruption has positive influence of increasing the stakeholder's consensus level.

Figure 6.6 reveals proposition is not statistically significant for the t value is 0.277 smaller than 1.96. To find the explanation of the result, we have to talk about the scenario proposed in section 6.5.1 again. Based on the mixed concept of "Alleviation of Poverty", "Barter System" and "Online Game/ Free Game", Blockfarm provides a domain of simulated game to carry out value exchanges on blockchain. This gamification design should benefit our experiment by attracting more people to try out the disruptive concept. However, besides Blockfarm lacks of incentive to users to build the connection to blockchain, the characteristic of gamification could hardly arouse the advantage of blockchain. In other words, users might not concern about whether the transaction is transparence or not in the game. Moreover, the transaction efficiency should be instant in the game even if blockchain is not introduced. Consequently, even though the combination of blockchain and gamification has a certain degree of disruption, the user would not feel the benefit for there is no difference of user experience with other games. This is the imperfection of our Blockfarm mechanism design. Therefore, service disruption shows no contribution to consensus level in our experiment.

Proposition 3. Service desirability has positive influence of increasing the stakeholder's consensus level.

Except the instructions we gave in the focus group, the only difference between the two phases is the system optimization according to feedback and observations. The revision helps us improve the service score which is verified in section 6.5.2.

Because of the limited resources, we cannot do extra effort to re-configure our value network and add new interactions into Blockfarm. The feedback points to consensus level, nevertheless, has raised as the same as the other two dimensions. Since the elaboration of proposition 2, we can exclude the possibility that disruption improves consensus level in our experiment. Consequently, the only reason could affect consensus level is service desirability. This outcome can be matched to the t-test for proposition 3 get a t value of 12.144 showing statistically significant.

6.6 Findings and Discussion

In previous section 6.5, we verified our measurements and propositions. Following of this section we will discuss our findings from the verifications in the sequence of disruption, desirability and consensus level.

First, the expected score of disruption measurement has a difference with the result of user's feedback. To understand what reason makes the differentiation, we conduct interviews with users. We find that the combination of blockchain and gamification is still disruptive to users. However, the mechanism is not good enough to make users feel the difference between Blockfarm and the other farming game without blockchain. Because of the improper linkage between blockchain and user experience, the service disruption degree could not make influence of increasing consensus level of the ecosystem. To put it another way, our proposition 2 is not supported in our experiment. But the feedback from the interviews shows the users had been increased their willingness and desirability to play Blockfarm. The result of improvement is the same as our proposition 1 supported by the t-test in section 6.5.4.

Second, since the growth of our measurement and feedback in two-phases which is displayed in section 6.5.2 are consistent, we believe that our measurement have a

co-relation with the service desirability. And after the improvement of Blockfarm which raising the service desirability score, users increase their consensus degree to the mechanism and engage more match-makings. As a result, we get another support to proposition 3 besides the t-test of the 12.144 point.

Finally, consensus level which we expected to be perfect in the design stage receives the lesser results. According to the experiment data and feedback, we discover that our service delivery design cannot fully make users perceive service value. That is the reason why we tried to solve as many issues users proposed as possible to meliorate the service delivery. And the result of feedback in phase 2 does imply the consensus level could be raised via the improvement of service delivery without re-configure the value network.

Chapter 7 Conclusion

In this section, we will elaborate our research contribution to answer our research question first. Then the managerial implications based on our contribution will be proposed in section 7.2. Lastly, our experiment limitations and future work will discuss in section 7.3.

7.1 Contributions

Because of the insufficient support to help service designer creating a digital destination ecosystem. In the beginning of this research, we proposed our research question:

"*How to facilitate service designers configuring a digital destination ecosystem under stakeholder's consensus consideration?*"

To find the solution, we proposed a conceptual framework composed with service disruption, service desirability and consensus level. This framework can keep service designer's eyes on configuring their value network toward a destination with the main constructor – consensus level. Since the main purpose of the system is to facilitate service designer's cognitive loading, we further design a system that integrated the spirit of framework. Our system is composed by three modules which are "Value activities analysis", "Stakeholder puzzling" and "Consensus measurement".

