

# Construct A Service-module Model Based on the System Perspective

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**Abstract**—The purpose of this paper is to develop a service-module model based on the system viewpoint which can be used to pre-analyze customer perceived internal processes. Then, resources can be aligned to this forecasted service processes to make the service created value be as close as possible to the customer perceived value. The model fits to the current mainstream service paradigms and can help improve existing service, develop new service, and predict competitor's service strategy.

**Keywords**- Service, Model, Perceived value, Paradigm, Process

## I. INTRODUCTION

This paper conceptually illustrates how a model constructed from the service production process that is common to all kinds of services can pre-analyze the customer's internal service process by utilizing the value co-creation concept of new service paradigms. The new service paradigms proposed that service is a perspective on value co-created with customer and assessed by customer.

In 2004, a new paradigm that argued service is the basic economic exchange unit announced the advent of the service-centric era. In the new service paradigms, products are seen as the materialized form of knowledge and skill, and service becomes a process of value co-creation made with customer. The value must be assessed by customer, and can be obtained by rent or access instead of ownership. IHIP was dispelled as a myth in the new paradigms. Under the concepts of value co-creation and assessment in new paradigms, this research adopts the nature of service production process to identify 4 usable dimensions for a service process, and 3 attributes for each dimension to construct a 3P+C model. The attributes are *a priori* knowledge employed from the findings of the other published researches. The attributes are symbolized and combined to form service modules for easier operation. A service module represents a service process and thus a service module forecasted from customer's perspective is the predicted customer internal process. The customer internal process represents the value perceived from customer side. The customer co-created value can thus be predicted by combining the service modules obtained from both provider and customer perspectives.

Key issue in service is to achieve customer satisfaction. If the customer perceived value could be known, then the

provider can align the resources to meet it. But it cannot be known in advance. The 3P+C can be used to predict it by analyzing the service modules from customer perspective. An illustration case of a commercial bank is exemplified to show the whole process of analysis.

In the similar process, 3P+C model can be used by enterprise to plan and develop new services, formulate service business strategies, predict competitors' service strategies, and benchmark the current service performance.

## II. LITERATURE REVIEW

Sasser, Olsen, and Wyckoff [1] was the first one in history to summarize from the previous researches that services had four distinct characteristics, i.e. Inseparability, Heterogeneity, Intangibility, and Perishability (IHIP) to distinguish services from goods. Then, most of the textbooks in marketing management incorporate IHIP as the basic concept of services, such as Kotler, Ang, Leong and Tan [2], Solomon and Stuart [3], Fitzsimmons and Fitzsimmons [4], and Zeithma, Parasuramann, and Berry [5] had reviewed 46 service-related publications of 33 authors from 1975 to 1983 and found the most frequently cited characteristics of services were IHIP.

Vargo and Lush [6] argued strongly the new dominant logic for marketing was the service-centered paradigm. Service was the basic economical exchange unit, and product was the materialized form of the knowledge and skill sold to customer to satisfy customer. In the same year, in another article [7], the well-known IHIP were dispelled as myths. It was debated that IHIP is too limiting to be able to effectively distinguish goods from services. Several evidences were exemplified in the arguments to show that too many exceptions existed in the IHIP characteristics to maintain it as a survivable paradigm.

Lovelock and Gummesson [8] concluded that IHIP paradigm was dying by re-investigating the application suitability of the four service characteristics on the four types of services, i.e. people-processing, possession-processing, mental stimulus-processing and information-processing. The announcement that IHIP paradigm was phased out meant that there was totally no need to intentionally divide goods and services into two distinct categories. Concept of rent and access or non-ownership of service was the derivative concept extended from that of the ownership of physical goods.

Services were seen as value that can be rented [8] in the new rental/access paradigm.

In the service-centered paradigm, Vargo and Lush [6] suggested that customer be the co-producer of service, and the value be perceived and determined by customer on the basis of “value in use”. As a matter of fact, long before Vargo and Lush suggested customer co-production and value-in-use concepts in service-centered logic, Edvardsson and Olsson [9] had already argued that judgment of service in terms of added value and quality should be based on customer perspective, and that customer was a co-producer during service process. Co-creation of value with customers is key and interactive, experiential, and relational nature form the basis for characterizing service [10].

