Chu-Ching Wang[1], Hsiu-Chen Chuang[2]
CONSTRUCT A SERVICE PRODUCTION MODEL TO PRE-ANALYZE THE CUSTOMER PERCEIVED VALUE OF SERVICE PROCESS

The purpose of this paper is to develop a service production model, the dimensions and the elements of 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 customer perceived value. The model fits into the current mainstream service paradigms and can help to improve the existing services, develop new services, and predict competitor's service strategy.

Keywords: service; model; perceived value; paradigm; process.

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ПОБУДОВА МОДЕЛІ СЕРВІСНОГО ОБСЛУГОВУВАННЯ ДЛЯ ПОПЕРЕДНЬОГО АНАЛІЗУ ЦІННОСТІ ПРОЦЕСУ ОБСЛУГОВУВАННЯ, ЯКА ВІДЧУВАЄТЬСЯ КЛІЄНТАМИ

У статті розроблено модель сервісного обслуговування, чиї параметри і елементи можуть бути використано для попереднього аналізу клієнтського сприйняття внутрішніх процесів. Потім ресурси можна привести у відповідність до цих прогнозованих процесів обслуговування, щоб привести створювану сервісом цінність у максимальну відповідність із цінністю, яка відчувається клієнтами. Модель відповідає основним сучасним парадигмам сервісу і може допомогти покращити існуючі послуги, розробити нові сервіси і спрогнозувати стратегію конкурента.

Ключові слова: сервіс; модель; сприйняття цінності; парадигма; процес.

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ПОСТРОЕНИЕ МОДЕЛИ СЕРВИСНОГО ОБСЛУЖИВАНИЯ ДЛЯ ПРЕДВАРИТЕЛЬНОГО АНАЛИЗА ОЩУЩАЕМОЙ КЛИЕНТАМИ ЦЕННОСТИ ПРОЦЕССА ОБСЛУЖИВАНИЯ

В статье разработана модель сервисного обслуживания, чьи параметры и элементы могут быть использованы для предварительного анализа клиентского восприятия внутренних процессов. Затем ресурсы можно привести в соответствие с этими прогнозируемыми процессами обслуживания, чтобы привести создаваемую сервисом ценность в максимальное соответствие с ощущаемой клиентами ценностью. Модель соответствует основным современным парадигмам сервиса и может помочь улучшить существующие услуги, разработать новые сервисы и спрогнозировать стратегию конкурента.

Ключевые слова: сервис; модель; ощущаемая ценность; парадигма; процесс.

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 customers' internal service process by utilizing the value cocreation concept of new service paradigms. The new service paradigms propose that service is a perspective on the value cocreated with customer and assessed by customer.

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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 cocreation made with a customer. The value must be assessed by a customer, and can be obtained by rent or access instead of ownership. IHIP was dispelled as a myth in 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 prior knowledge employed from the findings of 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 cocreated 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 a customer perceived value is known, then a provider can align 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 an enterprise to plan and develop new services, formulate service business strategies, predict competitors' service strategies, and benchmark the current service performance.

Literature Review. Sasser et al. (1978) was the first one in history to summarize from previous researches that services had 4 distinct characteristics, i.e. inseparability, hetrogeneity, intangibility and perishability (IHIP) to distinguish services from goods. Then, most textbooks in marketing management incorporate IHIP as the basic concept of services, such as Kolter (1999), Soloman & Stuart (2000), Fitzsimmons & Fitzsimmons (2011), and Zeithmal et al. (1985) 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 (2004a) 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 knowledge and skills sold to customers to satisfy them. In the same year, in another article (Vargo and Lush, 2004b), 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 (2004) concluded that IHIP paradigm was dying by re-investigating the application suitability of 4 service characteristics on 4 types of services, i.e. people-processing, possession-processing, mental stimulus-processing and information-processing. The announcement that IHIP paradigm was phased out meant 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 physical goods ownership . Services were seen as the value that can be rented (Lovelock and Gummesson, 2004) in the new rental/access paradigm.

In the service-centered paradigm, Vargo and Lush (2004a) 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 coproduction and value-in-use concepts in service-centered logic, Edvardsson and Olsson (1996) 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 coproducer during a service process. Cocreation of value with customers is interactive, processual, experiential and of relational nature forming the basis to characterize service (Edvardsson et al., 2005).

In the service-centered economy, customers who are coproducers of services are the centre of the whole service process. Therefore, customer's perceived value is the core value of service. Whether we can provide a service that generates customer perceived value decides the success or failure of this service. However, Matthing et al. (2004) argued that 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 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 achieve customer satisfaction quickly.