The system can analyze the key concept of designer planned value proposition then find the related activities and their correlations via the data from the whole world. Therefore, designers can simply configure their service value network by examining the displayed information. After the value network is proposed, the system will shows a score the reveal the consensus level of current configuration and gives designers a

guidance that will assist them create a destination ecosystem.

In summary, compared to the design processes, the methodology proposed in this research can not only provide a simpler way, but a more objective viewpoint with the indication of share of voice to facilitate service design. Meanwhile, the guidance can give service designers a clear instruction to re-configure the value configuration.

7.2 Managerial Implications

1. **Whether the service is disruptive does not directly matter to stakeholder's consensus.**

In this study, we conduct an experiment that combined blockchain with gamification. According to the feedback that we received, the mechanism of our experiment shows a certain degree of disruption. However, users does not increase consensus level from the combination of blockchain and gamification. It could be due to the user cannot sense the advantage of the disruptive function. In other words, the service disruption does affect consensus level when the users can understand and be benefited.

2. **The expected consensus level will be affected by success or failure service delivery.**

In the experiment of Blockfarm, we configure a value network with 100% consensus level. Nevertheless, the result of consensus is below our expectation. According to the data of Blockfarm, users does not meet consensus are frustrated by the improvable user experience. And the consensus level raises after the user experience becomes better with the same value configuration. Consequently, we believe the service delivery affects the consensus level of users.

7.3 Limitations and Future Works

1. User experience design of experiment

This research is focused on the value configuration. However, as aforementioned, the user experience does a strong effect on the perceived service value of users. It would cause the value configuration design cannot be brought into full play. To conduct the best experiment, we should make the user experience as perfect as possible. We had tried our best to conduct the experiment, nevertheless, because of our limited human power and development experience the service delivery is still not good enough. The user experience is worthy to be improved if we conduct another experiment to testify our value configuration.

2. Selection of experiment fields

The main value activities designed by our mechanism is bartering. It is a mechanism enables people to acquire desirable property via giving the things that is less important to them. The concept of bartering implemented by blockchain is disruptive. However, we do not have enough resources to run the experiment in real world for managing the ownership transfer. We have to find another way to conduct the experiment that we can control the bartering. Moreover, to collect as many data as possible, the experiment field must be attracting to people. As a result, we select gamification as the channel to conduct the experiment. But, the combination of blockchain and gamification should be exploited more in depth, such as introducing the contribution degree with social function by leveraging the blockchain's data (e.g., the results of match-making and the information of farmers' crops).

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Appendix A - Questionnaire

Questions about Desirability
Q1.You think our match-making mechanism meets your expectations and is easy to use.
Q2.Our match-making mechanism can help you exchange crops you really want.
Q3.Playing Blockfarm makes you feel pleasant that you are expected to play this game.
Q4.You feel enjoyable to have interactions in Blockfarm and would like to recommend this game to your friends. (interactions refers to thieving and guarding, crops transaction, etc.)
Q5.This game is entertaining to you and you are willing to share this experience to others
Questions about Disruption
Q1.The gaming mechanism of Blockfarm is original ad novel.
Q2.The gaming mechanism of Blockfarm is uncommon and deserve to be mentioned to others.
Q3.The gaming mechanism of Blockfarm is unique and irreplaceable.
Q4.Combination of blockchain and farming game is an innovating and expanding idea based on two differentiating domain.
Questions about Consensus level
Q1.I often could get crops I really want after match-making
Q2.I am satisfied with the way doing match-making
Q3.I think the mechanism of match-making is great enough
Q4.You are satisfied with our system’s quality and will keep playing this game.
Q5.I play Blockfarm frequently.
Q6.I will continue playing Blockfarm frequently in future.

Appendix B – Questionnaire result of Disruption

Phase 1.