In the service-centered economy, customers who are the co-producers of services are the centric of the whole service process. Therefore, Customer’s perceived value is the core value of the service. Whether we can provide a service that generates customer perceived value decides the success or failure of this service. However, Matthing, Sanden and Edvardsson [11] argued that the customer-company interaction often occurred at the same time as the customer experienced the service and it was problematic to obtain relevant feedback from customer in advance. It means that we cannot get customer’s comments, complaints, or feedback to know whether our service meets customer’s perceived value until it is consumed. Thus, for the planning or development of new services, we will never know what customer’s perceived value is before the service is launched and consumed. Therefore, it will be helpful to develop a model that can be used to pre-analyze customer’s perceived value and prepare the needed resources. Then after the services are launched, it will be easier to retune the model based on customer’s feedbacks to quickly achieve customer satisfaction.

### III. MODEL CONSTRUCTION

To develop the model, firstly, five dimensions of the service production process are identified. Among them, four independent dimensions are used to form a model called 3P+C model. Then three key attributes for each dimension are identified respectively by using the attributes that have been classified or adopted in the other researches.

#### A. Service production process

Service production process is a complete service cycle beginning from resource gathering, service creating and service consumption.

Most definitions also indicated directly or indirectly that service was a process. The actual scenario of the service production is just like what illustrated in figure 1. To generate services, the service provider has to prepare the resources which can be people, equipment, or knowledge. The resource has to be transformed into a form that can fit the recipient’s (or customer’s) specific situation.

During or after the recipient is serviced, he or she can feedback comments or complaints about the received service

quality to the service provider, which forms a service co-production process [9].

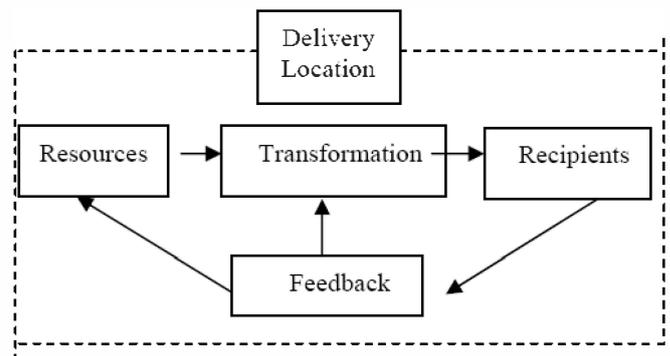


Figure 1: Service Production Process

#### B. 3P+C Model

To more precisely represent the roles in the service production process, we will use “provider” to replace resources who is responsible to gather resources, “process” to replace transformation which is actually a conversion process, “customer” to replace recipient who receives and consumes service, and “place” to replace delivery location where service is transformed or consumed, in the forthcoming discussion. But feedback is still maintained as feedback, which is used very common in describing an open system [12][13].

We have also identified the salient elements for the five dimensions of the service production process from the publications of the previous service researchers. The model is illustrated in Figure 2.

Without feedback dimension, the service production process is still a complete process. Customers are still able to be served even disregarding this dimension. So we assume the feedback has been well handled and the finalized service is a matured and a stabilized product, and thus we would not include feedback dimension in the following discussion. The other reason is that feedback dimension correlated closely with the other four dimensions that are independent to one another. The model consists of three dimensions starting with alphabet P, and one dimensions with C. We name it as 3P+C model for abbreviation.

#### C. Salient elements of the dimensions

##### 1) Provider

Provider is the short name of the service provider. Three elements, People (P), Equipment (E) and Knowledge (K) are identified to represent provider dimension. Thomas [14] and Kotler [15] used people-based and equipment-based attributes as the service classification bases. The other researcher used tangible or intangible domains [16].

Knowledge has become one of very important factors in service provision. Knowledge attribute is the enabler of the “professional service” classified by Maister and Lovelock [17]. In Vargo and Lush’s definition of service , knowledge is

regarded as one resource[6]. In this study, knowledge does not mean common knowledge that people use to service others or perform ordinary task. It means high-technological and unique know-how.