Edvardsson and Enquist (2006) argued that the concept of value had a moral dimension and an economic dimension. Comparing to economic dimension, moral dimension normally had clearer rules to follow and thus had less problems in identifying. Our discussion will be concentrated on economic dimension, i.e. the one that is more difficult to discover.

For economic dimension, the value logic was business and production, processes-focused (Edvardsson and Enquist, 2006). Gronroos (2004) suggested that to turn the interacted value base, cocreated with customer, to customer perceived value, a service provider must align its resources and competence with customer's internal processes. Combining these two thoughts, we can infer that to have the targeted service value equal or close to customer's perceived value and thus bring to customer's satisfaction, service production processes should be in line with customer's internal processes. Customer's internal process was referred to as how customer thought the service production processes should be like, and we could not know it in advance until service is consumed. Therefore, if we can find the basic elements that construct the service production process, and try to forecast what element would be selected by customer to form his/her internal processes, then we can align our resources and competence to these forecasted processes to create the customer's perceived value. This paper is trying to construct the model that can be used for such purpose.

Research Method: Model Construction. To develop the model, firstly, 5 dimensions of the service production process are identified. Among them, 4 independent dimensions are used to form a model called 3P+C model. Then 3 key attributes for each dimension are identified respectively by using the attributes that have been classified or adopted in other researches.

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

Most definitions also indicate directly or indirectly that service was a process. The actual scenario of service production is illustrated in Figure 1. To generate services, a 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.
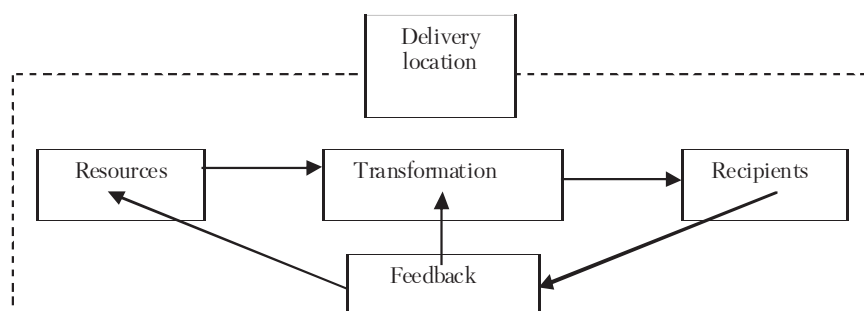

Figure 1. **Service Production Process**

During or after the recipient is serviced, he she can feedback comments or complaints about the received service quality to the service provider, which forms a service co-production process (Edvardson and Olsson, 1996).

3P+C Model. To represent the roles in the service production process more precisely, we will use the "provider" to replace a source responsible for gathering resources, "process" to replace transformation which is actually a conversion process, "customer" to replace recipient receiving and consuming 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 commonly in describing an open system (Boulding, 1956; Kast and Rosenzweig, 1979).

We have also identified the salient elements for 5 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 is correlated closely with the other 4 dimensions that are independent to one another. The model consists of 3 dimensions starting with P, and one dimension with C. We name it as 3P+C model for abbreviation.
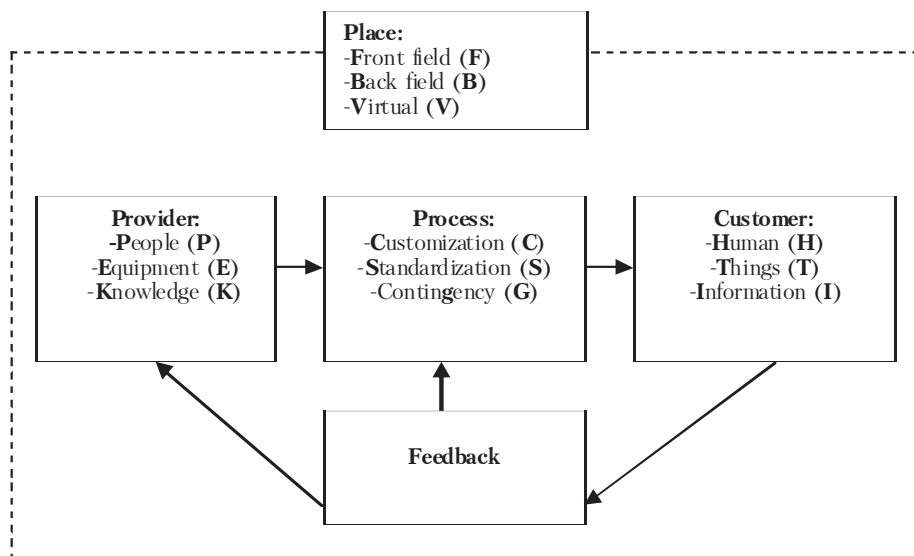
Figure 2. **3P+C Model**

