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Integrative Service Taxonomy and Business Strategies Formulation: 4P Model with Open System and Modularization Approaches

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Abstract

In many countries including Taiwan the output of service sector has exceeded 70% of GDP (Gross Domestic Production). It is worthwhile to investigate the insight of service and find the method to develop business strategy for service firms. This study adopts open system concept to identify 4 dimensions of service. Then via literature reviews 3 attributes are identified for each dimension. The combination of attributes forms 81 service modules, with which a service firm offering multiple services can integrate them to formulate the business strategy by using the managerial implications of the attributes. The MTMM (Multi-trait Multi-method) tool is used to show the integrative classification approach developed in this study is more effective than the previous approaches.

Keywords: Service Taxonomy, Business Strategy, Open System, MTMM.

1. Introduction

Clark [7] categorized the service as the tertiary sector in economic system. The production output of the service sector accounted for more than 70% of GDP, and the employment of it exceeded 70% of total working population in many OECD countries in 2002 (Wolfl [58]). Service has become the most important driving force for further economical growth today.

To investigate the insight of service, the classification of it would be the first thing to do. Many researchers have already developed varieties of service classifications with different schemes. However, as explained in the literature review, some of them are lacking exhaustiveness and representation, and some are not integrative. Quality of

business strategies formulated from those service classifications cannot be good and may lead the enterprise to wrong directions.

The good classification shall equip two key properties, which are mutual exclusivity and exhaustiveness of the classifying variables (Bailey[1]). Bailey [1] divided "classification" into "taxonomy" that is for practical uses such as empirical and strategy development, and "typology" that is for theory development. This paper is to develop an integrative service classification model, named 4P model, that possesses these two properties by using an open system concept (Boulding [4], Katz and Kahn [24], Huse [22], Kast and Rosenzweig [25]).

The utility of service classification schemes ultimately lies in their ability to facilitate the development of meaningful strategies and guidelines for service marketing and operations (Cook et al. [9]), i.e. to gain strategic marketing insights (Lovelock [32]). The 4P model developed in this paper also provides some meaningful management implications that can be used to formulate good business strategies. The managerial implications of attributes of the 4P model are summarized in the Appendix. Firms can find their own service modules of the service business and identify what attributes are contained in the service modules. Then they can use the managerial implications of the attributes to formulate their strategies."

Finally the multi-trait, multi-method (MTMM, Campbell and D.W. Fiske [5]) tool is used to show the integrative approach of this study is more effective than the previous classification methods.

2. Literature Review

After Judd [23] published the first services classification article, successively there were many other publications focused on classifying services from different perspectives. But there are common drawbacks for these classification methods, i.e. lack of exhaustiveness and external validity. The integrative service classification model developed in this research improves such weakness.

Basically, the structures of the previous classifications of services are based on the conceptualizations below.

(1) Classified by discrete item scheme

The classification in early days intended to classify services into few different absolutely independent categories. For example, Judd [23] classified the services based on the relationship between goods and the service activities into rented goods services, owned goods services and non-goods services. The advantage of such classification is the clearness in the classification types, the easiness of classifying, and the strong exclusivity between the classified clusters. The weakness is that it only considers one dimension of services and neglects the other important dimensions. It focuses mainly on the properties of the serviced objects but not on the traits of the service providers and the characteristics of the service delivery process.

(2) Classified by continuum scheme

Continuum type has two independent attributes at the two ends of the horizontal line. Few referenced points are selected as the basis of the classification items. For example, Shostack [49] used the physical goods and intangible services, and Thomas [53] used people-oriented provider and machine-oriented provider as the two ends of the continuum. The weakness of such classification is the same as the discrete item scheme that other important dimensions of services are not considered. In addition, Vargo and Lusch [55] argued that intangibility could not sufficiently characterize a service.

(3) Classified by 2-dimensional matrix scheme

The basic concept is to combine two item schemes or two continuum schemes to form a two dimensional matrix. For example, Maister and Lovelock [34], classified the services into service factory, service shop, mass service and professional service by using the extent of customization and the extent of customer contact. Such scheme more or less improved the weakness of the above two schemes, but still had the problems of insufficiency of exhaustiveness. Lovelock [32] proposed five independent classification matrix structures. It provided a more complete coverage for the service classifications, but without having them been integrated. Some problems in service classification still existed because of it. Moreover, if the marketing strategies are formulated by considering the property of the service classified from a single dimension, it might generate a fallacy to make the conclusion by only seeing a small portion of the whole big picture.

