*Accepted by International Journal of Services Technology and Management (IJSTM) Special Issue on: "Service Management in China"*

# New service development using GAP-based QFD: A mobile telecommunication case

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**Abstract:** Quality function deployment (QFD) is a customer-oriented structural development approach. Along the gaps in the circle of service satisfaction, a new model of service quality function deployment (SQFD) has been established to develop new service. The purpose of this paper is to provide a new service development approach both in terms of academic model and practical application. A Chinese mobile telecommunication case study (tariff package design) has been employed to verify and revise the model. The findings are that, although a concise model is adopted unusual according the actual service situation, the GAP-based QFD model expands the investigative scope of GAP study from GAP 1 and/or GAP 5 to GAP1 to GAP 5. It has also been found that it is a useful tool to develop new service using a reasonable and delicate combination of Kano model, SERVQUAL scales, and GAP circle, although several further directions are presented in the latter part of the study.

**Keywords:** Quality function deployment; QFD; GAP model; New service development; NSD; Tariff package; Telecommunication; China; Case study

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## 1. Introduction

The first Quality function development (QFD) application in services was in 1981 (Mazur, 1993). Actually, QFD is a customer-oriented structural product development approach in manufacturing; services are more customer-involved, employing personalised marketing means. However, the contemporary service industry indicates a strong trend towards mass customisation, combining the benefits of both customisation and that of mass production (Peters, Saidin, 2000; Silveira, Borenstein, Fogliatto, 2001; Jiao, Ma, Tseng, 2003). Consequently, some thoughts and approaches in manufacturing have been applied in services (Bitran, Pedrosa, 1998; Bullinger, Fahnrich, Meiren, 2003; Smith, Fischbacher, Wilson, 2007). Nowaday, service quality function development (SQFD) has become a useful approach to new service development (NSD) and service quality management, although there are still some difficulties (see e.g. Dube, Johnson, Renaghan, 1999; Tan, Pawitra, 2001; Chan, Wu, 2002).

QFD is a multi-stage mapping process with analysis, delivery and transition of information from demand to production. Consequently, marketing and design departments cooperate closely. The key elements of QFD are customer needs, house of quality (HOQ), and the translating process. An HOQ is a table which shows customer demand systematically, and the relation between customer demand and product quality. It is used for quality designing through translating customer demand into work specification (Akao, 1990). A common method of QFD is the four-stage deployment model, which is proposed by the American Supplier Institue (ASI) (see e.g. Akao, Mazur, 2003). It starts with customer needs, and ends with engineering and production (quality) controlling parameters through four stages, namely the product design stage, the part deployment stage, the engineering design stage, and the standard production controlling stage.

Contrasting with tangible product, service has four significant characteristics (see e.g. Levitt, 1981; de Brentani, 1989; Ennew, Wang, Wright, 1992; Johne, Storey, 1998; Avlonitis, Papastathopoulou, Gounaris, 2001).

(i) The first is intangibility; the foundational characteristic of service. The elements of service are abstract, and therefore difficult to describe. Moreover, benefits from consumer service often cannot be calculated quickly.
(ii) The second is simultaneity. Service production and consumption occur at the same time. Consequently, consumers communicate with the service provider directly.

(iii) The third is heterogeneity. The elements of service and their quality are in a constant state of change and cannot be defined uniformly. Futhermore, heterogeneity of quality depends on service providers, service consumers, and their service encounter.
(iv) The fourth is perishability. Service cannot be stored. Therefore, it will be lost if not consumed within a certain period of time.

These service characteristics have significant influence on QFD application, a summary of which is given in Table 1. Firstly, customer demand in service often does not reflect functional utility but rather experience value, which should be embodied in a service scenario (see e.g. Berry, Bendapudi, 2003; Pine, Gilmore, 1999; Gupta, Vajic, 2000). Therefore, the difficulties of demand transition are increased. Secondly, customer demand in service is matched at the front-office and back-office simultaneously. There is no delay in time and separation of space in most situations (see e.g. Safizadeh, Field, Ritzman, 2003). Therefore, the difficulties of demand transition decrease. Thirdly, it is easy for manufacturing to control the quality of tangible products. However, service heterogeneity is a barrier for transition quality (see e.g. Parasuraman, Berry, Zeithaml, 1985). Recognizing capability in customer demands and service skills of employees will ensure the reliability of transition of HOQ. Fourthly, usually the demand of service needs to be managed in order to smooth the service delivery burden (see e.g. Fitzsimmons, Fitzsimmons, 2004). Fortunately, QFD will be of benefit to this process through improving service efficiency and flexibility.

**Table 1** The influence of service characteristics on QFD

| | *Intangibility* | *Simultaneity* | *Heterogeneity* | *Perishability* |
|---|---|---|---|---|
| Customer demands (What) | ++ | | ++ | |
| Service contact (Who) | | + | ++ | |
| Service time (When) | | ++ | + | ++ |
| Service place (Where) | | + | + | ++ |
| Transform objective (Why) | | | ++ | + |
| Transform process (How) | + | ++ | + | |

Note: "+" means the strength of influence.

In Table 1, service intangibility and heterogeneity influence the identification of customer needs (What), while service simultaneity influences the transition process (How). Therefore, we can perform SQFD using the following strategies. Firstly, a more specialized approach in service marketing is needed to describe customer demand, such as allocating different weight to different service demands according to the Kano model (Matzler, Hinterhuber,1998; Tan, Shen, 2000; Shen, Tan, Xie, 2000; Tontini, 2003). Secondly, limited scope of problem in service management may be suitable for SQFD, such as adopting the SERVQUAL scale to address limited service demand (Lapidus, Schibrowshy, 1994; Mazur,1997; Stauss, 1993). Thirdly, a limited stage of new service development may be suitable for SQFD (Herrmann, Huber, Braunstein, 2000). Factually, we can adjust the deployment process flexibly according to the problem (Li, Lu, 2005). With the development of SQFD research,

the focus is transfered from analysis of service intangibility to analysis of service heterogeneity.

In this paper, we begin with a description of the challenges of this cross-field study in section 1. Next, we shall review the application stages of QFD in service briefly in section 2. Then, the models of GAP-based SQFD in theory and operation respectively will be established in section 3. Next, a case study of tariff package design on mobile telecommunication services in China is investigated under this framework in section 4. Some practical suggestions are presented further in section 5. Finally, the conclusion and discussion are given in section 6.

## 2. Review

### *2.1 Early application of SQFD: Beginning*

QFD is customer-oriented quality management and product development. Originally used for tangible products, its ideas are invariably applied to service products (Chan, Wu, 2002). In 1981, QFD was first applied in the service area, to a shopping mall in Japan. Then, it was used in a health care center in America in 1986 (Mazur, 1993).

Mazur (1993) defines SQFD as "a system and procedures to aid the plan and development of services and assure that they will meet or exceed customer expectations." Quality (Q) means customer satisfaction. Function (F) means organizational units of service. Development (D) means service development process, which includes customer deployment, voice of customer (VOC) deployment, quality voice of customer, function deployment, new concept deployment, and task deployment. Behara and Chase (1993) also propose a similar customer characteristic-based model named service quality development (SQD). Then, Stuart and Tax (1996) introduce a 3-stage quality-focused SQFD model. It translates customer demand into service interface, subsequently into service process elements, and lastly into service quality controlling parameters.

The QFD models above link service quality together with service function, service process, service tasks, and expanded into marketing and strategy. However, the psychological effects of service demand were not studied (Dube, Johnson, Renaghan, 1999). Therefore, early application of QFD in service was limited. Until 1997, there were only 136 reports of SQFD application throughout the world, while reports of QFD application exceeded 1000 in Japan (Mazur,1997). There was a general downward trend in SQFD after it's peak in 1993, which indicates that service is different to manufacturing according to customer demand and ways of providing products. Deeper integration of QFD and service will be need.

### *2.2 Integration of QFD and service: Based on intangibility*

Then, intangibility of customer demand is intoduced into the model. There are three sub-directions: simplifying QFD research problems; introducing customer value analysis into the SQFD process; and integrating customer value with customer satisfaction.