Salient elements of the dimensions

1. Provider. Provider is the short name for service provider. 3 elements, people (P), equipment (E) and knowledge (K) are identified to represent provider dimension. Thomas (1978) and Kotler (1980) used people-based and equipment-based attributes as the service classification bases. The other researchers used tangible or intangible domains (Shostack, 1977).

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 (1982). In Vargo and Lush's definition of service (2004a), knowledge is regarded as one resource. 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.

2. Process. This dimension is represented by 3 elements, i.e. customization (C), standardization (S) and contingency (G). Maister and Lovelock (1982), Schmenner (1986) and Haywood-Farmer (1988) used "extent of customization" as one of the dimensions to classify service. The other side of customization is standardization, which is the "degree of routinization" used by Wemmerlov (1990).

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 it.

The objective of service is mainly the processing of goods, people, or information/image (Perrow, 1967). Lovelock and Yip (1996) divided core services into 3 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, ICT progresses more rapidly than in 1996. The position of "information" is more important than ever. It normally relates to more knowledge-based services such as analysis of anamnesis, financial reports, marketing survey, customer database and engineering problems. Other services like credit check, credit card billing, or consultancy etc. belong to this category. Information normally deals with complex documents, images and databases.

4. Place. This dimension includes front office (F), back office (B), and virtual (V). Place is referred to the space where the service encounters occur. Bitner (1992) called it "servicescape". Silvestro et al. (1992) used the terms "front office" and "back office" developed by Maister (1983) for the source of added value.

Virtual marketplace or virtual space was used by Shih (1998), Gronroos et al. (2000), Bishop (2001) and Voss (2003). Due to ICT development, especially new software and broadband Internet technologies, many real-time services with images and videos can be done remotely via network.

Service module and its characteristics. As proposed above, each dimension of the service production process consists of 3 elements. For 4 dimensions, there exists 81 combinations of elements. We name each combination of elements a service module. One service module represents one service process. The combinational sequence is illustrated in Figure 3.
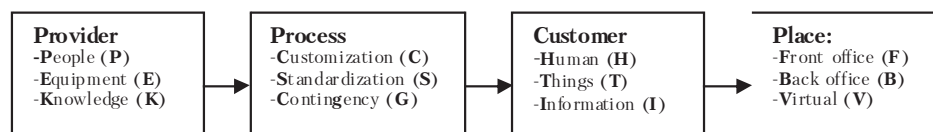
Provider	Process	Customer	Place:
-**P**eople (**P**) -**E**quipment (**E**) -**K**nowledge (**K**)	-**C**ustomization (**C**) -**St**andardization (**S**) -**C**ontingency (**G**)	-**H**uman (**H**) -**T**hings (**T**) -**I**nformation (**I**)	-**F**ront office (**F**) -**B**ack office (**B**) -**V**irtual (**V**)

Figure 3. **Combinational sequence of a service module**

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 a 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 redecorate the shop and add new facilities such as Hi-Fi audio to provide a 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 its 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 service modules from the customer perspective and then preparing the resources to achieve it. For example, in parking service, customer self-parking (ESTF) can be upgraded to parking by employee (PCTF).

3. For the same service, 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 a game is very sophisticated and complicated to challenge a player, then it is KSHF. If a game is complicated and have personalized flavor, it is KCHF.

The game platform from the provider's perspective is that his game software stored in the game server placed in the back office serves game players and the service module is ESIB or ECIB. But if he thinks that the game server services the game players' PCs, then its 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 24/7 days a week Internet online program (PSHV). Therefore, a college can have 4 core service modules of teaching. The college has to prioritize them by the number of students in each service module, or by the amount of tuition fee collected, to decide what resources to allocate in each service module.

Use of 3P+C model to pre-analyze customer-wanted processes: An 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 3P+C model. The service items and the weights are reasonably assumed. For real cases, there may be more service items, and the weights of services are different from those in the example. But the analysis processes are the same. For other businesses, the same analysis processes can still be applied.

Suppose the bank's revenue ratios from its 5 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%.

1. 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) online banking. 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.