3. Mapping Service Process to Open System
3.1. Open system concept

A system refers to an organized and integrated entity that includes two or more co-ordinated components or subsystems with a clear boundary to its external environment (Kast and Rosenzweig [25]). The typical open system, item (4), includes inputs, operations, outputs, feedback, and boundary (Huse 22, Sampson [45]) to equip the system with capability of self-reproduction (Boulding [4]). The open system can be illustrated as in Figure 1.
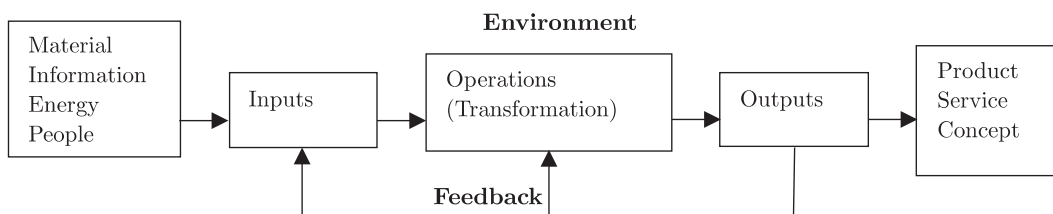
Source: Huse [22] p.7

Figure 1. Diagram of Open System.

3.2. Service system mapping

There are several different definitions of services cited from leading service researchers as follows:

- Services are processes involving customer contact (Chase [6]).
- Service is a product which is a process (Shostack [50]).
- Services can be defined as economic activities that produce time, place, form or psychological utilities (Murdick et al. [39]).
- Services are deeds, process, and performances (Zeithaml and Bitner [59]).

From the cited definitions, we can see that the service is actually a process. The process can generate utility by transforming the inputs of resources to outputs in the form of service. The utility is that the customer gets serviced. The illustration of the mapping is shown in Figure 2. The mapping process is as follows:

(1) Dimension "Provider" maps to "Input plus its outside resources" since the service provider has to consolidate all the needed resources to service customer.

(2) Dimension "Process" maps to "Operations" since it's the service production process.

(3) Dimension "Patron" maps to "Output and its serviced objects" since the services are delivered to recipients here.

(4) Dimension "Place" maps to "Environment" since it's the place where the services are produced and delivered.

(5) The "Feedback" remains the same. But feedback correlates to the other three dimensions, which impacts the exclusive principle of classification. It would not be used as a dimension of classification.
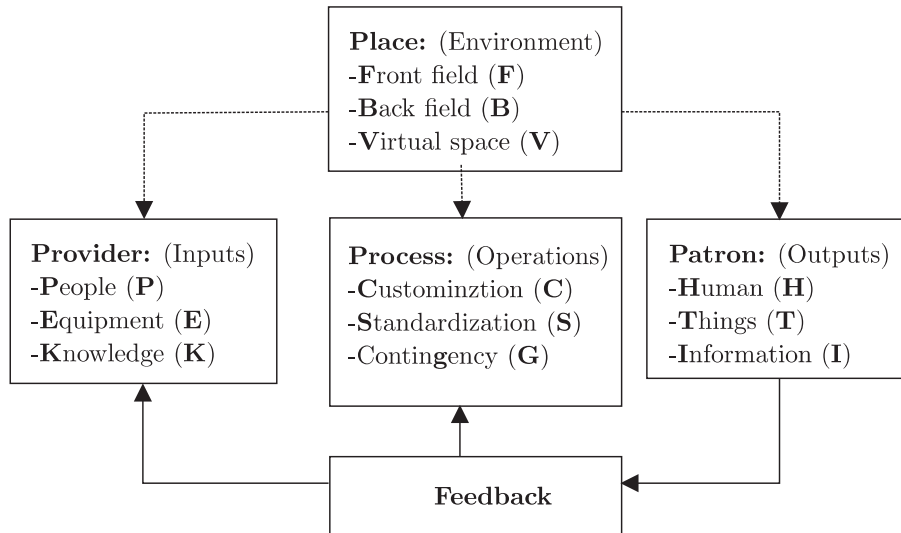

Figure 2. Diagram of Service Mapping onto Open System.

The system includes four initials "P" and thus is named as 4P model. Since all kinds of services have to go through such process, 4P model can be generalized to classify all kinds of services. That is to say, it has a high degree of external validity. The four dimensions are independent to one another, and are able to represent every service. Therefore, the classification developed with open system concept like 4P model possesses the characteristics of mutual exclusivity and exhaustiveness.