Firstly, Stauss (1993) proposes SPD (service problem deployment) model. He transforms the problem information into problem prevention activitues. Such

problems are the most frequent and typical, and will be the input of the first HOQ. Lapidus and Schibrowshy (1994) propose another model using QFD to classify and study customer complaints. *Blitz* QFD places emphasis on the service demand that customers most care about (Mazur,1997). With the improvement of models, customer demand is categorised according to importance and urgency. These studies do not refer to deep integration of ideas beween manufaturing and service.

Secondly, deep integration is started by Dube, Johnson, and Renaghan (1999). They introduce customer value into the SQFD process where customers' deep demand is analysed. The demand refers to personal value, personal expectation, consumer benefit, consumer consequence, etc. Therefore, the analysis of customer value is introduced as the important part of VOC. Means such as interview are needed to obtain detailed information of customer demand.

Thirdly, because of the difficulty intrinsic to deconstructing and measuring customer value and customer satisfation for QFD, Herrmann, Huber, and Braunstein (2000) build a model based on customer utility theory. They deduce design attributes of service from initial impulse purchasing, then perform a standard QFD process. Customer-oriented quality standard and customer satisfaction is achieved. The key to the deployment process above remains the product/service design route, but the input and output of the process are concerned with customer phycology. At this stage, customer psychology is considerd in the analysis of service demand. However, it is not easy to find ways of gaining detailed information about customers, and it is not practicable to link customer value, the QFD process, and customer satifaction all together. Therefore, the integration of QFD and service is still preliminary.

### *2.3 New application of SQFD: Based on heterogeneity*

With the development of service management, integration of QFD and service can be much deeper than before. Many scholarly studies exist in which SQFD is combined with service quality and customer satisfation. The studies are mainly about the conjunction of the Kano Model, SERVQUAL Scale and SQFD.

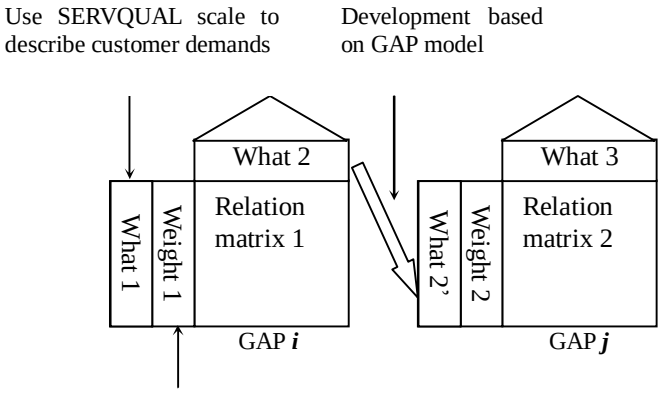
In the Kano Model, there are three types of customer demand: basic demand (must-be), performance demand, and exciting demand. Basic demand must be satisfied, or it will lead to unsatisfaction. Performance demand is basic expectation, and has a positive relation with customer satisfaction. Exciting demand is beyond customer expectation, it can enhance customer satisfaction but is not must-be. It should be noted that the same attribute may change category over time. Exciting demand can become performance demand and then further become basic demand (Kano, Seraku, Takahashi, Tsuji, 1984). The objective of satisfying these three types of customer demand is integrated into the SQFD process (Mazur, 1993). Moreover, some scholars introduce the Kano model into the SQFD (Matzler, Hinterhuber,1998; Tan, Shen, 2000; Shen, Tan, Xie, 2000; Tontini, 2003). They propose the use of questionnaires based on the Kano model to define customer demand, and then deployment of the SQFD process.

Parasuraman, Berry, and Zeithaml (1985, 1988) propose the GAP model of service quality and the SERVQUAL scale. Kuei and Lu (1997) suggest the integration of evaluating means and improving means on service quality, and the introduction of SQFD based on SERVQUAL analysis. Curry and Herbert (1998) use

the SERVQUAL scale to understand public service customers. The results of SERVQUAL analysis are regarded as the deployment elements of HOQ; the score of customer expectation is regarded as the weight of each element; and the score of customer perception of service is regarded as the benchmark of HOQ. In their study on education services, Sahney, Banwet, and Karunes (2004) use SERVQUAL to define factors of GAP, and apply SQFD to their research.

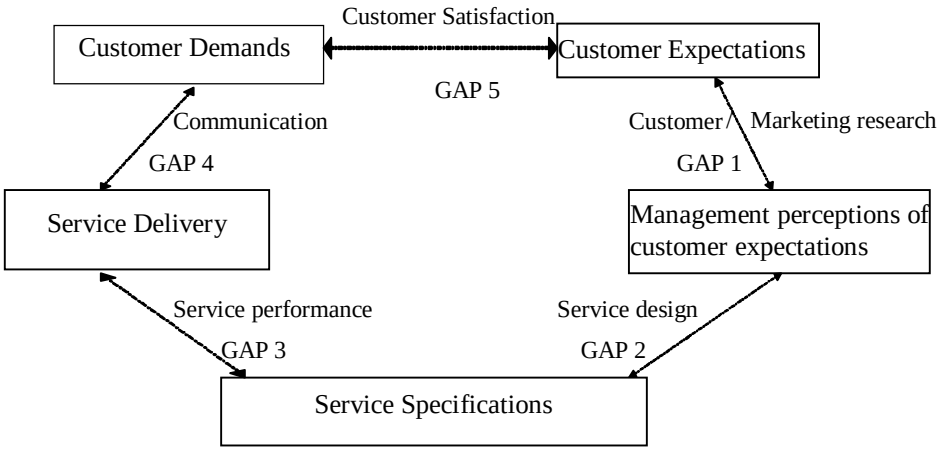
Furthermore, Tan and Pawitra propose the integration of the three theories (Kano model, SERVQUAL scale, GAP model) to study SQFD (Tan, Pawitra, 2001; Pawitra, Tan, 2003). They give three types of customer demand with different weights as "4", "2", "1", then they calculate the score of customer expectation on the SERVQUAL scale. The result is regarded as the weight of customer demand in HOQ (Figure 1).

**Figure 1** Methodology of service heterogeneity analysis




Five gaps in service quality are included in the GAP model. They are gaps between; customer expectations and management perceptions of customer expectations (GAP 1), management perceptions and service specifications (GAP 2), service specifications and the service actually delivered (GAP 3), service delivery and customer perceptions of service (GAP 4), customer perceptions and customer expectations (GAP 5). Li and Lu (2005) claim that only GAP 1 and GAP 5 can be analysed by the model of SQFD combing with Kano model and SERVQUAL scale. Actually, the logical circle from GAP 2 to GAP 5 should be deployed (Figure 2).

**Figure 2** GAP model of service quality




At this stage, the application of SQFD is based on mature theories of service quality and customer satisfaction. In the five GAPs, GAP 1 can be reduced by setting up weights for different types of service demand. GAP 2 to GAP 4 can be reduced by the relation matrix and cooperation among managers. Reducing GAP 5 is one of the ultimate goals for SQFD in the long run. Analysing customer satisfaction before introducing SQFD will reduce GAP 1 directly. Therefore, it will enhance the reliablity of SQFD if we input the analysis result of GAPs to SQFD process.

*2.4 Summary*

Service and manufacturing differ significantly. Therefore, the integration of QFD with service should be based on service characteristics, and should perform easily. Application of QFD in service includes three stages (Table 2). Firstly, QFD is applied to service directly with no integration. Secondly, QFD is improved based on intangibility analysis of service demand. Thirdly, QFD is integrated based on service heterogeneity. With further development, the improvement and integration of SQFD will be based on more theories, and will be more meaningful for service management.