Player	Q1	Q2	Q3	Q4
1	5	5	5	5
2	5	4	5	5
3	4	4	4	4
4	5	5	3	4
5	4	4	5	4
6	3	2	4	4
7	3	3	3	3
8	4	4	3	4
9	4	4	3	4
10	2	2	2	4
11	3	3	3	3
12	5	5	2	5
13	3	4	4	5
14	3	3	3	4
15	4	5	5	5
16	4	4	5	4
17	4	4	4	4
18	3	3	3	3
19	4	4	4	5
20	1	2	2	3
21	3	4	2	4
22	4	4	4	5
23	3	3	3	4
24	3	3	3	4
25	3	3	3	4
26	3	3	2	5
27	1	3	1	3
28	3	3	4	4
29	3	4	3	3
30	4	3	3	4
31	4	4	4	4
32	4	3	3	4
33	2	3	2	2

34	4	5	5	5
average	3.44	3.59	3.35	4.03

Phase 2.

Player	Q1	Q2	Q3	Q4
1	4	4	3	4
2	2	3	3	4
3	5	3	5	5
4	4	4	5	5
5	5	5	5	4
6	5	5	5	5
7	4	3	4	3
8	1	1	1	1
9	5	5	5	4
10	3	2	2	3
11	5	4	5	4
12	5	4	4	5
13	4	4	4	4
14	5	5	4	5
15	4	5	4	5
16	4	5	4	4
17	4	5	4	4
18	5	5	5	5
19	4	5	5	5
20	4	4	3	4
21	4	4	3	4
22	4	5	5	5
23	3	4	4	4
24	3	4	2	3
25	4	4	4	5
26	4	3	4	3
27	3	2	2	4
28	4	4	4	4
29	3	5	4	4
30	5	4	5	4
31	5	5	5	5

32	4	3	3	4
33	3	3	2	4
34	3	3	3	4
35	5	5	4	4
36	3	2	3	4
37	4	5	4	5
38	3	3	4	3
39	5	4	3	4
Average	3.95	3.92	3.79	4.1

Appendix C – Questionnaire result of Desirability

Phase 1

Player	Q1	Q2	Q3	Q4	Q5
1	5	4	5	5	5
2	4	4	4	4	3
3	2	2	4	5	5
4	2	4	2	2	1
5	4	4	4	4	4
6	3	4	4	3	4
7	2	3	3	3	2
8	2	2	4	4	3
9	4	5	4	4	4
10	2	2	3	3	3
11	2	2	4	3	3
12	5	5	5	5	5
13	5	3	4	4	5
14	3	3	3	3	2
15	5	5	5	4	5
16	4	5	5	4	4
17	3	3	4	5	5
18	3	3	3	3	3
19	4	5	4	4	5
20	4	4	2	3	2
21	2	2	3	3	3
22	3	4	4	4	4
23	3	4	4	4	5
24	3	4	2	3	2
25	4	4	4	4	4
26	3	4	4	3	4
27	3	4	3	3	3
28	1	1	2	1	1
29	4	4	4	4	4
30	3	4	4	2	3
31	1	2	3	3	2
32	4	5	2	3	4
33	2	2	2	2	2

34	1	2	5	5	5
Average	3.09	3.47	3.59	3.5	3.5

Phase2

Player	Q1	Q2	Q3	Q4	Q5
1	2	5	4	3	4
2	2	2	4	4	4
3	5	5	4	4	5
4	4	5	5	5	5
5	5	5	4	4	3
6	4	4	5	5	5
7	3	4	5	4	4
8	1	1	1	1	1
9	4	4	4	4	4
10	4	5	4	3	3
11	4	5	5	4	5
12	2	1	4	5	4
13	3	3	3	4	3
14	5	5	5	5	5
15	4	4	4	4	5
16	4	4	4	4	4
17	4	5	5	4	4
18	4	5	5	5	5
19	5	5	4	4	5
20	4	3	4	4	4
21	4	4	4	5	4
22	2	3	5	5	5
23	4	4	4	4	4
24	2	1	2	2	3
25	4	4	5	5	5
26	3	4	4	4	4
27	2	4	4	4	4
28	4	5	4	4	4
29	4	4	4	4	4
30	4	5	5	5	5