4. 4P Model of Service Classification

In the 4P model, the four dimensions are further sub-divided into three key attributes for each "P" dimension. These attributes are identified from the previous researches.

4.1. Provider

Three attributes, People (**P**), Equipment (**E**) and Knowledge (**K**) are identified to represent provider dimension. Thomas [53] and Kotler [29] used people-based and equipment-based attributes as the service classification bases. The other researcher used tangible or intangible domains (Shostack [49]).

OECD ([41], p.7) emphasized the importance of knowledge in service provision. Knowledge attribute is the enabler of the "professional service" classified by Maister and Lovelock [34]. In Vargo and Lusch's [55] definition of service, knowledge is regarded as one resource. Kotler and Keller [30] used "type of technology" as one service classification attribute.

4.2. Process

This dimension is represented by three attributes, i.e. Customization (**C**), Standardization (**S**) and Contingency (**G**).

Maister and Lovelock [34], Schmenner [47] and Haywood-Farmer [18] 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 [57].

The third attribute "contingency" means situation-dependent and those lying in between fully customized and fully standardized. It also covers the category of "labor intensity" (Schmenner [47], Haywood-Farmer [18]), and "mass transaction" and "contingent relationship" in Tinnila and Vepsalainen's [54] "type of service".

4.3. Patron

Patron means customer or the serviced object and is represented by Human (**H**), Thing (**T**), and Information (**I**). Customer can be an individual or a company. Gronroos [16] suggested consider customers to be important attribute in market plans.

The objective of service is mainly for the processing of goods, people, or information/image (Perrow [42], Lovelock and Yip [33]) 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.

4.4. Place

This dimension includes Front office (**F**), Back office (**B**), and Virtual (**V**) as its attributes. Place is referred as the space where the service encounters occur. Service providers contact customers and deliver services in here. Bitner [3] called it "servicescape". Silvestro et al. [51] used the term Front office and Back office developed by Maister [35] for the source of added value. In back office, internal services are provided to support indirectly customer relation . Virtual marketplace or virtual space was used by Shih [48], Gronroos et al. [17], Bishop [2], and Voss [56] for networking services such as e-commerce and other Internet applications.

5. Service Module

The 81 combinations of the 12 attributes of the 4 dimensions are used to classify the service type or module. The concept of the classification is illustrated in Figure 3. The arrow direction in Figure 3 means the sequence of the combination.
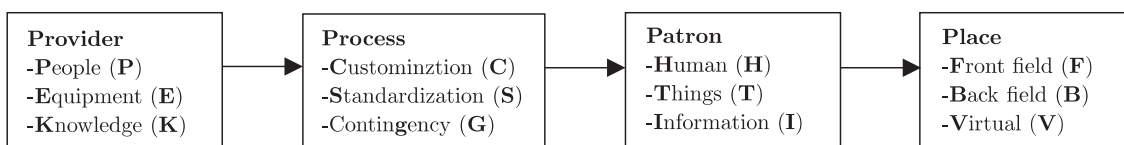

Figure 3. Service Classification Concept of 4P Model.

The 81 service modules are formed by combining the attributes of each dimension as follows:

PCHF	PCHB	PCHV	PCTF	PCTB	PCTV	PCIF	PCIB	PCIV
PSHF	PSHB	PSHV	PSTF	PSTB	PSTV	PSIF	PSIB	PSIV
PGHF	PGHB	PGHV	PGTF	PGTB	PGTV	PGIF	PGIB	PGIV
ECHF	ECHB	ECHV	ECTF	ECTB	ECTV	ECIF	ECIB	ECIV
ESHF	ESHB	ESHV	ESTF	ESTB	ESTV	ESIF	ESIB	ESIV
EGHF	EGHB	EGHV	EGTF	EGTB	EGTV	EGIF	EGIB	EGIV
KCHF	KCHB	KCHV	KCTF	KCTB	KCTV	KCIF	KCIB	KCIV
KSHF	KSHB	KSHV	KSTF	KSTB	KSTV	KSIF	KSIB	KSIV
KGHF	KGHB	KGHV	KGTF	KGTB	KGTV	KGIF	KGIB	KGIV

Some of the service types may not exist at the present time. But it does not mean that they would not come out in the future. The list of the service type provides a hint

and direction to build a new business model if the service type does not exist currently. The 4P model can inspire innovations of new business models.

