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A Symbiosis-Based Value Co-Creation Framework for Service Delivery Design

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ABSTRACT: *This paper proposes a service delivery design framework as a means-end tool for modeling, designing, and developing the service systems (e-service) which can fulfill (semi-)automated value co-creation between the service providers and the customers. In order to achieve the goal of service innovation, this study arise concerns how an innovative e-services can be systematic service process according to the proposed service delivery design framework. However, the framework takes into account a novel service delivery classification and individual criteria. In this paper, either service delivery classification or the counterparts of service performance measures emerged from the ecological symbiosis perspective through analytic and synthetic methods. The proposed service delivery design framework defines two dimensions -- continuity of co-creation and mutual adaptability -- characterized by the process of exchanging service/benefit and building relationship (i.e., partnership) involved within a service. The framework indicated that how the interactions and the service/benefit exchange between the service provider and the consumer can conduct in a service delivery process. To build partnership by the service participants due to mutual adaptability whose they adapt to the counterpart of service (i.e., the service provider or the customer). This paper accordingly classifies the six categories of service delivery based on ecological symbiosis perspectives. To examine individual service performance is derived from a set of criteria of species' performance measures in ecological mutualism including proximate response, evolved dependence, and ultimate response. The service delivery systems comply with the characteristics and criteria in the framework to demonstrate the sets of methodology for innovative service delivery design.*

KEYWORDS: *Service Delivery Innovation, Value Co-creation, Classification, Service Delivery Design Framework, Service Performance, Mutualism, Collaboration.*

1. Introduction

Service systems, in general, are made up of large numbers of interacting consumers and producers who co-produce value. The dynamics of their interactions are driven by the constantly shifting value of knowledge distributed among consumers and producers, evolving in difficult to predict ways. Consequently, the design of service systems driving

innovation is generally regarded as a very challenging problem (IBM, 2005). For the purposes of this research, service innovation refers to invented service system designs yielding value in solving real service problems, where such value is toward maximum customer satisfaction and service productivity.

A service system (e-services) can be viewed as an eco-system. Thus, the superior relationship between the service provider and the customer is similar with the relationship among the species when they increasingly evolved the partnership as mutualism (i.e., symbiosis). In order to achieve the advancement in the partnership, the study presents a service delivery design framework, aimed at classifying six categories of invented service delivery design. Either a service provider or a customer interacts with the counterpart of partner to value co-creation within a service delivery. The framework is able to facilitate to build a superior partnership to co-produce collaborative service through a service provision and service encounter in the novel service systems.

In the service delivery design framework, either "continuity of value co-creation" or "mutual adaptability" can be characterized by the service/benefit exchange and build the relationship such as collaborative and mutualism. The dynamic relationship between the providers and the customers is relatively complex; consequently, we fix the problem using the evolutionary concept (e.g., adaptation and evolution) and the emerging technologies. To design a service system outlines in "intelligent service delivery design" in the sense that designers are aware of the ecological symbiosis between the partners. Although the service delivery design framework is potentially applicable to a variety of service industries, the artwork design industry can be used to fulfill and implement the characteristics and concepts of ecological symbiosis we adopted. For example, three service delivery systems (e.g., interior design, industrial design and entertainment design) in this study can be demonstrated by applying the service delivery design framework to describe how service participants can achieve the collaboration and symbiosis.

The remainder of this article consists of five sections. Section 2 describes the migration behind the service economy, service/benefit exchange, services innovation for the artwork design industry. Section 3 presents an approach to classifying services and individual criteria. Section 4 provides three scenarios to exemplify the concept of symbiotic and collaborative e-services. Section 5 discusses the managerial implications of this research. Concluding remarks are presented in Section 6.

2. Background

The service sector is becoming increasingly important to the economies of many countries, especially developed countries, where services account for a dominant

percentage of economic activity (Lusch, et al., 2008). However, the rapid growth in services is also being seen in developing countries. The Organization for Economic Co-operation and Development (OECD) recently released its report "Promoting Innovation in Services," which noted that government policy in developed countries has not been attuned to the service sector (Bitner and Brown, 2006).