**Table 2** Summary of reviews

| *Stage* | *Branch* | *Literatures* | *Advantages* | *Disadvantages* |
|---|---|---|---|---|
| Early stage | | Mazur (1993); Behara and Chase (1993); Stuart and Tax (1996) | Easy and practical | Apply QFD in service without integration |
| Intangibility stage | For special problems in services | Stauss (1993); Lapidus and Schibrowsky (1994); Mazur (1997) | Focus on important and urgent customer demands | Difficult to describe customer demands |
| | Reduce stages of SQFD application | Herrmann et al. (2000) | Applied more easily | Difficult to integrate with customer demands |
| | Describe customer demands by professional methods | Dube et al. (1999) | Understand customer demands well | Difficult to collect data and information |
| Heterogeneity stage | Set up weights for customer demands based on Kano model | Matzler and Hinterhuber (1998); Tan and Shen (2000); Shen et al. (2000); Tontini (2004) | Combine with mature theories and methods | Describe customer demands in a indirect way |
| | Describe customer demands by SERVQUAL scale | Kuei and Lu (1997); Curry and Herbert (1998); Sahney et al. (2003) | Combine with mature theories and methods | Describe customer demands in a indirect way |
| | Development based on GAP mode | Li and Lu (2005) | Research result is meaningful | Face the problem on service quality only |

Note: Tan, Pawitra (2001), Pawitra, Tan (2003) proposed the idea that studying SQFD with combination of Kano model and SERVQUAL scale.

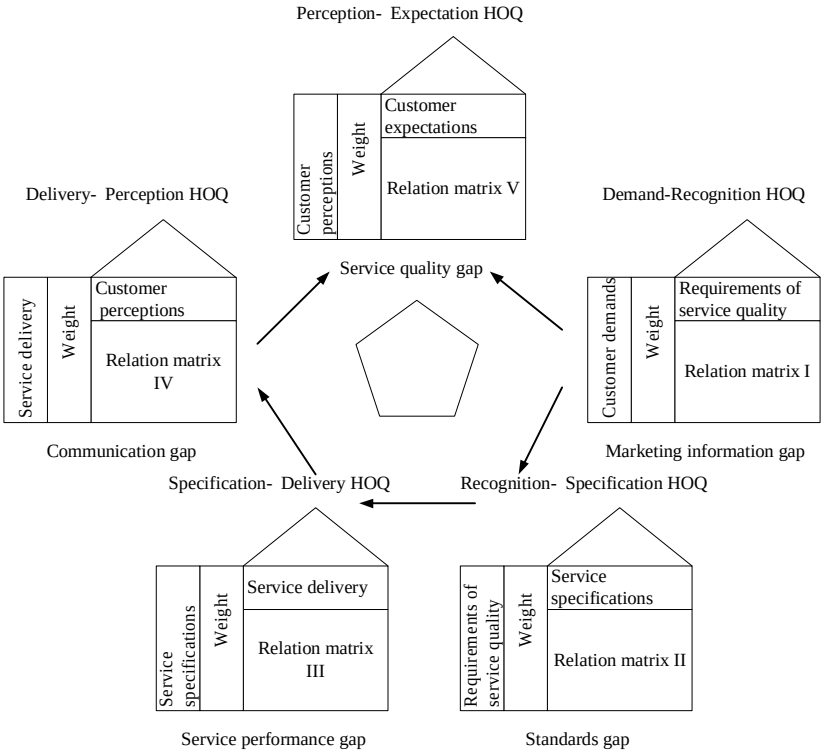
## 3 GAP-based service quality function deployment model

### *3.1 Theoretical model of GAP-based SQFD*

The GAP theory has indicated that there are five gaps in the process of service development, including marketing information gap (GAP 1), standards gap (GAP 2),

service performance gap (GAP 3), communication gap (GAP 4), and service quality gap (GAP 5). QFD is integrated with GAP theory to establish a 5-stage GAP-based SQFD model (Figure 3). The five stages are: identification of customer demands, translating customer demands into service specifications, delivering/providing service according to service specifications, perception of the delivered service, and contrast with perceptions and expectations. HOQ is provided at each stage, and they are linked in a circle. The output of one HOQ is regarded as the input of the next.

**Figure 3** GAP-based service quality function deployment (theoretical model)




At the first stage, VOC is identified. Companies collect information regarding customer demands through interviews, questionnaires, and complaint analysis. Then, they transform the vague demands into requirements of service quality that can be measurable. Customer value was used to analyse the requirements, which were weighted. At this stage, customer demands are recorded on the "left wall" of the first HOQ, while requirements of service quality as perceived by companies, are recorded on the "ceiling" of the first HOQ. The first HOQ is named "Demand-Recognition HOQ", which relates to GAP 1 (marketing information gap).

The task of the second stage is design service specifications. At this stage, requirements of service quality are transformed into detailed specifications. Service specifications describe and regulate behaviour and ways to deliver service. Requirements of service quality, which are on the "ceiling" of the first HOQ, are now transferred onto the "left wall" of HOQ, while service specifications are recorded on

the "ceiling". The second HOQ is named "Recognition-Specification HOQ", which relates to GAP 2 (standards gap).

The task of the third stage is performing the specifications. Companies should take measures to enhance the enthusiasm and ability of employees in performing service specifications. At this stage, the specifications on the "ceiling" of the second HOQ are transferred onto its "left wall" service delivery being regarded as the elements of the "ceiling" in this HOQ. The third HOQ is named "Specification-Delivery HOQ", which relates to GAP 3 (service performance gap).

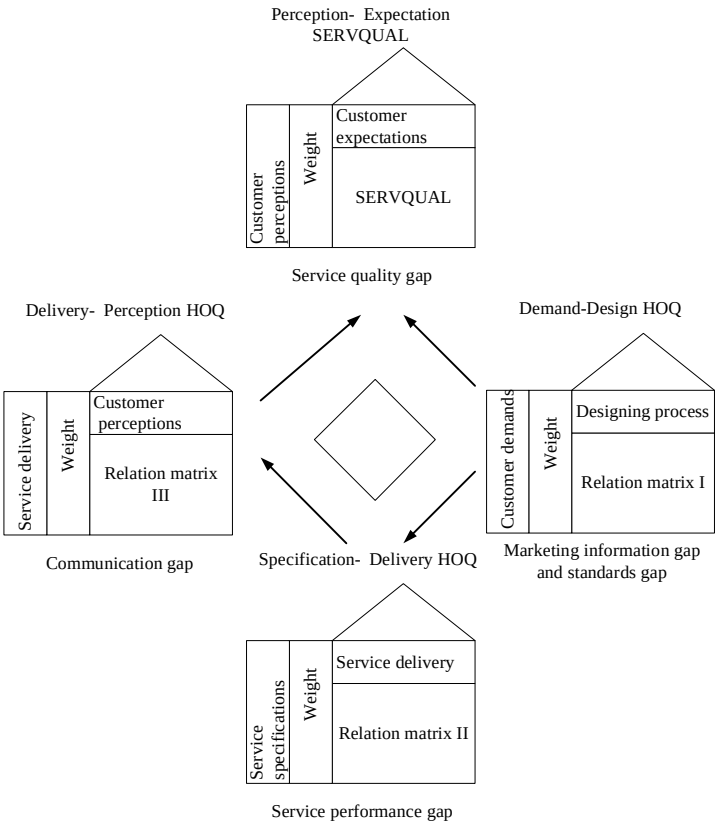
The task of the fourth stage is perception of service delivery; the fourth HOQ is established to describe this gap. On the "left wall" of this HOQ, it is service delivery that is transferred from the "ceiling" of the third HOQ. Customer perceptions of service delivered are on the "ceiling" of this HOQ. This, the fourth HOQ, is named "Delivery-Perception HOQ", which relates to GAP 4 (communication gap).

At the fifth stage, customers compare their perceptions of service with their expectations. If they are different, the service quality gap arises. It is the last service gap, and is dependent on the other four gaps. On the "left wall" of the fifth HOQ it is customer perceptions of service quality, while on the "ceiling" it is customer expectations of service quality. The last HOQ is named "Perception-Expectation HOQ", which relates to GAP 5 (service quality gap).

### *3.2 Operational model of GAP-based SQFD*

The operational model of GAP-based SQFD model is showed in Figure 4. Firstly, in fact, the stage of identifying customer demands and the stage of design service specifications are often performed together. It is difficult to differentiate customer demands, requirements of service quality and service specifications in practice. Therefore, two HOQs are integrated, named "Demand-Design HOQ". On the "left wall" it is VOC while on the "ceiling" is the designing process of service specifications/service products. Service specifications are treated as the requirements of service quality that are perceived through analysing customer demands. However, the content on the "ceiling" of the new HOQ has been changed from service specifications to the whole design process of specifications/products. The purpose of GAP-based SQFD model is to analyse the internal relations of GAP 2 to GAP 4, and to facilitate new service development. Therefore, the detail of design process is introduced in this HOQ.