A service business normally operates several services. For example, a college, i.e. an educational service business, provides several core services. It has 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, due to that the mails are mainly processed by sorting and delivering equipment), 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, i.e. PSHF, PSHB, ESHB and PSHV. 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.

Another example, a commercial bank provides the services: Front counter cash deposit and withdraw service as PSHF; ATM service as ESHB; Loan service as PCIB; Credit card service as PGTB; and On-line banking service as KGHV. The classified output that 4P model generates is the "service type" or "service module". It implies several concepts as follows:

(1) A service business or organization, e.g. a college, can have several different service types or modules at the same time. A college has 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 due to the mails are mainly processed by sorting and delivering equipment), and 24 hours per day, 7 days a week Internet on-line program (PSHV). Therefore, a college can have four service types of teaching, i.e. PSHF, PSHB, ESHB and PSHV, in its educational service business portfolio. If the college opens the programs also for the training of dogs, cooking, painting and flower decorating, another service types, PSTF, PSTB, ESTB and PSTV will come out. To have these different service types in the educational service business, the college has to prioritize them by the numbers of students of each service type, or by the amount of tuition fee collected for each service type, to decide what resources to allocate to each service type. Meantime, the strategic marketing plan can also be formulated for each of the service type and integrated to gain synergy under a holistic system perspective.

(2) The same service can be classified into different service types or modules due to the weight difference of the components of service content. If the above- mentioned college establishes a new graduate school focusing more on research aspect, then the PSHF that corresponds to the classroom teaching will become KSHF. It is changed due to knowledge account for more weight than people in the service content in such case.

(3) The same service can be classified into different service types or modules due to the different perspectives from different stakeholder. The on-line game becomes more and more popular nowadays. From the consumer point of view, he plays games by

using a PC and the service scenario is equipment service people in standard form in front field, i.e. ESHF. If the game is very sophisticated and complicated, then it is KSHF. If the game is complicated and have personalized flavor, then it is KCHF. The user may also feel that the scenario is that his PC is serviced by the game server located at provider's premises and the service type is ESTB or ECTB, depending on the sophistication of the game software. Or the player would think that it is the other players who entertain him by playing the game together and the service type is PSHB or PCHB. The game platform provider's (service provider's) view is that his game software stored in the game server (computer hardware) placed in back office services the game players and the service type is ESPB or ECPB. But if he thinks what the game server serviced is the PCs of the game players', then the service type would be ESTB or ECTB. If the game server is managed by co-location (i.e. the game service provider who owns the game server rents the site facilities and contracts the maintenance of the server to the facility owner), then the facility owner's view is his site services game server in front office with the service type as ECTF. Under such situation, the service provider has to consider all the service types that can possibly be perceived by all the related parties, and formulates a most optimum marketing strategy.

(4) For the same service purpose, the service type can be different due to different service means. The mission of the mentioned college is to educate students. To achieve the same mission, different means can be adopted. The college can use regular classroom instruction, or TV broadcasting, or postal tuition, or Internet non-stop teaching. As described above, they are the different service types.

6. Modularization Concept of Service Business and Strategy Formulation

The concept is shown in Figure 4 by using the on-line game example. As described above, a service business can have several service types or modules. Therefore, a service
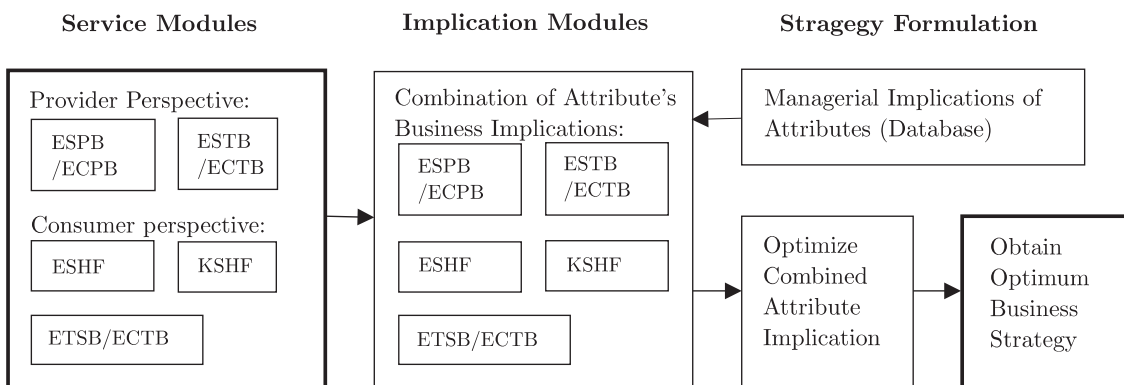

Figure 4. Modularization Concept of Service Business (On-line Game).

business can be seen as a service system consisting of several service modules. In addition, the service modules viewed from customer maybe different from what the service business sees.