Recently, Steven and Paul (2006) wrote a significant attention has been drawn to a new research area of services science that applies insights from scientific, management, and engineering (SSME) and scientific, management, engineering, and design (SSMED) (Spohrer and Kwan, 2009; Glushko, 2008) perspectives to analyze how to align people and technology effectively to generate value for both services providers and clients. IBM (2005) discussed the objective of service science includes such issues as management of service innovation and restructuring of organizations. Other important aspects of service science pointed out that co-creation and sharing of value through the collaboration of firms and suppliers, research into the capabilities of business and government to create improved value, evaluation of the information technology and tools, and investigation of enterprise culture for the encouragement and convergence of employees as well as the totality of services effectiveness. Chesbrough and Spohrer (2006) identify several elements of a foundation for this research area: (1) close interactions of suppliers and customers; (2) nature of knowledge created and exchanged; (3) simultaneity of production and consumption; (4) combination of knowledge into useful systems; (5) exchange as processes and experience points as well as (6) exploitation of ICT and transparency. In the other words, this study showed that "how might a service scientist approach the problem of creating service innovations and improving the service system?"

In order to meet the consumer's needs, Heskett (2003) wrote the service providers now attempt to add or create value through services. According to Prahalad and Ramaswamy (2004), two paradoxes dominate the future of competition in services: consumers face choices that yield less satisfaction, while managers face more strategic options that yield less value. However, the traditional e-service should be re-examined, this research address the arguments that how to be the advancement in value co-creation through emerging technologies (e.g., adaptive technologies) and system architecture (e.g. SOA).

2.1 Service exchange for value co-creation

With the properties of services sector, they are different from the goods-producing sector. A service delivery can be view as the course of value co-creation between the provider and the customer. The service providers utilize the capabilities to fulfill the task of services for the customers during a service process. In other words, the way to exchange service/benefit represents how the service participants deal with the responsibilities, capabilities, and benefits to fulfill value co-creation. Steven and Paul

(2006) describe a service also involves people in terms of (1) building and maintaining relationships and (2) understanding the interface between people, business strategy, business processes, and technology). Thus, building the superior relationship could be useful to value co-creation among service participants.

A service has a number of unique characteristics that tangible products often lack. Vermeulen et al. (2001) describe services are intangible, co-produced between the providers and the customers, perishable, experienced, and heterogeneous. With the difference in service production process, customers co-production were accommodated in production process, production setting and production employees besides co-producers (Bowen and Ford, 2002). For emerging service-centered dominant logic, people exchange acquire the benefits of specialized competences (knowledge and skills), or services in Vargo and Lusch (2004). Normann and Ramirez (1993) have pointed out that services cover all activities in which obtaining actual utility value requires customer value creation. The link between actions by supplier and customers they termed "offerings." Ramirez, (1999) indicated that business definition can study how economic actors (1) design new offerings, joining actors in innovative co-productive relationships; (2) reconfigure the roles each co-producer holds in relating to others, and (3) new value creation systems. In concerning co-production view, value is co-produced, with customer, over time -- for both co-producers (relationship). The effects of service delivery through a service process result from the service/benefit exchange and value co-creation among service participants within a service encounter.

A service system composed of subsystems/components which refer to the value co-creation productively or uniquely. To facilitate the development of service systems with value co-creation (Payne at. al., 2008) is crucial to ensure superior service delivery. Such collaborative e-services can be certainly facilitated by intranets, extranets, and internet. Furthermore, the adaptive techniques (e.g., genetic algorithms) are especially appropriate for dealing with co-production and customization issues in James and Daniel (2003). In this study, an innovative service system for transformative processes are further examined, in light of the fact that service innovation can be driven by information technology to identify the advantage of value co-creation. Estimating value in service systems, Caswell et al., proposed a descriptive structure for the analysis of this complexity which combines graph theory and network flows with economic tools (Caswell et. al., 2008). Accordingly, IT has given providers and customers access to the support of collaboration in service provision and service delivery. Service participants build the relationship as partner (i.e., symbiosis) to create the value co-creation. The flexible relationship is associated with the relationship between the customer and the producers. This framework takes into account the two dimensions, value co-creation continuity and mutual adaptability to facilitate the service delivery design.

2.2 Services innovation for design industry

In order to demonstrate intelligent service delivery design, artwork design industry can be used to be the example to showcase the service delivery design underlying ecological sysmbiosis. Cooper and Press (1995) observed that artwork design is at once an art, a problem solution, a creative behavior, a collected specialization, and an industry. Walsh et al. (1992) viewed artwork design as an activity and a result of an activity, activities as a design procedure, the results of activities as ideas, as a plan of principle parts that can be made, or as a plan of the type of principle part. Design scholars, Ulrich and Eppinger (1995), proposed the artwork design development concept from the perspective of artwork designers including (1) confirming requirements from customers; (2) creating specifications of the objective; (3) developing the concept of production; (4) selecting the concept of production and (5) modifying specifications for the market. Hickey and Siegel presented "a case study involving a provider of IT infrastructure services and solutions and the business context of the service provider, its approach to the analysis of the requirements of multiple standards, process integration efforts, and the reuse of documentation and other evidentiary data in the context of obtaining certificates of registration or certifications." (Hickey and Siegel, 2008) In this study, the service systems of artwork design services can be a demonstration of (semi-)automated value co-creation and ensure the service productivity and customer satisfaction.