**Figure 4** GAP-based service quality function deployment (operational model)




Secondly, the content on the "left wall" of the second HOQ (Specification-Delivery HOQ) is not the same as that on the "ceiling" of the first HOQ (Demand-Design HOQ). The design process of service specifications is on the "ceiling" of the first HOQ. Now, the result of the design process, and service specification/service products, are inputted onto the "left wall" of the second HOQ. Thirdly, service delivery on the "left wall" and customer perceptions on the "ceiling" of Delivery-Perception HOQ are exchanged. It now becomes "Perception-Delivery HOQ". The first three HOQs, which are based on GAP 1, GAP 2, and GAP 3, are deployed from the customer side to the company side. The Delivery-Perception HOQ is started by the corporation, then developed towards customers. The new HOQ is inconsistent in the logical direction. Fourthly, Perception-Expectation HOQ is established in the fifth stage. SERVQUAL scale is used to measure the gap between customer perceptions and customer expectations, which is is more convenient and simple.

### *3.3 Weights of service quality*

The weights of service quality are designed according to the mean proposed by Tan

and Pawitra (2001), Pawitra and Tan (2003). Small modifications were made. Questionnaires on customer demands were designed in which positive and negative questions for each aspect of customer demands were listed. Every answer had five options: "happy", "necessary", "indifferent', "acceptable", and "unhappy". "Happy" means customers are satisfied with the service; "necessary" means that the service is must-be; "indifferent" means that the service has no influence on customers' attitude; "acceptable" means that customers can endure the service; "unhappy " means that customers are unsatisfied with the service. The negative questions had the same five options, but the meanings were opposite.

Consequently, the results of the questionnaires were inputted into a 5*5 form (Table 3). Quality of service is inputted into six categories according to the statistical results. They are: attractive quality, one-dimension quality, must-be quality, indifferent quality, reverse quality, and questionable quality. After eliminating the last three types, we identified Kano's three customer demands. Then, we gave weights by "1", "2", and "3" to the three types of service quality according to service characteristics and experts' suggestions. The weights of service quality are calculated according to the score of customer satisfaction (absolute value of GAP * expectations of service quality) and the weights of different types of service quality. It means that, weights of service quality = the score of customer satisfaction * weights of service quality type. The results of the calculation are regarded as the weights with which to measure the importance of customer demands.

**Table 3** Classification of service quality

| *Positive questions* | *Reverse questions* | | | | |
|---|---|---|---|---|---|
| | *Happy* | *Must-be* | *Indifference* | *Acceptable* | *Unhappy* |
| Happy | Q | A | A | A | O |
| Must-be | R | I | I | I | M |
| Indifference | R | I | I | I | M |
| Acceptable | R | I | I | I | M |
| Unhappy | R | R | R | R | Q |

*Notes*: A—Attractive quality; I—Indifferent quality; R—Reverse quality;
M—Must-be quality; Q—Questionable quality; O—Performance quality
*Source*: Matzler and Hinterhuber (1998)

## 4 New Tariff Package Developments in China's Mobile Telecommunication Service

### *4.1 Background*

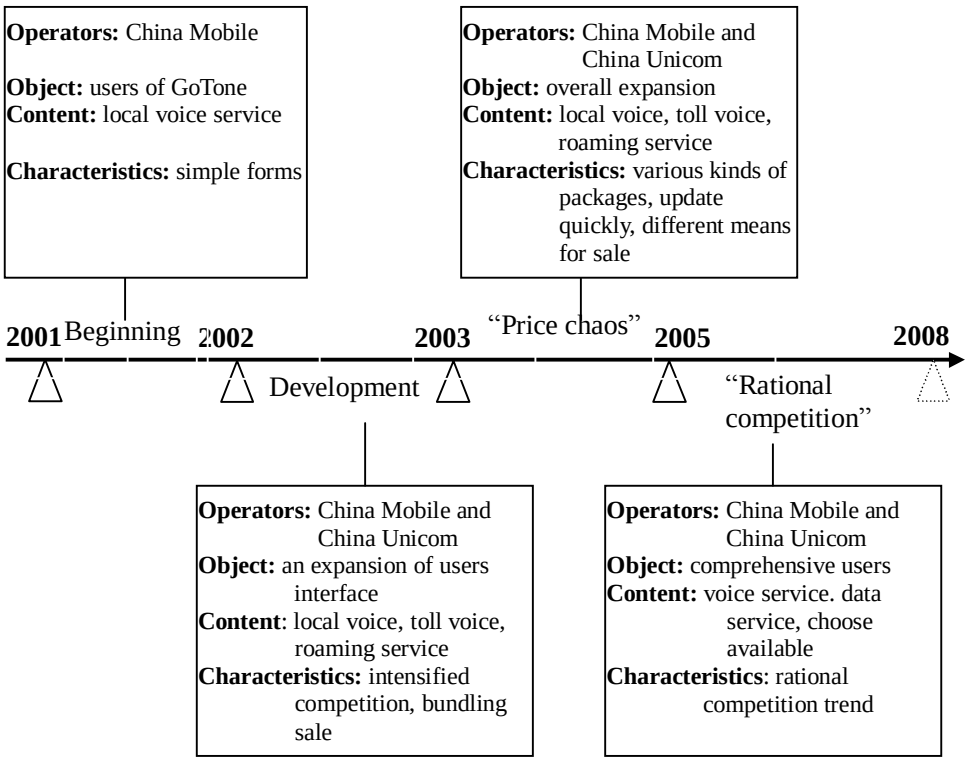
Tariff package of mobile telecommunication service is a service package that is designed according to customer demands. It usually bundles basic service, data service and added value service together. According to the theory of service package, features of mobile telecommunication service as outlined below. Explicit services provide the design of service product contents and its rationalities. Implicit services are convenience of service hall, message service platform, service website, etc. Subsidiary goods are the related cards, booklets, etc. Supporting facilities include the front-end service halls, back-end support sections and soft/hardware technical

equipment, etc. The primary area of concern is tariff package design, which belongs to explicit services.

Nowadays, the mobile telecommunication companies in China provide customers with individual service and achieve large-scale economic performance. There are two main companies in China, namely, China Mobile and China Unicom. China Mobile provides three series of tariff package, which are: GoTone, M-zone, and Easyown. GoTone's target group is mainly composed of businessman and other high earners; M-zone's is mainly composed of students; and Easyown's group is composed of the remaining sections of society. Most customers are not satisfied with the high charges for some services and unclear billing structures. In a tariff package, there are numerous elements such as local phone service and / or long-distance phone service, voice service in and out of VPN, voice service, data service, and so on. The discounts on different service packages are limited to special ranges.

Through tracking the related literature concerning tariff packages in the mobile communication market and interviewing mobile communication professionals, the development stages of Chinese tariff packages is given in Figure 5.

**Figure 5** The development of tariff package in China's mobile telecommunication market




**Stage 1: the beginning**. On Mar. 21, 2001, China Mobile launched its tariff package known as "GoTone" in its branches in 18 provinces and cities. This package

provided tariffs in the form of monthly rent fee, ranging from 30 yuan to 788 yuan, in which users could enjoy free talk time from 48 minutes to 2588 minutes. As to the excess mobile fee on top of the purchased tariff package, China Mobile charged differently according to peak hours and off-peak hours. At this stage, the target users of the tariff package were the "GoTone" users only, and contents of the package were limited to local voice service. Meanwhile, forms of the package are simple.

**Stage 2: the development stage**. In 2002, China Mobile and China Unicom launched their respective tariff packages. Compared with stage 1, operators had now intensified competition in the design of the tariff package due to the accession of China Unicom. Moreover, apart from the local voice service, the contents of this tariff package added toll voice service and roaming service. Customers pay fee in advance, then they get a free mobile phone now. Two companies enhanced customer loyalty and set up an "off-network" obstacle to users.