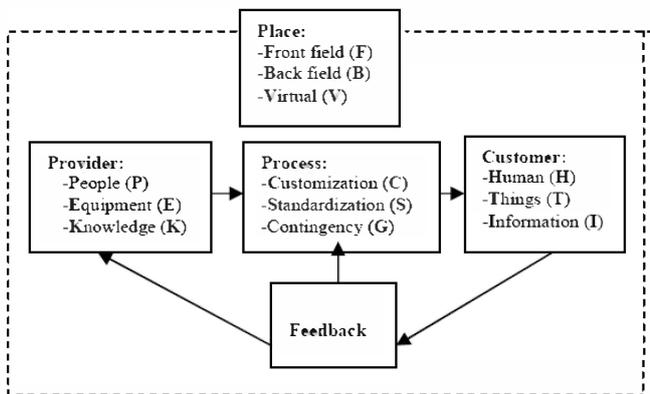


Figure 1. Figure 2: 3P+C Model

2) *Process*

This dimension is represented by three elements, i.e. Customization (C), Standardization (S) and Contingency (G). Maister and Lovelock [17], Schmenner [18] and Haywood-Farmer [19] used “extent of customization” as the one of the dimensions to classify service. The other side of customization is standardization, which is the “degree of routinization” used by Wemmerlov [20].

Contingency is referred to those lying in between fully customized and fully standardized. Sometimes, it is referred as “standardized and customized at the same time”, e.g. Dell’s personalized customization for its mass produced PCs.

3) *Customer*

Customer means the serviced objects and is represented by Human (H), Thing (T), and Information (I). Customer can be an individual or a company. Human is actually the same as people. But to avoid duplication with the “People” element in Provider dimension, Human is used to replace people. Thing means the service receiver is the tangible goods such as the cargo is delivered or the car is repaired.

The objective of service is mainly for the processing of goods, people, or information/image [21]. Lovelock and Yip [22] divided core services into three categories, i.e. People-processing services which refer to tangible actions to customer in person, Possessing-processing services which refer to tangible actions to physical objects, and Information-based services. Today, the ICT progresses more rapidly and more advanced than that of 1996. The position of “Information” is more important than ever. It normally relates to more knowledge-based services such as analysis of an anamnesis, financial reports, marketing survey, customer database and engineering problems. Other services like credit check, or credit card billing, or consultancy, etc. belong to such category. Information normally deals with complex document, image and database.

4) *Place*

This dimension includes Front office (F), Back office (B), and Virtual (V) s. Place is referred as the space where the service encounters occur. Bitner [23] called it “servicescape”. Silvestro, Fitzgerald, Johnson, and Voss [24] used the term Front office and Back office developed by Maister [25] for the source of added value.

Virtual marketplace or virtual space was used by Shih [26], Gronroos, Heinonen, Isoniemi, and Lindholm [27], Bishop [28] and Voss [29]. Thanks to the ICT development, especially the application software and the broadband Internet technologies, many real-time services with images and videos can be done remotely via network.

D. *Service module and its characteristics*

As proposed above, each dimension of the service production process consists of three elements. For the four dimensions, there exists 81 (3<sup>4</sup>= 81) combinations of elements. We name each combination of elements as the service module. One service module represents one service process. The characteristics are discussed briefly as below:

1) *For the same service, different perspective corresponds to different service module, which implies different resources investment.*

For a simplest service such as haircut, the service module is ESTF, which means that cutter (equipment) serves hair (thing) in a standardized way at the front office. If he wants to increase the price per haircut, he then hires a hair designer to customize the hairstyle for customers and the service module becomes PCTF. Some special customers, want an enjoyable experience and do not care about the price. the owner will re-decorate the shop and add new facilities such as Hi-Fi (high fidelity audio) to provide a home-like relaxation atmosphere and dignified ambient.

2) *Core service module and supplementary service module*

When the core service is PCHF, the barbershop needs more peripheral services to support the core service to differentiate his service from competitors’. The supplementary services can be a parking service (ESTF), children play area service (ESHF or PCHF), and customer waiting room service (ESHF), etc.. The same analysis can be made by predicting the service modules from the customer perspective and then prepare the resources to achieve it. For example, for the parking service, customer self-parking (ESTF) can be upgraded to parking by employee (PCTF).

3) *For the same service, the service modules can be quite different between those from provider perspective and those from customer perspective*

We use an on-line game service to explain this concept. From the consumer perspective, he plays games by using a PC and the service scenario is equipment serves people in standard form in front office, i.e. ESHF. If the game is very sophisticated and complicated to challenge player, then it is KSHF. If the game is complicated and have personalized flavor, it is KCHF.