3. Intelligent service delivery design

Intelligent service delivery design is a novel service delivery design framework for systematic service innovation based on the ecological symbiosis concept. Ecology is a science that examines the interrelationship of organisms, their environments, and how organisms adapt to their environments. From the standpoint of ecology, there are different levels of viability under which organisms adapt in response to changed circumstances. For instance, the population of organism might be eliminated due to environmental change or competition. Intelligent service delivery design uses ecological symbiosis concepts to model the interactions between the customers and the suppliers in service/benefit exchange to fulfill value co-creation.

3.1 Research method

Intelligent service delivery design aims at presenting a framework for a new delivery in service delivery design and service systems. These are regarded as artificial artifacts encompassing both natural and goal-dependent phenomena, represented respectively by concepts of symbiosis from ecology and value co-creation. Our research method is based on the principles of "science of the artificial," i.e., the science (analytic) of engineering (synthetic) in Simon (1969). An artifact, in general, embodies two perspectives -- analytic

(or descriptive) and synthetic (or prescriptive). Being synthesized, the artifact can be characterized in terms of functions, goals, and adaptability, and is often discussed in terms of both imperatives and descriptives. Fulfillment of purpose involves a relation between the artifact, its environment and a purpose or goal. One can view the artifact as the interaction of an inner environment (internal mechanism), an outer environment (conditions for goal attainment) and the interface between the two. Such artificial artifacts enable to account for the service systems (e-services) in this study.

This research addressed an intelligent service delivery design using design science. According to the proposed framework, the service systems were implemented by simulation. In this paper, an up-to-date service system is regarded as the inner environment (awareness/intelligence of the scientific model of symbiosis), an outer environment (conditions of customers and suppliers in terms of the degree of continuity of co-production and mutual adaptability during value co-creation), and the interface defined as the fulfillment of service innovation by a variety of intelligent service delivery design components (Figure 1), guaranteeing the goal performance criteria (Figure 3).

3.2 Service/benefit exchange as symbiotic relationship

In symbiotic relationship, the certain species exhibit mutual dependence according to the natural phenomena of the ecological system. For instance, communalism exhibits the least extent of mutually beneficial interactions between species seeking optimal benefit utilizing a natural resource in Caroline and Gross (2000). Mutualism is defined as a reciprocally beneficial interaction between different organisms. Such symbiotic relationships frequently involve the exchange of nutrients or certain services such as the protection from enemies or transportation in Zeithaml (1981). These dependency relationships could be further detailed as follows:

- Mutualism: Mazancourt (2005) introduce this is a mutually beneficial interaction between individuals of two species. Also, mutualism is commonly divided into obligatory mutualism and non-obligatory mutualism:

  (1) Obligatory mutualism: Two species must be cooperation; otherwise, they cannot survive. Their mutualism is permanent and obligatory.

  (2) Non-obligatory mutualism: Two species have benefits each other when they can be cooperation, but their fixed role for cooperation is unnecessary.

- Commensalism: Although two species can be cooperation, only one-sided has benefit.

Wu (2003) wrote Mutualism and Commensalism have been investigated group and organization research. System, cycle, network, hierarchy (and the particular role of organisms in those structures) become the basis for the scientific work focused on the

concept of ecosystem in Leydesdorff (2006). A certain number relationships between producers and customers are characterized by symbiosis. In terms of service/benefit exchange, both providers and the customers are involved in shaping the continuum of value co-creation (i.e., mutualism/collaboration/commensalism). The interactions between providers and customers were deemed the cooperation as addressed in the ecological symbiosis. Moreover, the providers and the customers are engaged in adapting their behaviors and developing their flexible relationships during the service/benefit exchange process. The adaptation of behaviors and flexibility account for "the degree of mutual adaptability" (i.e., "one-sided" represents customer or provider; "two-sided" represents customer and provider). Mazancourt, Loreau, and Dieckmann (2005) discuss the three levels of service/benefit exchange are defined -- commensalism, collaboration, and mutualism -- commensalism refers to slight symbiosis, collaboration refers to a medium symbiosis, and mutualism refers to full symbiosis.