**Stage 3: the "price chaos" stage (2003-2005)**. At this stage, the mobile communication operators fought for the market share mainly by using the tariff package as a competitive tool. This stage was characterized by price competition, which was the primary means of tariff competition, leading to a sharp decline in the local mobile fee and the toll mobile fee. Secondly, the range of newly introduced tariff packages ranged widely, they were introduced in quick succession, thus they could update quickly. In addition, different operators set up different preferential policies, for example, China Mobile introduced three major brands, and took price promotions based on respective brand as a main line, while China Unicom took promotions based on various preferential services as a main line and so on.

**Stage 4: the "rational competition" stage (2006-2008)**. With the changes in price control policy and the development of 3G technology, the tariff package has entered a period of "rational competition". This period has several new characteristics: First of all, the object of the tariff package has expanded from individual customers to groups of customers, and the idea of customization has been introduced into the design of the tariff package; Secondly, the content of the tariff package has expanded from voice service to data service, its basic form is "voice service + data service". Occasionally, tariff packages of toll service and free answering service are available as a supplement, which personalizes the design of the tariff package.

Then, stage 5 will come soon.

### *4.2 New tariff package development process*

The process of the tariff package design is presented in Figure 6, which primarily includes the following steps:

**Step 1: market forecasts.** Through carrying out market investigations and collecting the needs of users, the company can find market opportunities once it has collated and analyzed this information. Then it should concentrate on the tariff package strategy used by competitors, and consider coping strategies combined with its own operating circumstances, through which it can determine the necessity to design a corresponding tariff package.

**Step 2: defination of objectives**. According to preliminary analysis, the company should focus on the marketing objectives and target consumers of the tariff

package, then it can define the selling point of the package in accordance with the consumption characteristic analysis of the users.

**Step 3: design of tariff package**. The company can design a product mix for the tariff package by analyzing the consumption characteristics of target consumers and historical information on their database; it can also decide the tariff level in advance according to the cost of the product and the price sensitivity of users.

**Step 4: design of marketing strategy**. According to the product features of the tariff package and the consumption characteristics of the target consumers, the company can select marketing channels and modes of sale, in order to formulate the external publicity strategy.

**Step 5: benefit forecasts**. The company should select certain samples of users to test the market, then assess the test results. Additionally, it should predict the benefits and costs of the tariff package to determine the tariff level in accordance with a pre-assessment concerning the sale of the package.

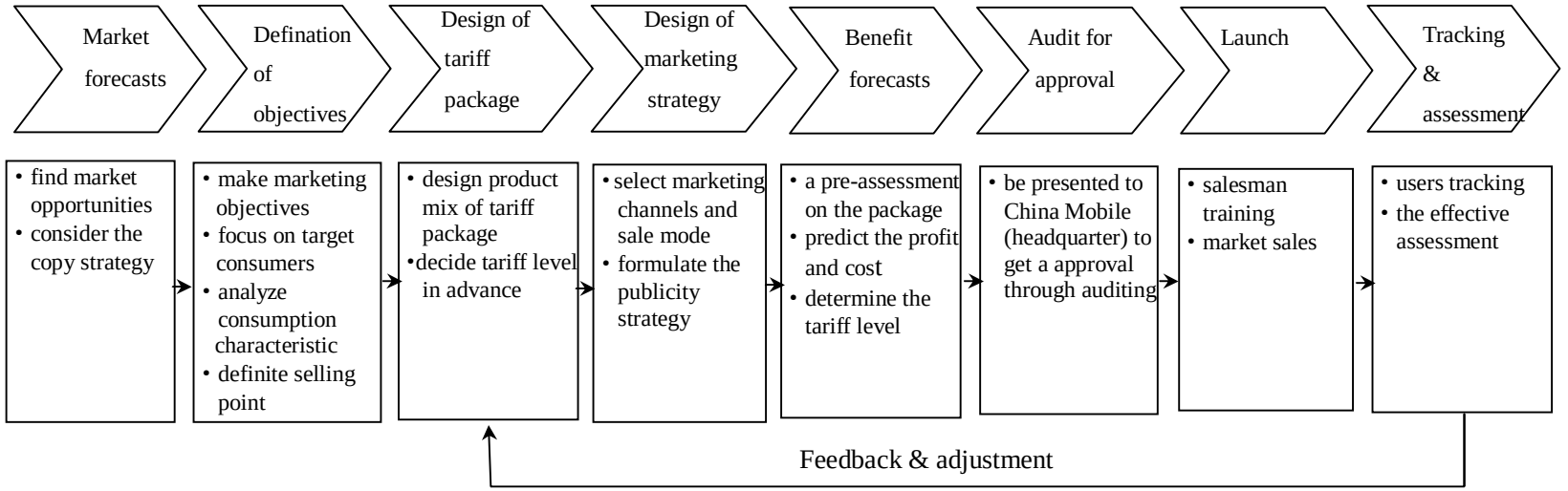
**Step 6: audit for approval**. The tariff package design and the benefit forecast results should be presented to the corporation in order to get approval through auditing.

**Step 7: launch**. The company should train their salesmen to become acquainted with the new service, then choose the right time to launch the package.

**Step 8: tracking and assessment**. The company should contact the users of the package and check sales regularly, and make an effective assessment of how the tariff package is faring in the market.

**Step 9: feedback and adjustment**. The company should adjust and optimize the tariff package based on tracking and assessment.

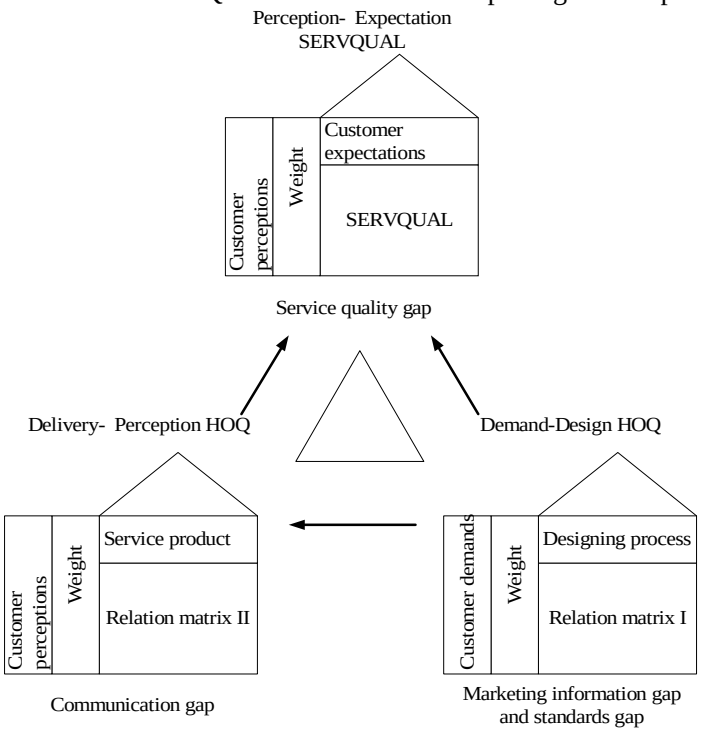
**Figure 6** The process of the tariff package design in mobile telecommunication



*4.3 GAP-based SQFD model in new tariff package development*

Tariff package is a service product, and can be seen as specification. The delivery process of the tariff package can be seen as the sales process. The design process of tariff package includes three aspects: designing service product, designing sales methods, and designing after-sales service. Customer perception of tariff package is more about service product, rather than the selling process. According to ZMTC practice, the GAP-based SQFD model is simplified. Three HOQs were developed for this application, i.e. Demand-Design HOQ, Delivery-Perception HOQ, and Perception-Expectation HOQ (Figure 7).

**Figure 7** GAP-based SQFD model in new tariff package development




The Demand-Design HOQ is employed to design the tariff package, sales process and after-sales service, based on analysis of customer demands. It indicates the relationship between customer demands and the design process. The key stages in the design process can be found according to the weighted scores of service quality. The corresponding gaps to the HOQ are the marketing information gap and the standard gap. Then, the task of Delivery-Perception HOQ is to find the relationship between customer perceptions and tariff package, sales process, and after-sales service. It refers to customer perceptions, so the weights are designed according to customer demands. The corresponding gap to the HOQ is the communication gap. Finally, Perception-Expectation HOQ is replaced by the SERVQUAL scale, which calculates the gap between customer perceptions and expectations.