Different service type or module has different combinations of the implications. It can be seen as an "implication module". Service business can integrate the implication modules that correspond to both provider-perceived and customer- perceived service modules to formulate an optimum marketing strategy. If conflict strategies are found caused by difference perspectives, an optimization must be made based on the weight of the service modules classified from different perspectives in terms of revenue, or profit, or market share. The business strategies can cover all the aspects of the firm, such as organization, marketing, human resources and other related value chains.

Moreover, customer perspective must be the first priority during the optimization of the implication module. Such concept is totally compliant with the critical view of the service portraits (Edvardsson et al. [13]) that service is a perspective and the focus is on value through the lens of the customer. It also echoes with what Murphy and Enis [40] argued that the classification allowed the integration of marketing decision for strategy formulation, ensuring decisions were founded on consistent motions of buyer behavior.

7. Theoretical Foundation of 4P Model Taxonomy

Warriner (from Rich [44]) identified three classifying procedures, i.e. traditional, theoretical and empirical. They are corresponding to the classification methods of Intuitive, logical, and quantitative, respectively. The traditional classification procedure is based on the intuitive common sense. Its classification contents and procedures have not been clearly defined for it. It not only lacks qualitative logicality but also quantitative empirical data to verify.

The theoretical classification is based on *a priori* theory, i.e. the classes of the organization have been formed by the logic concept before the classification is made, and then the members are classified into the class that they belong. The logic of the classification procedure is the top-down deductive process. The conceptualization of the 4P model of taxonomy in this paper is to integrate in light of the open system theory the attributes that have been already used by the other researchers and those actually exist to construct a structure of 81 service classes or types.

The empirical classification procedure is to use inductive method, i.e. to quantify the empirically collected data, and form the classes of the same property by using statistics method. It is a bottom-up inductive process. Some multivariate analysis techniques such as factor analysis, cluster analysis, multidimensional scaling, and MTMM are often used for such purpose.

To illustrate the different classification procedures, a comparison summary is listed in Table 1. The classification procedure of 4-P model basically belongs to the theoretical type. But due to the use of MTMM analysis in the assessment of the classification effectiveness, it also covers part of the empirical type.

Table 1. Summary of Comparison of Classification Procedure.

| Type of Procedure	Basis of Classification	Results of Procedure	Classification Method	Remarks (by author)
Traditional	Common sense	Fails to define contents of assigned organizational groups.	Intuitive	
Theoretical	A Priori/ heuristic	Organizational classes are formed prior to the placement of organization into these classes.	Logic, Deduction (Qualitative)	4-P Model belongs to such two procedures
Empirical	A posteriori /arithmetic	Organizational classes emerge from the empirical procedures used to sort organizational feature on the basis of similarity or contrast	Statistics (e.g. MDS, MTMM), Induction	

Source: Rich, P. [44], p.760.
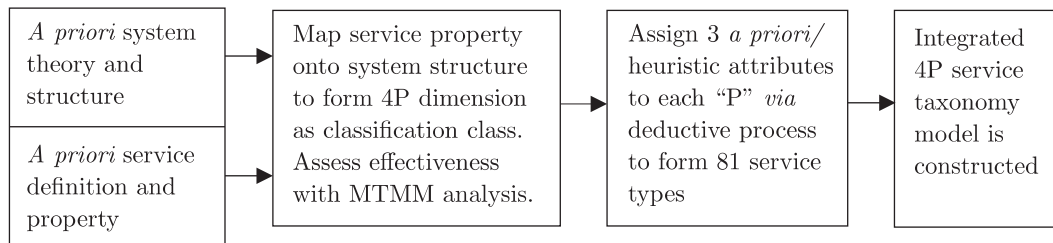
Figure 5. Construction Procedure of 4P Service Taxonomy Model.

From Table 1, we can argue that the procedure of the construction of 4P model of service taxonomy is basically of theoretical type with an assisting quantitative analysis. Figure 5 is the illustration of the construction of the 4P service taxonomy model via the strict theoretical processes.