3.3 Service delivery classification underlying evolution and adaptation in ecology

This section presents a framework for classifying the service delivery design using the concepts of symbiosis. The framework of service delivery design includes six quadrants, each of which is associated with certain properties in service/benefit exchanges to fulfill systematic service innovation. The details of the two dimensions of framework as following:

- Continuity of value co-creation:

  The three types of evolutionary phenomenon -- obligatory mutualism, non-obligatory mutualism, and commensalism -- in the symbiosis of ecology.

  (1) Mutualism: mutually beneficial interactions between the providers and the customers. The specific partner (i.e., it's a fixed relationship between the provider and the consumer) is necessary for the value co-creation.

  (2) Collaboration: mutually beneficial interactions between the providers and the customers. Comparing with mutualism, the specific partner is unnecessary (i.e., it's not a fixed relationship between the provider and the customer) for value co-production.

  (3) Commensalism: one-sided (provider or customer) has the benefit when they build the symbiotic relationship.

- Degree of mutual adaptability:

  In order to identify the type of adaptability displayed in the interactions of the providers and the customers in service/benefit exchange. The dimension of mutual adaptability derives from the well-known evolution underlying modern

ecology that describes adaptation of organisms to their environment (i.e., Darwin's evolution theory). Two types of mutual adaptability involve:

(1) One-sided adaptability: either the providers adapting to the customers or the customers adapting to the providers.

(2) Two-sided adaptability: enabling high flexibility in changing the objectives of the partnership.

Considering continuity of value co-creation and the degree of mutual adaptability, the framework identifies a variety of interactions in the process of services/benefit exchange (as shown in Figure 1).

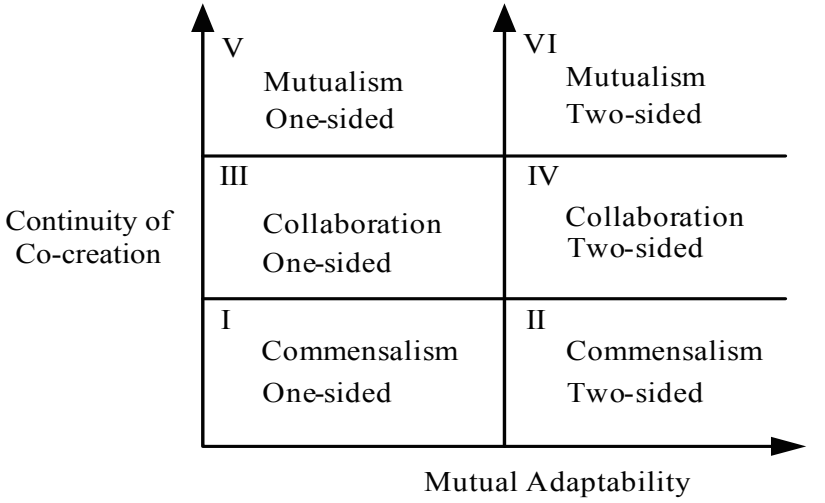

Figure 1 Classification Framework

This framework has been demonstrated through the three service systems featuring mechanisms of (semi-)automating the service/benefit exchanges denoted by IV, V, VI of Figure 1. The service systems interpreted by the scenarios in the diverse artwork design industry respectively.

3.4 Measuring service delivery performance from measuring mutualism's performance

Rust et al. (2006) wrote productivity and satisfaction are not always mutually compatible goals, especially in the service sector. According to the symbiosis perspective, a mutualism is a mutually beneficial interaction between individuals of two species. To identify continuity of value co-creation and mutual adaptability can be addressed in this framework. We can apply the notions of symbiosis performance in monitoring mutualism to the interactions of service/benefit exchange between the providers and the consumers. As a result of the measures of service performance, a service delivery design platform

also should provide a mechanism of performance measurement which devised for (semi-) automation of the service/benefit exchanges with specified performance criteria