*4.4 Questionnaires and data*

The questionnaire was sent to some consumers of China mobile in Zhejiang province to investigate expectations, perceptions, and types of service quality. The questionnaire included four sections. The first section obtained general information regarding the respondents, such as gender, age, career, degree, monthly income, types of tariff package used, and so on. The second section concerned customer expectations of tariff package, while the third part regarded customer perceptions of tariff package. The last part was about the types of service quality. We asked respondents five aspect questions on service quality, including elements and dimensions of package, range of free choice, personalization, and price. The 7-point Likert scale was employed in Part Two and Part Three, and the 5-point scale in Part Four.

130 questionnaires were sent in August 2007. 125 questionnaires are available. The profile of respondents is outlined as follows:

- 50.4% of respondents were male; 49.6% were female
- 47.2% were aged from 22 to 25, and 31.2% were aged from 26 to 30
- Teachers made up 8.8% of respondents, managers 15.2%, students 30.4%, general workers 33.6%; the remainder worked in "other areas"
- 47.2% had gained a Bachelor degree, and 36% had gained a Master degree or higher
- 36% had an income of 1000 to 3000 RMB per month; 23.2% from 3000 to 5000
- 22.4% of customers used GoTone, 22.4% Easyown, and 55.2% M-zone.

The gap correlations are shown in Table 4. Factor analysis is used to test reliability (Table 5). The KMO value is 0.876, and every loading factor is higher than 0.5. The Alpha values of the four factors are 0.822, 0.848, 0.807, 0.837, respectively.

**Table 4** Pearson correlations of GAPs

| | Mean | S. D. | G1 | G2 | G3 | G4 | G5 | G6 | G7 | G8 | G9 | G10 | G11 | G12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G1 | -1.472 | 1.532 | 1.000 | | | | | | | | | | | |
| G2 | -1.240 | 1.445 | 0.662** | 1.000 | | | | | | | | | | |
| G3 | -1.568 | 1.653 | 0.527** | 0.615** | 1.000 | | | | | | | | | |
| G4 | -1.648 | 1.700 | 0.423** | 0.521** | 0.508** | 1.000 | | | | | | | | |
| G5 | -2.264 | 2.229 | 0.546** | 0.453** | 0.395** | 0.437** | 1.000 | | | | | | | |
| G6 | -2.112 | 2.145 | 0.472** | 0.486** | 0.498** | 0.418** | 0.736** | 1.000 | | | | | | |
| G7 | -1.576 | 1.628 | 0.514** | 0.527** | 0.537** | 0.424** | 0.422** | 0.508** | 1.000 | | | | | |
| G8 | -1.824 | 1.918 | 0.481** | 0.490** | 0.490** | 0.362** | 0.473** | 0.405** | 0.552** | 1.000 | | | | |
| G9 | -.984 | 1.555 | 0.460** | 0.447** | 0.509** | 0.211* | 0.401** | 0.383** | 0.552** | 0.591** | 1.000 | | | |
| G10 | -.536 | 1.609 | 0.315** | 0.374** | 0.333** | 0.146 | 0.061 | 0.176* | 0.478** | 0.415** | 0.513** | 1.000 | | |
| G11 | -2.184 | 1.949 | 0.530** | 0.457** | 0.516** | 0.492** | 0.542** | 0.607** | 0.602** | 0.529** | 0.472** | 0.354** | 1.000 | |
| G12 | -2.008 | 2.116 | 0.337** | 0.300** | 0.363** | 0.516** | 0.531** | 0.521** | 0.404** | 0.384** | 0.338** | 0.138 | 0.722** | 1.000 |

Notes: ** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

**Table 5** Result of factor analysis

| ID | Service quality (customer demands) | Load | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| G1 | Required elements can be always found | 0.317 | **0.624** | 0.465 | 0.037 |
| G2 | The differentiation between elements is always significant | 0.313 | **0.797** | 0.272 | 0.052 |
| G3 | The elements of package are full enough | 0.362 | **0.667** | 0.193 | 0.227 |
| G4 | The package is simple enough | 0.035 | **0.688** | 0.042 | 0.603 |
| G5 | I can choose elements of package freely | 0.089 | 0.244 | **0.845** | 0.293 |
| G6 | The packages with same brand can be chosen together | 0.162 | 0.271 | **0.725** | 0.357 |
| G7 | The interval between new tariff packages is reasonable | **0.601** | 0.369 | 0.228 | 0.325 |
| G8 | The package is always improved with the changing of customer demands | **0.619** | 0.259 | 0.350 | 0.206 |
| G9 | The content of package is novel and personalized | **0.776** | 0.146 | 0.339 | 0.082 |
| G10 | The tariff package has image symbols | **0.838** | 0.181 | 0.185 | 0.075 |
| G11 | The package is always with a preferential price | 0.407 | 0.223 | 0.348 | **0.687** |
| G12 | The package is always with a clear billing | 0.150 | 0.077 | 0.317 | **0.857** |

Notes: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Service items of tariff package are classified to draw its' weight, which helps us to avoid blindness in the GAP-SQFD model applied in the service hall. Table 6 divides the service quality of tariff package into three stages of quality, they are: must-be quality, one-dimensional quality, and attractive quality. Table 7 calculates the weight of the service quality of tariff package.

**Table 6** Classification of service quality of tariff package

| ID | The answer to the question (%) | | | | | | Category |
|---|---|---|---|---|---|---|---|
| | A | I | M | O | Q | R | |
| G1 | 11.2 | 16.8 | 33.6 | **38.4** | 0.0 | 0.0 | O |
| G2 | 15.2 | 24.8 | **33.6** | 26.4 | 0.0 | 0.0 | M |
| G3 | 14.4 | 34.4 | 24.0 | **27.2** | 0.0 | 0.0 | O |
| G4 | 16.8 | 23.2 | 29.6 | **30.4** | 0.0 | 0.0 | O |
| G5 | 19.2 | 14.4 | 24.8 | **41.6** | 0.0 | 0.0 | O |
| G6 | **28.8** | 27.2 | 20.0 | 24.0 | 0.0 | 0.0 | A |
| G7 | **20.0** | 48.8 | 12.8 | 18.4 | 0.0 | 0.0 | A |
| G8 | 23.2 | 20.8 | 21.6 | **34.4** | 0.0 | 0.0 | O |
| G9 | **22.4** | 56.8 | 7.2 | 13.6 | 0.0 | 0.0 | A |
| G10 | **24.8** | 55.2 | 10.4 | 8.0 | 0.0 | 1.6 | A |
| G11 | 8.8 | 3.2 | ***48.0*** | 40.0 | 0.0 | 0.0 | M |
| G12 | 4.8 | 5.6 | ***56.8*** | 32.8 | 0.0 | 0.0 | M |

Notes: A－Attractive quality; I－Indifferent quality; R－Reverse quality; M－Must-be quality; Q－Questionable quality; O－Performance quality (One-dimensional quality)

**Table 7** The weight of service quality of tariff package

| ID | Importance | Gap | Category | Weight | Sorting |
|---|---|---|---|---|---|
| G1 | 6.192 | -1.472 | O | 18.230 | 7 |
| G2 | 5.984 | -1.240 | M | 7.420 | 12 |
| G3 | 6.032 | -1.568 | O | 18.916 | 6 |
| G4 | 6.176 | -1.648 | O | 20.356 | 5 |
| G5 | 6.280 | -2.264 | O | 28.436 | 2 |
| G6 | 6.048 | -2.112 | A | 38.319 | 1 |
| G7 | 5.856 | -1.576 | A | 27.687 | 3 |
| G8 | 6.120 | -1.824 | O | 22.326 | 4 |
| G9 | 5.392 | -0.984 | A | 15.918 | 8 |
| G10 | 5.176 | -0.536 | A | 8.332 | 11 |
| G11 | 6.600 | -2.184 | M | 14.414 | 9 |
| G12 | 6.584 | -2.008 | M | 13.221 | 10 |

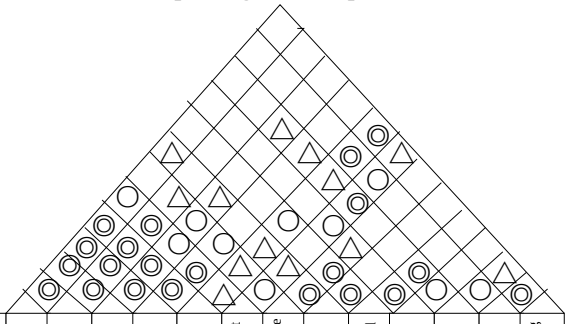
Notes: M=1, O=2, A=3;
Weight = Importance * Absolute Value of Gap * Category of service quality;
Importance is the expectancy of service quality.