31	5	4	5	5	5
32	5	5	3	4	3
33	3	2	2	3	3
34	4	2	3	3	3
35	4	3	5	4	5
36	3	4	4	5	4
37	5	4	4	5	4
38	2	2	3	2	2
39	3	5	3	3	2
Average	3.59	3.82	4	4	3.97

Appendix D – Questionnaire result of Consensus Level

Phase 1

Player	Q1	Q2	Q3	Q4	Q5	Q6
1	4	5	5	5	4	4
2	4	4	5	3	3	4
3	5	4	3	4	3	4
4	4	2	2	2	2	1
5	4	4	3	5	4	4
6	4	4	4	2	4	2
7	3	2	3	2	2	2
8	2	2	2	4	3	2
9	2	4	3	4	4	4
10	4	3	3	3	3	2
11	3	3	3	2	3	3
12	5	5	5	5	5	5
13	4	4	4	3	4	3
14	4	4	4	2	2	3
15	5	5	5	5	4	4
16	5	5	5	5	4	5
17	3	3	3	5	4	5
18	3	3	3	3	3	3
19	4	5	5	4	4	4
20	3	4	4	1	2	1
21	5	3	3	3	3	4
22	5	3	2	5	4	4
23	4	4	4	4	4	4
24	3	3	2	1	2	2
25	3	4	3	4	3	3
26	4	3	4	4	3	4
27	3	3	3	3	2	4
28	1	1	2	1	1	3
29	4	4	4	4	5	4
30	4	4	3	4	3	3
31	4	2	2	2	1	2
32	4	4	4	3	2	2

33	2	2	2	3	3	2
34	2	1	2	5	4	5
Average	3.62	3.41	3.35	3.38	3.15	3.26

Phase 2

Player	Q1	Q2	Q3	Q4	Q5	Q6
1	3	4	3	4	4	4
2	2	4	2	3	2	2
3	4	4	4	5	4	4
4	5	5	4	5	5	5
5	4	4	5	3	5	5
6	5	5	5	5	5	5
7	4	5	3	3	4	4
8	1	2	3	3	1	1
9	4	4	4	4	4	4
10	4	4	3	3	2	2
11	4	5	4	4	4	5
12	2	1	2	4	1	1
13	4	4	3	3	2	3
14	5	5	5	5	5	5
15	5	4	4	3	4	3
16	5	5	4	5	4	5
17	5	5	4	5	5	5
18	5	4	4	5	5	5
19	5	5	5	4	3	4
20	4	4	5	3	3	4
21	4	5	4	4	4	4
22	2	3	3	5	5	5
23	4	4	5	4	5	5
24	1	2	3	3	2	2
25	5	4	5	5	5	3
26	4	4	3	3	2	3
27	4	4	2	3	3	3
28	4	4	4	5	5	4
29	4	4	4	5	4	4

30	5	5	4	4	4	4
31	4	5	5	5	3	4
32	2	3	3	3	2	3
33	3	3	3	3	2	2
34	4	3	3	3	3	3
35	4	4	2	4	4	4
36	4	3	4	4	3	4
37	4	5	5	5	4	5
38	3	3	2	1	2	1
39	3	3	3	3	3	2
Average	3.82	3.95	3.68	3.87	3.5	3.61