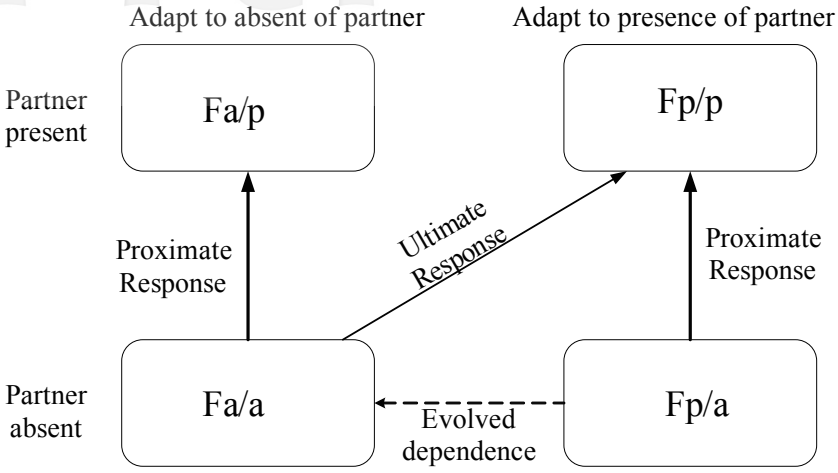

Figure 2 Performance Difference for Proximate Response, Evolved Dependence, and Ultimate Response

Mazancourt, Loreau and Dieckmanu (2005) describe the three different criteria derived from ecology can be used to test for performance of mutualism (Table 1):

Table 1 Definitions of Criteria Items

Criteria item	Definition
Proximate Response (PR)	The difference in performance of a genotype before and after short-term removal (or addition) of the partner species. That is, proximate response aims to understand whether the performance of the same genotype with the partner performs better than that without partner.
Ultimate Response (UR)	The performance, in the partner's presence, of a genotype adapted to the partner, is compared with the performance, in the partner' s absence, of another genotype adapted to this absence. The ultimate response aims to understand whether the focal species performs better than it would have done without the other species.
Evolved Dependence (ED)	This measures the performance difference between the performance without the partner of a genotype that evolved without the partner and the performance without the partner of a genotype that evolved with the partner. Evolved dependence measures the loss of performance of a focal population in the absence of a partner due to its adaptation to the presence of the partner.

To identify the partner in a service, a provider can be viewed as a partner for a customer (versus for a customer can be a partner for a provider). Figure 2 depicts the three criteria (proximate response, ultimate response, and evolved dependence) represented in terms of the methods of performance measurements associated with the service performance between the providers and the customers:

Table 2 Equations of Criteria

Criteria	Definition	Equation
PR Criteria	measuring the proximate response of a provider to the removal of its partner in terms of the performance deviation (shown in Figure 2 by a single solid line)	$F_{p/p}$- $F_{p/a}$ (ie., PR_p) $F_{a/p}$- $F_{a/a}$ (ie., PR_a) where $F_{p/p}$ denotes the performance measure of the customer with partner present, $F_{p/a}$ is the performance measure of the customer with partner absent, the proximate response of the customer to partner addition is measured as $F_{p/p}$- $F_{p/a}$ for the customer adapting to the partner presence. The proximate response of the customer to partner absent is measured as $F_{a/p}$- $F_{a/a}$ for the customer adapting to the partner absence.
UR Criteria	Measuring the performance, in the partner's presence, of a provider adapted to the partner, is compared with the performance, in the partner's absence, of the customer adapted to this absence in terms of the performance deviaiton (shown in Figure2 by a single double line).	$F_{p/p}$- $F_{p/a}$ (ie., $UR_{p/a}$) where $F_{p/p}$ is the performance measure of the customer with partner present, $F_{p/a}$ denotes the performance measure of the provider with partner absent The ultimate response of the customer to partner removal is measured as $F_{p/p}$- $F_{p/a}$, representing the difference between the performance in the presence of the partner of a customer that evolved with the partner and the performance in the absence of the partner of a provider that evolved without the partner.
ED Criteria	Measuring the performance deviation between the provider that adapted to the partner's absence and the customer that adapted to its presence, both measured in the absence of the partner by performance difference (shown in Figure 2 by a dotted line).	$F_{a/a}$- $F_{p/a}$ (ie., ED_{ap}) where $F_{a/a}$ is the performance measure of the provider with partner absent, $F_{p/a}$ is the performance measure of the customer with partner absent. Evolved dependence is measured as the difference between the performance without the partner of a customer that evolved without the partner and the performance without the partner of provider (Figure 2).

4. Service delivery systems as demonstration

This study specifies the three services for artwork design relative to the characteristics of quadrant IV, V and VI respectively (Figures 1). Each of the artwork design services displays characteristics of the continuity of co-production and mutual adaptability. This pioneer study may make an important contribution in laying the groundwork for understanding how a platform of artwork design service provides value service innovation (as shown in Figure 4).