The 4P model of this article consists of four independent classification variables or dimensions, which is considered as a multidimensional classification and thus should conduct a multivariate analysis to do the inductive classification. The objective of this research, however, is to construct a conceptual model of taxonomy. Therefore, the empirical multivariate analysis will not be conducted for the service type classifying. But for evaluating the effectiveness of the classification scheme of the 4P model, i.e. reliability and validity, the MTMM method will be used to convert the conceptual dimensions to quantitative data, and then carry out a "quasi quantitative" analysis. The reason that we call it "quasi" is because it is not a fully empirically quantitative approach. The assessment process is made in the next section.

8. The Evaluation of the Effectiveness of 4P Model by Using MTMM

The concept of multiple-ism is stemmed from the multiple operation-ism identified by Campbell and Fiske [5]. The basic theory of the multiple-ism is that when problems

Classification Scheme (Method)	Dimension	Item				Continuum				Matrix				4P Model			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Item	1	1															
	2	X	X														
	3	X	X	X													
	4	X	X	X	X												
Continuum	1	X	X	X	X	1											
	2	X	X	X	X	X	X										
	3	X	X	X	X	X	X	X									
	4	X	X	X	X	X	X	X	X								
Matrix	1		X	X	X		X	X	X	1							
	2	X	X	X	X	X	X	X	X	0	1						
	3	X	X	X	X	X	X	X	X	X	X	X					
	4	X	X	X	X	X	X	X	X	X	X	X	X				
4P Model	1		X	X	X		X	X	X		0	X	X	1			
	2	X	X	X	X	X	X	X	X	0	1	X	X	0	1		
	3	X	X	X	X	X	X	X	X	X	X	X	X	0	0	1	
	4	X	X	X	X	X	X	X	X	X	X	X	X	0	0	0	1

Note: The value of "X" is between 0 and 1, i.e. $0 < X < 1$.

Figure 6. The Comparison List of MMTM Analysis for the Different Classification Scheme.

come and there are a variety of approaches but we are not sure which approaches are more correct. Then all the approaches have to be selected so that the approaches of the most useful or those closest to the fact can be identified by using multi-method techniques. In short, the multiple-ism mainly argues that the research questions and hypothesis should reflect the perspectives and values of the multiple stakeholders in order to increase the applicability of the research results (Levinton and Hughes [31]).

From the concept of the above multiple-ism, there always exist many diversified classification methods and schemes for the service taxonomy. Each method and scheme has its own unique value and it's difficult to give up any one. In light of the concept of multiple-ism theory, multi-method can be used to identify which approach of classification method and scheme is closest to the fact or most useful.

The multi-method used by multiple-ism to measure validity is the multivariate analysis techniques, including MDS, Path analysis, and MTMM. MTMM is the main method used to test validity. The comparison of the MTMM analysis for the different scheme of the service classification methods is shown in the Figure 6.

In the cells (or checks) of the 16 by 16 MTMM matrix of Figure 6, there are three values, i.e. 1, 0, and X. "1" means the correlation coefficient of the two corresponding dimensions is 1, "0" means coefficient is 0, and "X" means the correlation coefficient is between 1 and 0, i.e. $0 < X < 1$. The basic concept is that the scheme of Item type has one dimension, Continuum type has one dimension, Matrix type has two dimensions, and integrated type like 4P model has four dimensions. The MTMM matrix is used to test the followings:

- Reliability: Same method, same dimension

  The averaged value of the correlation coefficients between the same scheme types (or methods) and the same dimensions is used to explain the level of reliability. High value coefficient of the variables of the same dimension refers to their strong capability to explain the related constructs. Therefore, the larger the average value is, the higher the reliability will be. Cells along the bold-solid line are used to calculate the average value.

- Discrimin ant validity: Same method, different dimension

  The average value of the correlation coefficients between the same scheme type (or methods) and the different dimension is used to explain the level of discriminant validity. Low value of correlation coefficient of the variables of the different dimension refers to their strong capability to differentiate each other. Therefore, the smaller the average value is, the higher the discriminant validity will be. Cells contained in the bold-lined triangles are used to calculate the average value.

- Discriminant validity: Different method, different dimension

  The average value of the correlation coefficients between the different scheme type (or methods) and the different dimension is used to explain the level of discriminant validity. Low value of correlation coefficient of the variables of the different dimension refers to their strong capability to differentiate each other. Therefore, the smaller the average value is, the higher the discriminant validity will be. Cells included in the thin-lined triangles are used to calculate the average value.