Appendix E – Questionnaire result for PLS analysis

Player	DisQ1	DisQ2	DisQ3	DisQ4	DesQ1	DesQ2	DesQ3	DesQ4	DesQ5	ConQ1	ConQ2	ConQ3	ConQ4	ConQ5	ConQ6
1	4	4	4	4	2	2	4	5	5	5	4	3	4	3	4
2	5	5	3	4	2	4	2	2	1	4	2	2	2	2	1
3	4	4	5	4	4	4	4	4	4	4	4	3	5	4	4
4	3	3	3	3	2	3	3	3	2	3	2	3	2	2	2
5	3	4	4	5	5	3	4	4	5	4	4	4	3	4	3
6	3	3	3	4	3	3	3	3	2	4	4	4	2	2	3
7	4	4	4	4	3	3	4	5	5	3	3	3	5	4	5
8	3	4	2	4	2	2	3	3	3	5	3	3	3	3	4
9	4	4	4	5	3	4	4	4	4	5	3	2	5	4	4
10	3	3	3	4	3	4	4	4	5	4	4	4	4	4	4
11	3	3	3	4	3	4	2	3	2	3	3	2	1	2	2
12	3	3	3	4	4	4	4	4	4	3	4	3	4	3	3
13	3	3	2	5	3	4	4	3	4	4	3	4	4	3	4
14	1	3	1	3	3	4	3	3	3	3	3	3	3	2	4
15	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
16	3	3	4	4	1	1	2	1	1	1	1	2	1	1	3
17	3	4	3	3	4	4	4	4	4	4	4	4	4	5	4
18	4	3	3	4	3	4	4	2	3	4	4	3	4	3	3
19	4	4	4	4	1	2	3	3	2	4	2	2	2	1	2
20	4	3	3	4	4	5	2	3	4	4	4	4	3	2	2
21	2	3	2	2	2	2	2	2	2	2	2	2	3	3	2
22	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
23	4	4	3	4	2	5	4	3	4	3	4	3	4	4	4
24	2	3	3	4	2	2	4	4	4	2	4	2	3	2	2
25	5	3	5	5	5	5	4	4	5	4	4	4	5	4	4
26	4	4	5	5	4	5	5	5	5	5	5	4	5	5	5
27	5	5	5	4	5	5	4	4	3	4	4	5	3	5	5
28	5	5	5	5	4	4	5	5	5	5	5	5	5	5	5
29	4	3	4	3	3	4	5	4	4	4	5	3	3	4	4
30	1	1	1	1	1	1	1	1	1	1	2	3	3	1	1
31	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4
32	3	2	2	3	4	5	4	3	3	4	4	3	3	2	2
33	5	4	5	4	4	5	5	4	5	4	5	4	4	4	5
34	5	4	4	5	2	1	4	5	4	2	1	2	4	1	1
35	4	4	4	4	3	3	3	4	3	4	4	3	3	2	3

36	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5
37	4	5	4	5	4	4	4	4	5	5	4	4	3	4	3
38	4	5	4	4	4	4	4	4	4	5	5	4	5	4	5
39	4	5	4	4	4	5	5	4	4	5	5	4	5	5	5
40	5	5	5	5	4	5	5	5	5	5	4	4	5	5	5
41	4	5	5	5	5	5	4	4	5	5	5	5	4	3	4
42	4	4	3	4	4	3	4	4	4	4	4	5	3	3	4
43	4	4	3	4	4	4	4	5	4	4	5	4	4	4	4
44	4	5	5	5	2	3	5	5	5	2	3	3	5	5	5
45	3	4	4	4	4	4	4	4	4	4	4	5	4	5	5
46	3	4	2	3	2	1	2	2	3	1	2	3	3	2	2
47	4	4	4	5	4	4	5	5	5	5	4	5	5	5	3
48	4	3	4	3	3	4	4	4	4	4	4	3	3	2	3
49	3	2	2	4	2	4	4	4	4	4	4	2	3	3	3
50	4	4	4	4	4	5	4	4	4	4	4	4	5	5	4
51	3	5	4	4	4	4	4	4	4	4	4	4	5	4	4
52	5	4	5	4	4	5	5	5	5	5	5	4	4	4	4
53	5	5	5	5	5	4	5	5	5	4	5	5	5	3	4
54	4	3	3	4	5	5	3	4	3	2	3	3	3	2	3
55	3	3	3	4	4	2	3	3	3	4	3	3	3	3	3
56	5	5	4	4	4	3	5	4	5	4	4	2	4	4	4
57	3	2	3	4	3	4	4	5	4	4	3	4	4	3	4
58	4	5	4	5	5	4	4	5	4	4	5	5	5	4	5
59	3	3	4	3	2	2	3	2	2	3	3	2	1	2	1
60	5	4	3	4	3	5	3	3	2	3	3	3	3	3	2