4.1 Measuring service delivery performance with criteria

In this section, we propose the three scenarios to further illustrate the design, model and development of artwork design e-services, including the elements of continuity of co-production and mutual adaptability as well as the criteria of performance (as shown in Figure 3):

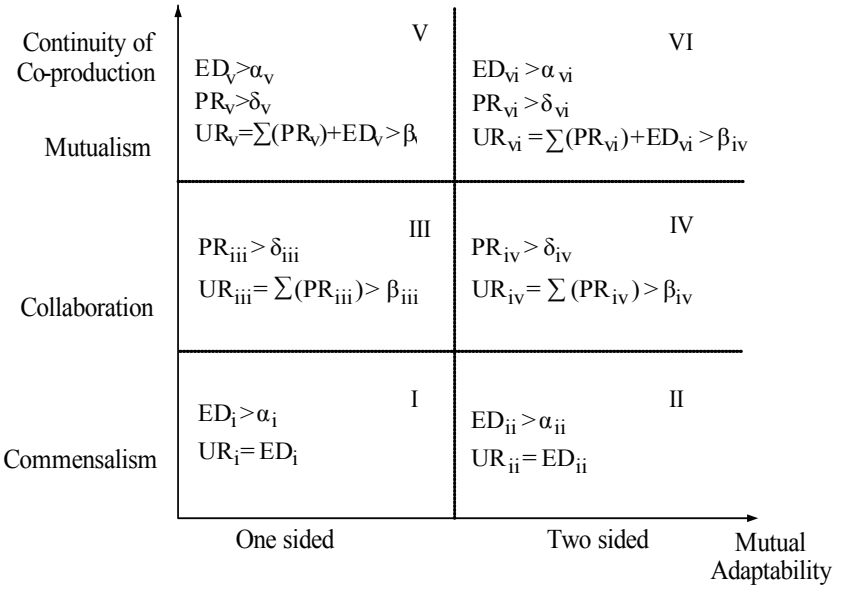

Figure 3 Performance Criteria in the Framework of Service Delivery Design

Figure 3 and Table 3 show the criteria of service performance for the collaboration and mutualism e-services. PR estimates the fitness of each service interaction, which service participants co-create the artwork in the design service. UR estimates the fitness of entire service over time. ED estimates the probable loss performance derived from the partnership change. The threshold value of PR, UR or ED ($\alpha_i \beta_i \delta_i$) respectively depends on the context of service delivery design.

Table 3 List of Thresholds Used in Figure 3

Threshold	Illustration
α_i	The threshold (α_i) of ED criteria met (greater than) qualifies for quadrant, *i = i, ii,...iv*
β_i	The threshold (β_i) of UR criteria met (greater than) qualifies for quadrant, *i = i, ii,...iv*
δ_i	The threshold (δ_i) of PR criteria met (greater than) qualifies for quadrant, *i = i, ii,...iv*

4.2 Service delivery systems scenario

4.2.1. E-entertainment

The trend of "open source" for design work implies that it might be a smart move to collect a variety of creative notions from any person who wants collaborate for value co-creation. Much artwork design in the entertainment field, such as music composition or movie production can be undertaken collaboratively by integrating many sources of materials. This service delivery system constructed of the three service components including "ontology developer," "partnership matcher" and "value appraiser" (Figure 4). However, it is unnecessary for each person involved in the work to engage cooperatively with the specific partners. Any person who is involved in co-production is non-specific partner. E-entertainment design can thus be represented as an e-service denoted in quadrant IV in Figure 1 and characterized as follows:

- Non-specific partner results in no ED
- PR > threshold (δ_{vi})
- UR is equal to the sum of PR

4.2.2. E-industrial design

Almost all existing mobile phones were designed by several representative mobile phone manufacture firms. Their mutual adaptability between the customers and the providers is virtually inconsistent. Thus, a way to co-produce the design of mobile phone is increasingly important. E-industrial design is able to meet the goal and the value co-creation of the mutualism underlying one-sided high adaptability. The service delivery system constructed by the four modules including "ideation," "competition," "mutation," and "monitoring" to implement the ideation design management and process for mobile phone design (Figure 4). The PR and UR must meet the goal of the specific thresholds, which comply with the criteria of quadrant V in Figure 1 as following:

- ED > threshold (α_v)

- PR > threshold (β_v)
- UR > threshold (δ_v)
- UR is equal to sum of PR and ED

4.2.3 E-interior design

Almost all interior designs require continuously modify the coordinate, however, the design process deems that an evolve process through the interior designer and customer exchange ideas. The example of e-interior design embodies the two-sided high adaptability to fulfill value co-creation of mutualism. This service delivery system constructed of four service components including "design problem specification", "design recommendation," and "cooperative interactive CGA" as well as "evaluation" (Figure 4). The mutualism's e-services through the cooperation of service participants need to examine the criteria of ED, UR, and PR, which the service performance comply with the criteria of quadrant VI in Figure 1 as following:

- ED > threshold (α_{iv})
- PR > threshold (β_{iv})
- UR is equal to sum of PR and ED

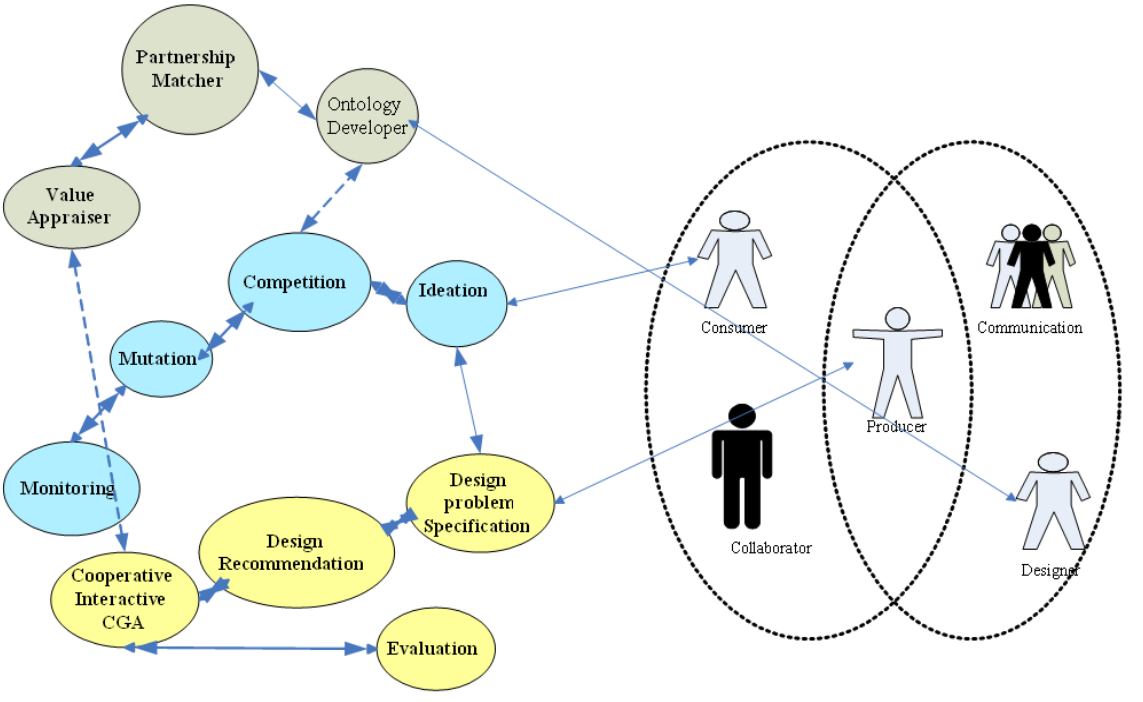

Figure 4 A Platform for the Three Service Systems

5. Managerial implication and discussion

This study has yielded finding that have both managerial insight on service delivery innovation. Along with the rise of service disciplines, there has been a parallel evolution of services research. With the emerging services science, management and engineering, advancement in service development are listed below:

- Service innovation (acquiring knowledge from outside sources, forming the collaboration and depending on highly skilled and educated employees. Given the importance of human factors, entrepreneurship is a driver.)
- Goods to services transformation (The new services refer to actual revenue-generating offerings.)
- Service and technology (Technology has become prominent in the firm-customer interface through self-service technologies.)

For the challenges of service economy, the dominance of services into the future and the strong push for continued innovation is driving a strong demand for "service innovation." The emerging information technologies allow the customers and the providers to access such systematic service innovation to create future value of service. A new frame of reference for service delivery design, the framework in this study presents a novel way to exchange service/benefit as a (semi-)automated value co-creation between consumers and providers. In terms of innovated service systems, they encompass the both natural and goal-dependent phenomena, represented respectively by concepts of symbiosis and service delivery design.

In order to create the competition of service sector, the CEO, managers, or service provider take into account how a service system can meet the goal of value co-creation with customer, not just only focus on the traditional concerns on service/products such as minimum cost. Moreover, the service infrastructures might comply with the service delivery design framework to model and develop. Especially, the interactions between providers and consumers result in the collaborative value through the service process of value co-creation.