- Convergent validity: Different method, same dimension

  The average value of the correlation coefficients between the different scheme type (or methods) and the same dimension is used to explain the level of convergent validity. High value of correlation coefficient of the variables of the same dimension refers to their close relationship. Therefore, the higher the average value is, the higher the convergent validity will be. Cells along the thin-dashed lines are used to calculate the average value. The result of the assessment in Appendix 3 is summarized in Table 2 as follows:

Table 2. Summary of the Effectiveness Calculation Results.

Effectiveness	Item	Continuum	Matrix	4P Model
Reliability	$(1+3x)/4$	$(1+3x)/4$	$(2+2x)/4$	$4/4$
Discriminant Validity-1 (note 1)	$6x/6$	$6x/6$	$(0+5x)/6$	$(6*0)/6$
Discriminant Validity-2 (note 2)	x	x	$(0+17x)/18$	$(0+17x)/18$
Convergent Validity	$(2+10x)/12$	$(2+10x)/12$	$(4+8x)/12$	$(4+8x)/12$

Notes: 1. Discriminant Validity-1 is with same method and different dimension.
2. Discriminant Validity-2 is with different method and different dimension.

The value of "X" is between 0 and 1. Therefore, according to the arguments above, the ranking order (from high to low) of the effectiveness of the different classification schemes will be as follows:

(1) For reliability: 4P Model, Matrix, Continuum and Item;

(2) For Discriminant validity: 4P Model, Matrix, Continuum and Item (same method, different dimension);

(3) For Discriminant validity: 4P Model and Matrix, Continuum and Item (different method, different dimension);

(4) For Convergent validity: 4P Model and Matrix, Continuum, Item.

In the above list, "and" means the rank of the scheme types are equal. The 4P model gets the highest effectiveness if all the four components of effectiveness are considered.

9. Conclusions
9.1. Unique characteristics

The 4P model of service taxonomy constructed in this article has the following unique characteristics in contrast to the previous articles of the similar purposes:

(1) It is developed by a strict theoretical process and thus has a strong academic foundation.

(2) It is developed by the open system approach and thus has integrated all the key dimensions of service system. The classifying dimensions conform to the principles of mutual exclusivity and exhaustiveness in social science. It meets the ideal requirements of typologies mentioned by Kitay and Marchington [28]. New attributes of each dimension can be added to refine into more service types, but meantime it will increase the complexity of the service taxonomy by doing so. The key attributes are selected in this article by using a priori and heuristic knowledge.4P model has put into consideration the emerging services intensively using ICT under the knowledge-based economy environment. The environment can be extended further to include e.g. globalization and cultural dimensions. The "feedback" dimension of the service system is the direction to review issues such as quality of service, customer satisfaction etc. from a holistic system perspective.

(3) The system approach makes the 4P model fit to all kinds of service organizations, including profit, non-profit and government as well as the services internal the organization.

(4) It has higher effectiveness of classification over the previously developed service classification schemes in terms of validity and reliability.

(5) It uses the concept of service modules and implication modules (stored in database). The business can use such modularization concept to formulate the most optimum marketing strategy as shown in Figure 4.

(6) Service business with several service types can prioritize the resources allocation by checking the weight of each service type or module.

(7) The service types classified by 4P model, whether exist currently or not, can inspire the innovation of new business models.

9.2. Limitation of research

The environment of the service system only covers service encounter scope in this research. The other environmental dimensions such as culture, internationality, politics and economics that can also be used for classification have not been included. Only 12 salient attributes are adopted to do the classification. There can be more attributes to be added to each dimension to make the classification finer and thus increase its exhaustiveness. By doing so, however, at the same time it also makes the classification over-complex and impractical in application. The feedback dimension of the open system would cover the subjects such as customer satisfaction, service quality, and customer participation, etc. for the service provider's reflection and adjustment in order to prevent the service system from declining. This article does not tackle with those issues.

9.3. Future research

Empirical research using quantitative analysis can be made in an inductive procedure based on the open system view to verify the effectiveness of the 4P model classification taxonomy. The classified service types can be ranked according to the revenue, or the ROI, or the market share of each service type. Future researches can be made based on the rankings to develop optimization processes in allocating the resources such as employee headcount, budget or capital investment to produce the best synergy amongst the different service types. The business strategies of service types (implication modules) from customer perspective and from provider perspective may conflict to each other. A research can be made to develop a methodology to optimize the decision making process of strategy formulation under such circumstance.