*4.5 Demand-Design HOQ*

Demand-Design HOQ is shown in Figure 8. As shown in the figure, we can understand the relationship between customer demands and the design process.

Customer demands are on the “left wall” of the HOQ (What 1), which includes elements of package, range of free choice, personalization of package, and price. The design process of tariff package is on the “ceiling” of HOQ (How 1). The coefficients of relations between customer demands and design process are determined by interviewing and communicating with managers. It ensures that all coefficients are objective, scientific, reliable, and accurate. The HOQ relates to the marketing information gap and the standard gap.

**Figure 8** Demand－Design HOQ of new tariff package development



| Designing process of tariff package / Customer demands | Weight | Finding market opportunities by market research | Planning and strategy | Locking in the target market | Analysing customer characteristics to design unique selling points for tariff package | Design of tariff package based on research and data base | Marketing strategies based on different tariff package | Pilot for tariff package and evaluate the result | Forecast of revenue on tariff package and pricing | Submitting to headquarter for approval | Training of salespersons for new service product | Launch tariff package into market | Keeping track and evaluation of tariff package | Improving the tariff package according to feedback |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Required elements can be always found | 18.230 | ◎ | ◎ | ◎ | ◎ | ○ | △ | ◎ | | △ | △ | △ | ◎ | ◎ |
| The differentiation between elements is always significant | 7.420 | △ | ○ | △ | △ | △ | | | | △ | △ | △ | △ | △ |
| The elements of package are full enough | 18.916 | ◎ | ◎ | ◎ | ◎ | ○ | ○ | ◎ | | △ | △ | △ | ◎ | ◎ |
| The package is simple enough | 20.356 | ○ | ○ | △ | △ | △ | | | | △ | | | ○ | ○ |
| I can choose elements of package freely | 28.436 | △ | △ | △ | △ | △ | △ | | | | | △ | △ | △ |
| The packages with same brand can be chosen together | 38.319 | △ | ○ | △ | △ | △ | △ | △ | | | | △ | △ | △ |
| The interval between new tariff packages is reasonable | 27.687 | ◎ | ◎ | ◎ | ◎ | △ | △ | | | | | ○ | ◎ | ◎ |
| The package is always improved with the changing of customer demands | 22.326 | ◎ | ◎ | ◎ | ◎ | ◎ | △ | ◎ | | | | ○ | ◎ | ◎ |
| The content of package is novel and personalized | 15.918 | ○ | ○ | △ | △ | △ | △ | | | | | | △ | △ |
| The tariff package has image symbols | 8.322 | △ | ○ | ◎ | ◎ | △ | △ | | | | | ○ | △ | △ |
| The package is always with a preferential price | 14.414 | △ | △ | △ | △ | △ | ○ | ◎ | ◎ | ◎ | △ | △ | ○ | ○ |
| The package is always with a clear billing | 13.221 | △ | △ | △ | △ | △ | | △ | | △ | ◎ | △ | △ | △ |
| Weighted score | | 444 | 498 | 425 | 425 | 315 | 225 | 259 | 43 | 212 | 99 | 256 | 443 | 443 |

*Note*: "◎" means strong correlation (3); "○" means correlation (2); "△" means weak correlation (1).

The strict design process provides a guarantee for a reasonable and scientific tariff package. Some points can be concluded from this part of the study. Firstly, the relation matrixes between different stages of the design process (“roof” of HOQ) indicate that all stages of the design process are closely linked.

Secondly, market forecasts and target orientation are significant. In Figure 8, the

weighted scores of four items that are included in these two stages are all over 400. These four items are: finding market opportunities through market research (444), planning and strategy (498), locking in the target market (425), and analysing customer characteristics to design unique selling points for tariff package (425). Through interviews, we found that these two stages are also the most difficult stages during the design process. It is difficult to understand customer psychology, and the market is always changing. Therefore, mass market research, scientific analysis of data, and reasonable forecasts of market development are needed in order to establish accurate target marketing.

Thirdly, evaluation and improvement of tariff package is also significant. Two items, keeping track and evaluation of tariff package (443), and improving the tariff package according to feedback (443), both gain highly weighted scores. Tariff package is different with general service products, it is more systematic, and its content and form should be adjusted and improved when the market changes. Related business process also changes with the adjustment of tariff package. So continuity of design process, attention to related business processes, keeping track of the launched tariff package, and timely improvements should all be considered.

### *4.6 Delivery—Perception HOQ*

Delivery-Perception HOQ is showed in Figure 9. In the "left wall" of the HOQ, it is customer perception of service delivery that includes elements of package, range of free choice, personalization of tariff package, and price. Their weights are same with customer expectation (customer demand). In the "ceiling" of the HOQ, it is tariff package that is designed through Demand—Design HOQ. Four aspects of tariff package are designed under "4P" (product, price, place, and promotion) theory, and the detail items are summarised from the interviews with managers. Items of product include target market, quality, brand, service content, and after-sales service; items of price include discount, pricing, payment, customer recognized value, and differentiation; items of place include location, arrival, and distribution; and items of promotion include advertising, sales promotion, personal selling, and propagandizing.

**Figure 9** Delivery-Perception HOQ of new tariff package development (roof is omitted)

| Delivery of tariff package / Customer demands | Weight | Clear market orientation | Combining a package with other special elements, i.e. services. | Times of voice service satisfy customer demand | Flow rate of data service satisfy customer demand | Latest data service can be included | Bundling of voice service and data service is reasonable | Tariff package is related with special brand, differentiation between packages is significant | Evaluation and improvement of the launched tariff package | Simplifing tariff package and reducing types of packages | Price matches with its value | Price differently for different brand | Provide preferential price for idle time | Provide preferential price according to years of using service | Provide preferential price according to amount of consumption | Provide different preferential price to different groups of customers | Price differently in different stages of life cycle of tariff package | Make differentiate pricing reasonable | Propagandize new service reasonably | Set up special area for real experience of new service | Train special consumers for special service | Provide consulting service to special consumers for special service | Analyse tariff package regularly, and improve its marketing | Hold sales promotion regularly | Hold promotions based on reliable forecasts and analysis | Analyse tariff package regularly, and improve promotion activities |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Required elements can be always found | 18.230 | ◎ | △ | | | ◎ | | △ | ○ | | △ | | | | | | | | | ○ | | | | | | |
| The differentiation between elements is always significant | 7.420 | | | | | | △ | | △ | ○ | △ | | | | | | | | | ○ | | | | | | |
| The elements of package are full enough | 18.916 | ◎ | ◎ | | | △ | ◎ | △ | ◎ | ○ | ◎ | | | | | | | | | ○ | | | | | | |
| The package is simple enough | 20.356 | △ | | | | | ○ | | △ | ◎ | △ | | | | | | | ○ | | △ | | | | | | |
| I can choose elements of package freely | 28.436 | | ○ | | | | | | | △ | | | | | | | | | | | | | | | | |
| The packages with same brand can be chosen together | 38.319 | | ◎ | | | | | | | △ | | | | | | | | | | | | | | | | |
| The interval between new tariff packages is reasonable | 27.687 | | | | | △ | | | ◎ | | △ | | | | | | | | | | | | | | | |
| The package is always improved with the changing of customer demands | 22.326 | | | | | △ | | ◎ | | | | | | | | | | | | | | | | | | |
| The content of package is novel and personalized | 15.918 | | | | | ◎ | | | △ | | △ | | | | | | | | | ○ | | | | | | |
| The tariff package has image symbols | 8.322 | ◎ | | | | | | ◎ | | | | △ | | | | | | ◎ | | △ | | | | ○ | | |
| The package is always with a preferential price | 14.414 | | △ | ◎ | ◎ | | ◎ | ○ | | △ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | ○ | | | | ◎ | ◎ | ◎ |
| The package is always with a clear billing | 13.221 | | | | | | | | | ◎ | △ | ○ | | | | | | | ○ | ○ | ◎ | ◎ | ○ | | | |
| Weighted score | | 157 | 261 | 43 | 43 | 171 | 148 | 91 | 287 | 235 | 203 | 78 | 43 | 43 | 43 | 43 | 43 | 109 | 26 | 205 | 40 | 40 | 26 | 60 | 43 | 43 |

*Note*: "◎" means strong correlation (3); "○" means correlation (2); "△" means weak correlation (1).