The game platform from provider’s perspective is that his game software stored in the game server placed in the back

office serves the game players and the service module is ESIB or ECIB. But if he thinks what the game server serviced is the game players' PCs, then it module would be ESTB or ECTB.

4) *A service business normally comprises several core service modules*

A college, as an education service business, provides several core services. It has, for example, a regular program that students have to attend in the classroom in person (PSHF), a scheduled TV-broadcasting program (PSHB), a postal tuition program (ESHB), and 24 hours per day, 7 days a week Internet on-line program (PSHV). Therefore, a college like this can have four core service modules of teaching. The college has to prioritize them by the numbers of students of each service module, or by the amount of tuition fee collected, to decide what resources to allocate to each service module.

IV. USE 3P+C MODEL TO PRE-ANALYZE CUSTOMER-WANTED PROCESSES: A CASE ILLUSTRATION OF CORE SERVICES ANALYSIS FOR A COMMERCIAL BANK

We use the core services of a hypothesized commercial bank as an example to illustrate the application of the 3P+C model. The service items and the weights are reasonably assumed. For the real cases, there may be more service items, and the weights of services are different with those of the example. But the analysis processes are the same. For the other business, the same analysis processes can still be applied.

Suppose the hypothesized commercial bank whose existing revenue ratios from its five core services are as follows: (1) Front counter cash deposit and withdraw 20%, (2) ATM service 10%, (3) Mortgage loan 50%, (4) Credit card service 15%, (5) On-line banking 5%. Can we use 3C+P model and the provided data to pre-analyze which elements in service production process are the customer's main concerns? If we can extract customers' most concerned elements from the existing provided services modules mainly from customer perspective, then we can formulate a service strategy based on these elements to align the currently available resources to the service process wanted by customer. The followings are the steps to do it.

A. *Find the service modules of the core services from both provider and customer perspectives*

For the purpose of better understanding, the same sequence of the above core services is followed, i.e. (1) Front counter, (2) ATM, (3) Loan, (4) Credit card, (5) On-line bank. The corresponding provider-perceived service modules of the core services are (1) PSHF, (2) ESHB, (3) PCIB, (4) PGTB, (5) KGHV or ESTV.

The most possible customer-perceived service modules of the core services are (1) PSHF, (2) ESHF, (3) PCHB, (4) PGTB (5) PCHV or PCTV.

B. *Sum all the service modules by weight (revenue ratio)*

The rules of summing are: (1) Customer perspective is the most crucial, but the value of service is co-created by both provider and customer in service-centric paradigm. Provider's capacity and resource must be also considered. Thus customer

perspective is assigned with higher priority weight 70% and provider perspective is 30 % weight. The customer priority can be increased to 80% or 90% for more aggressive strategy, if needed. (2) For the same core service, customer or provider himself can have different service modules. Each module weights 50% for this core service. For example, for on-line banking, customer may view it as 50% PCHV and 50% PCTV, and provider perceives it as half KGHV and half ESTV.

The revenue ratio scheme reflects the allocation of the provider's existing resources in different core services. The resource adjustment has to be based on the existing available resources, even if there needs some new additional investments. In our discussion, we do not encourage a revolution of service business that requires totally new resources. The details of summing process of attributes is shown in the Appendix 1.

**Sum of elements of service production process** = Sum of weighted service modules = **【Services of Provider perspective x 30%】 + 【Services of Customer perspective x 70%】 = 0.885P + 0.1075E + 0.0075K + 0.535C + 0.3075S + 0.1575G + 0.675H + 0.175T + 0.15I + 0.27F + 0.68B + 0.05V.....(1)**

The resulted sum of elements in Equation 1 can be used directly to formulate the strategy. The coefficient of the element stands for its weight. But it would not be efficient and practical to select all the elements and use the limited resources to do everything. We need to optimize the resource utilization effectiveness by extracting the more significant element. The optimization process is illustrated step by step in the Table 1 of Appendix 2. We rank the elements in the result according to the percentage that the element is accounted for and select the elements in about the front 80%. Then the new percentages of the survival elements are recalculated and those with less than 10% are discarded. Table 1 of Appendix 2 shows the steps of optimization. The final results of the optimized elements the most likely suite customer service process are 29P + 22H + 22B + 17C + 10S.