Some marketplace begins to resemble a dialog locus organized around customers and their co-creation counterparts rather than around the passive demand for the providers. These new proposition and implications indicated that new business capabilities. Obviously, managers need a radically different approach for reigniting the growth and innovation capabilities of their enterprises. A new frontier of the study of service innovation provides a new opportunity in service economy. This desire to be successful will require restructuring and creating value in a fundamentally different way which was previously

carried out. In this emergent experience economy, research is required on further educating current and potential consumers as to what the service would be like. The service delivery design framework set forth a roadmap that recognizes the traditional service can be obsolete and that customers can engage in value co-creation and migrate into new systematic service delivery innovation. Various types of co-creation, distinguished by different levels of value proposition, can be illustrated as shown in Figure 5. This taxonomy unfolds the emerging opportunity space for service delivery design and development.

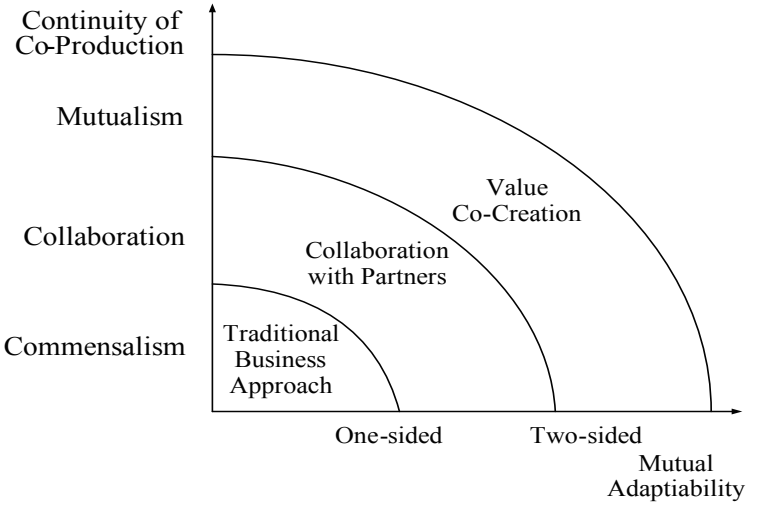

Figure 5 The Opportunity Space of Value Co-creation

New business models of service industry addressed by this study, however, the fundamental value proposition derived from the new thought such as the opportunity space of value co-creation in Figure 5.

6. Conclusion

In this paper we have presented an intelligent design framework of service systems fulfilling systematic value co-creation for service delivery underlying the ecological perspective. This research addressed an intelligent service delivery design using design science. According to the proposed framework, the service systems can be implemented by simulation to demonstrate this intelligent service delivery design. In this framework of this study, the two dimensions -- continuity of co-production and mutual adaptability -- aim to determine the diverse characteristics of service/benefit exchange and the partnership building. The framework for service delivery classification also proposes a blue print to indicate how to construct the innovated (semi-)automated value co-creation e-service. In

other words, the framework facilitates to identify a variety of intelligent service delivery designs.

As a result of the proposition of value co-creation and service delivery innovation, this study makes a great impacts on IT and business strategy. Especially, the framework is critical to facilitate to partnership building between the service provider and the customer through emerging technologies (e.g., adaptive technologies, Java, or Ajax) and system architecture (e.g., SOA). Given the value of business through the delivery of IT is the core mission of IT organizations (Hirschheim and Todd 2006). Based on the emerging IT, a service provider will be changed into a business partner. Developing partnerships might be a feasible strategy of engineering design for an innovated e-service process. With the business strategy of partnership, the changed role of IT will then transform e-service in order to enhance business value. As both suppliers-customers and technologies advance as the aforementioned, IT will subsequently shape the business mechanisms under the new vision of experience economy, An invented service systems could lead to a variety of intelligent service delivery design components for fulfilling service innovation (Figure 4).

Nevertheless, there exist certain limitations in this study. Based on the scientific model of ecological symbiosis, the classification devised by exerting two differential dimensions, continuity of value co-creation and degree of mutual adaptability, identifies diverse types of service/benefit exchange and the partnership. The two differential dimensions could be validated using the other empirical research methods in line with the nature of service exchange systems (i.e., dealing with individual relationships in human society).

The future research includes the implementation of the e-service engine based on the awareness of ecological symbiosis, which the engine will also encompass a few autonomous cognitive learning components, guaranteeing effective accomplishment of the goal as performance criteria (PR, UR and ED). Furthermore, the further service performance indicators exerted to evaluate these criteria of user experience in a service delivery process can be worthy of further investigation, regardless of domain dependence or domain independence.

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