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

The rules for summing are: (1) Customer perspective is the most crucial, but the value of service is cocreated by both provider and customer in service-centric paradigm. Provider's capacity and resources must be also considered. Thus, customer perspective is assigned with higher priority weight 70% and provider perspective is 30%. (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 online banking, customer may view it as 50% PCHV and 50% PCTV, and provider perceives it as 50% KGHV and 50% 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 it 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 the process of attributes is shown in the Formula 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%] = [Provider perspective of (Front counter x 20%) + (ATM x 10%) + (Loan x 50%) + (Credit card x 15%) + (On-line banking x 5%) x 30%] +[Customer perspective of (Front counter x 20%) + (ATM x 10%) + (Loan x 50%) + (Credit card x 15%) + (On-line banking x 5%) x 70%]= (PSHF x 0.2) + (ESHB x 0.3+ESHF x 0.7) x 0.1 + (PCIB x 0.3+PCHB x 0.7) x 0.5 + (PGTB x 0.15) +[(KGHV x 0.5+ESTV x 0.5) x 0.3 + (PCHV x 0.5+PCTV x 0.5) x 0.7]x 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   (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 Table 1. 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 new percentages of the survival elements are recalculated and those with less than 10% are discarded. The final result of the optimized elements the most likely to suite customer service process are 29% servicing personnel (resources), 22% serviced customer, 22% back office, 17% customization and 10% standardization.

Table 1. **Optimization in Elements of Service Production Processes for a Commercial Bank**

	Steps	Element and Percentage											% Sum
1	Resulting elements of equation 1	P	H	B	C	S	F	G	T	I	E	V	
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 (%)[a]	26	20	20	16	10	8						100
5	De-select the element with less than 10% in step 4, and recalculate its percentage among the final survivals (%)[b]	29	22	22	17	10							100

Note: a: For example, P's new percentage = 22/84 = 26%.
b: For example, P element's new percentage = 26/92 = 29%.

3. Results Interpretation. Among many possible services provided by a commercial bank, one of the services that can meet the resulted service element weights seems to be personal financing service (PFS). To facilitate PFS services, the bank will have to train some of the existing employees 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 customers' finance capability. The bank has to invest the cost of converting those employees to become PFS certified experts.

Discussion and Conclusion.

The 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 existing 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. 3P+C model can be used as a tool to do the following:

(1) Business simulations

a. By changing the ratio of the weight of customer perspective to provider perspective (C/P ratio) from 100:1, 90:10, 80:20, 70:30, 60:40, to 50:50 in sequence, different salient element groups can be obtained. Service business can locate where they are currently, and increase or adjust resources to have customer perspective ratio as high as possible, i.e. to achieve higher customer satisfaction.

b. By using the moderate C/P ratio, e.g. 70:30 and the current revenue weights, service business can investigate if the existing resource allocation is reasonable or not.

c. By giving a specific service a targeting weight, service business can forecast the resources needed to achieve that target. The target can be revenue, profit or market share.

d. For service modules, weights normally are different for revenue, profit, and market share. Service business can forecast what resources are needed, if a companys strategy is to focus on higher revenue, or more profit, or bigger market share.

(2) Fitness matching

Through repeated optimizing as exemplified, and fine-tuning after receiving customer's feedback, the fitness between service types and resources, providers and customers can be maximized.

(3) Formulating business strategies

As shown in the example of the commercial bank, a marketing plan can be formulated based on the salient elements after optimization.

(4) Plan or develop new service business as shown in the illustrative case of commercial bank.

(5) Gaining competitive advantage by predicting competitor's strategies.

By using the collected competitors' revenue, market share and profit information to conduct simulations as mentioned above, competitors' business strategies can be predicted.

(6) Optimizing interdepartmental service to increase overall performance at an enterprise.

If the relationship between departments can be emulated as provider and customer, resources can be optimized to achieve the highest overall performance of an enterprise.

Last but not the least, 3P+C model symbolizes the elements of the dimensions of the service production process. By using the symbols such as P, C, H, E etc., the operation of pre-analyzing customer's internal service process becomes easier. For a more complex service business with many more core and peripheral services, a computerized optimization becomes feasible.

Empirical tests can be done in the future to verify the suitability and applicability of such 3P+C model. In addition, to construct finer resolution of the dimensions, more elements can be added to each dimension, e.g. further dividing human element into physical body and psyche, and contingency element into high and low labor intensity etc. But adding more elements will increase the complexity of service modules and makes it more difficult to handle and interpret. In future research, it can be done by writing a new application software, and leaving the optimization to computer.

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Стаття надійшла до редакції 20.03.2012