C. *Interpretation of the results: 29P + 22H + 22B + 17C + 10S*

From the commercial bank's revenue ratio scheme of the existing five core services, we optimize the service modules of the core services by prioritizing customer perspective by 70% and provider by 30%. The final result is 29% servicing personnel (resources), 22% serviced customer, 22% back office, 17% customization and 10% standardization. Amongst many possible services provided by a commercial bank, one of the services that can meet the resulted service element weights seems to be the Personal Financing Service (PFS). To facilitate PFS services, the bank will have to train some of the existing employees who are already financially knowledgeable to be certified for financing consultancy. The certified employees can then provide to customers personally customized financing services for some standardized financing products depending on customer's finance capability. The bank has to invest the

cost of converting those employees to become the PFS certified experts.

#### D. Business Implication

We have deduced a possible new service by the optimized service elements resulted from heavily prioritizing possible customer perceived service processes based on the existing core services and the revenue weights. It is very likely what the customer wants. According the 20-80 rules, 80% of revenue might be generated by aligning 20% of the current resources to such customer-needed service process. If it succeeds, the service company can find another profitable core service utilizing the same steps. The company can thus keep on growing in such a way along with the adoption of new technologies.

#### V. CONCLUSION

Main contribution of this paper is the construction of 3P+C model. The model is able to fit to all kinds of services because it is developed from the service production process that all kinds of services have to experience. Therefore, 3P+C model is neutral to all of the current service paradigms.

By pre-analyzing the customer internal process, service business can forecast customer needs before launching or developing a new service. The empirical survey and feedback then can be complemented to retune the development plan. The whole process will enable enterprises or government agencies to run service business more effectively and precisely.

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#### APPENDIX 1: DETAILS OF SUMMING PROCESS

Sum of elements of service production process = Sum of weighted service modules

$$= \mathbf{【 Services of Provider perspective x 30\% 】} + \mathbf{【 Services of Customer perspective x 70\% 】}$$

$$= \mathbf{【 Provider perspective of ( Front counter service module x 20\% ) + ( ATM service module x 10\% ) + ( Loan service module x 50\% ) + ( Credit card service module x 15\% ) + ( On-line bank service module x 5\% ) x 30\% 】} + \mathbf{【 Customer perspective of ( Front counter service module x 20\% ) + ( ATM service module x 10\% ) + ( Loan service module x 50\% ) + ( Credit card service module x 15\% ) + ( On-line bank service module x 5\% ) x 70\% 】}$$

$$= (PSHF \times \underline{0.2}) + ( (ESHB \times 0.3 + ESHF \times 0.7) \times \underline{0.1} ) + ( (PCIB \times 0.3 + PCHB \times 0.7) \times \underline{0.5} ) + (PGTB \times \underline{0.15}) + \mathbf{【 ($$

$$(KGHV \times 0.5 + ESTV \times 0.5) \times 0.3 + ((PCHV \times 0.5 + PCTV \times 0.5) \times 0.7) \times 0.05$$

$$= 0.885P + 0.1075E + 0.0075K + 0.535C + 0.3075S + 0.1575G + 0.675H + 0.175T + 0.15I + 0.27F + 0.68B + 0.05V \dots (1)$$

## APPENDIX 2

TABLE I.      TABLE I: OPTIMIZATION OF ELEMENTS OF SERVICE PRODUCTION PROCESSES FOR A COMMERCIAL BANK

	Steps	Element and Percentage										% Sum		
		P	H	B	C	S	F	G	T	I	E	V		
1	Resulting elements of Equation 1													
2	% of elements in Step 1	22	17	17	13	8	7	4	4	4	3	1	100	
3	Cumulative % of elements in step 2	22	39	56	69	77	84	88	92	96	99	100		
4	Retain the element whose cumulative % in step 3 is close to 80%, and recalculate its percentage among the survivals (%) <sup>a</sup>	26	20	20	16	10	8						100	
5	De-select the element less than 10% in step 4, and recalculate its percentage among the final survivals (%) <sup>b</sup>	29	22	22	17	10							100	

Note: a: For example, P element's new percentage = 22/84 = 26%, and for H, it's 17/84 = 20%, etc.

b: For example, P element's new percentage = 26/92 = 29%, and for H, it's 20/92 = 22%, etc.