Researchers can also consolidate all the attributes used by the other previous researchers to fill into the attributes of the 4P dimensions, to develop, for example, marketing strategies for each new attribute, and to generate more combinations of marketing strategies, i.e. more implication modules. The database of the implication modules and service modules would then become very complex due to too many combinations, and can only be handled by computer. A computer software tool package can be developed to use the service modules and implication modules of the service business to generate the integrated marketing strategy for service business.

Appendix. Managerial Implication of the Attributes of 4P Model

Element	Strategic Implications
People	Employees of the service provider are those who conduct customer contact. They have to be well trained to properly service customer and generate customer satisfaction. Only happy employees can foster happy customers. Employees' benefit and personal growth have to be thoroughly planned. High customer loyalty and low employee turnover can thus be achieved.
Equipment	Sophisticated and reliable equipment has to be invested in order to gain competitive advantages. When to invest and how much to invest must be justified. The safety factors related to the servicing equipment have to be specially considered. Maintenance policy must be complete and practical to reduce operational cost. Automation equipment to shorten customer contact time needs to be planned all the time.
Knowledge	The service organization has to invest substantially on the knowledge management system including hardware, software, internal community and personnel mentality and behavior buildup. CEO's fully support is critical for success. Knowledge can only be accumulated overtime rather than overnight. Organization culture is vital for the formation of the KM system. An external consultant can be of great help.
Customization	Customization will normally provide the highest customer satisfaction due to intensive mutual interactions. The customer contact time, however, will be too long to maintain the service system efficiency and the provider will have less control in the whole service process. The service providers have to improve the situation by using automatic equipment like ATM in bank service, selling machine for retailer, or with the help of ICT to shorten the contact time.
Standardization	Standardization implies mass service. But it will normally lose differentiation and consequentially customer satisfaction. Moreover, it is normally easier to be copied or imitated by competitors. It can be improved with the help of ICT to make mass customization. To add a unique feature protected by a patent can lift the entry barrier to the new entrants.
Contingency	With the help of ICT, mass customization can be achieved. To do it, the plan in how to implement the mass customization system has to be designed carefully and thoroughly. The operation process may need to be changed. If so, it will relate to organization re-engineering, cultural change, new technology acquisition, and marketing strategy re-planning, etc. For the other situation such as labor-intensive case, automation is the direction to reduce the extent of labor requirements and thus improve service efficiency.
Human	The customer relationship will be important if the serviced object is human. Key items of human nature must be captured. Relational marketing concept has to be built up in the servicing organization. The ultimate goal is the capability to make the toughest customers become friends. In addition, safety will have to be carefully managed during service process.
Thing	The owner of thing is human being. The things have to be treated considerately as if they are human beings in the service attitudes. The owners of the things will thus appreciate and build up customer loyalty. If the service content is technique-oriented, the training of service personnel in technical aspect would be extreme important.

Element	Strategic Implications
Information	To service information, the service provider will need special knowledge and expertise. To control the quality and efficiency, institutionalization of the service procedures and the establishment of the checkpoints during the service process are absolutely necessary. Good knowledge management of the service organization will improve the effectiveness and efficiency of the service.
Front Office	The physical setting and environment shall appeal to customers depending on the market positioning of the service products to make the customers experience an enjoyable encounter. But front contact always implies higher cost and labor-intensive. Service provider can improve the efficiency with automation or ICT to reduce his front field activity scale or move it to back office.
Back Office	The service providers can have better controls in back field operation which often implies higher efficiency and lower cost. But due to the visibility, customers will always have perceived risks on the trustworthiness of the service organization and its service quality. In addition to precisely planed operation process, the service provider shall build up its credibility into customers' mind. Words of mouth factor will be more important than front office service.
Virtual Space	Doing business in the virtual space needs to be very cautious. So many dotcom companies established and soon collapsed in the last decade. There were many complicated reasons. Few of reasons are the rightness of business model, security issue of Internet, trust issue to service providers, and the completeness of regulations. However, as people become more mature and the technologies evolve over time, many problems are gradually overcome. Together with physical servicescape, there are still plenty of new opportunities to develop new services. To build the virtual space, the service provider can either rent or purchase the needed ICT equipment or networks, depending on the cash-flow plan.

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