The corresponding gap in the HOQ is the communication gap. The relation matrix between tariff package and customer perception of service quality are defined through more in-depth interviews. This is also shown in Figure 9. Firstly, the evaluation and improvement of the launched tariff package are significant. Its weighted score is the highest (287) among all. A close relationship should be kept with customers, and communication with them should be frequent in order to understand changes in their requirements. In accordance, the tarrif package should be improved.

Secondly, it is important that it should be possible to combine a package with other special elements, i.e. services. The weighted score of it is the second highest (261) in all. We found that, when a tariff package is launched, customers often cannot choose the package and other requisite elements simultaneously, apart from free answering service, or network IP long-distance calling. Therefore, they may be paying for unrequired services, or paying extra for required elements that are not included in the tariff package. An incorrect balance between flexibility of customer demand and fixity of tariff package will lead to downward satisfaction.

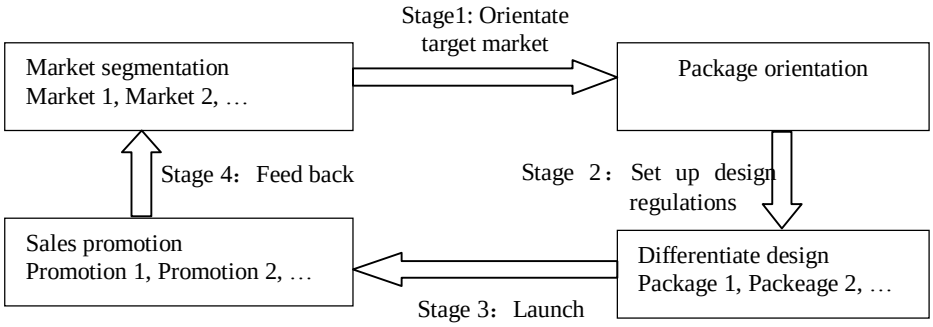
Thirdly, the simplification of tariff package and reduction of choice have a close relationship with customer perception. The weighted score is 235. Nowadays, there are too many kinds of tariff package, and it is difficult to unify billing structure. A service package usually includes items in pairs, such as local and long-distance calls, calling out service and calling in service, service in VPN (Virtual Private Network) and out VPN. Different items have different charges, the billing therefore becomes unclear and even complicated for customers, who expect a tariff package to be simple and clear. Because customers don't know much about the technology of telecommunication, they feel they are powerless when faced with a complex tariff package.

## 5. Managerial implications

### *5.1 Objective and feedback*

Strict design process is the guarantee for a reasonable tariff package. There are nine design stages, including market forecast, target orientation, design of tariff package, planning of marketing strategy, revenue forecasts, approval, launching onto the market, keeping track and evaluation of tariff package, and improving tariff package according to feedback. The nine steps are compressed into four stages: orientating target market; setting up design regulations to differentiate packages; launching onto the market; and gathering feedback and improving tariff package (Figure 10). Particular attention should be paid to the first and last stages.

**Figure 10** Design process of tariff package




Firstly, tariff package design is a systematic process. Before developing a new tariff package, the company sets a clear objective based on company strategy, and makes clear their reaons for developing a new tariff package, and what the new tariff package will look like.

(i) Identification of customer demand through data analysis and market research. The company can provide preferential prices for some services for specific customer segments, and set high prices for other services that are not necessary to this segment in order to differentiate tariff packages. This means that design should start from analysis of customer behaviour, and different service packages should be provided according to ARPU (Average Revenue Per User).
(ii) Keeping track of company business operation and analysis of its changes. When the package has over-covered or not covered enough within the market, or its sales have changed, the tariff package should be improved and/or new tariff products developed.
(iii) Consideration of rivals' strategies. The mobile service is highly competitive, and rivals' strategies will influence other companies. Therefore, it is important to analyse their strategy and develop new tariff packages accordingly.

Secondly, the company should keep track of and evaluate its tariff packages, and timely improvements should be made according to feedback. The company should evaluate the effect of market activities, such as channel, product and advertisement after the tariff package has been launch onto market. They should find and improve upon the weak areas. Three ways for evaluation of feedback are proposed.

(i) Students can be employed to investigate M-zone consumers and collect customer comments. The company then improves the tariff package according to the comments.
(ii) Salesperson should call or send a message the customers to ask their opinion of the tariff package. Then the company can adjust the package using the information gathered from the customers. This method is used mainly for GoTone users.
(iii) The company should find more ways to communicate with customers, such as

hotline, online, and business hall. Through widely communicating with users, they can get full information regarding the tariff packages, find the problems in the process of designing and selling, and then make timely improvements.

*5.2 Segment, structure, and price*

Reasonable content is the core of any tariff package. Two suggestions for it are given: Firstly, segmenting and branding for sub-markets. Customers are divided into different groups according to different variables, such as ARPU, customer behaviour, and customer psychology. It is suggested that market segmentation should be mainly based on customer value and customer behaviour, and brand establishment should be based on characteristics of customer groups. Customer value can be divided into two categories, i.e. existing value and potential value. Existing value is the profit brought to the customer; potential value is influenced by the customer's potential credit, potential loyalty, potential life period, and potential growth. Companies use the information on their databases and analyse customer behaviour by cluster analysis, discriminant analysis, neuroid network, and so on. According to existing value and potential value, customers are divided into four types such as high value customers, secondary value customers, third value customers, and potential value customers. In China Mobile's packages, the categories are as below.

(i) The GoTone customer group can be regarded as the high value customers. They are not sensitive to price, and they mainly use voice service. China Mobile provides service bundles including voice service and other supplementary services according to business demands.
(ii) The M-zone group can be regarded as the potential value customers. Most of them are students on a low income, so they are sensitive to price. However, they are potential customers for data service and other services. China Mobile should emphasize bringing out these consumers' potential consumption when designing tariff packages.
(iii) The average income users in the Easyown group can be regarded as the secondary value customers. Their price elasticity is higher than GoTone customers but lower than M-zone customers.
(iv) The users with low income can be seen as the third value customers. They are sensitive to price, and they mainly use voice and text messaging services. Their consumption is stable. However, there is no customization package designed specifically for them.

The second suggestion is simplifing tariff packages. They are easily understood, and customers will benefit. The tariff package can be simplified by dividing its design into two parts; the first part is the basic package, and the other is the supplementary package. The basic package is a must-be option. It includes basic services such as local phone service, voice service in VPN, and SMS. It can be divided into several tariff types with different flat rates according to the four types of customer. Supplementary packages are optional services that include long-distance calls, multimedia messaging service (MMS), customised ring tones, WAP service, and so on. Each supplementary package has a flat rate.

Price is a critical factor in competition. It influences customer behaviour and customer psychology. Strategic pricing of packages attracts customers and affects the company's revenue.

(i) A "fixed flat rate + discount" model is adapted to price the basic package. A monthly charge is composed of a fixed flat rate and the fees exceeding the flat rate. Different discounts are provided to customers according to their years of using the service, monthly consumption, and different customer groups.
(ii) A "limited flow rate + discount" is adopted to price supplementary packages. Several supplementary packages are set up for every brand, providing different discounts for customers according to their years of service use, monthly consumption, and different customer groups. Consequently, customer demand of flexible pricing is met, and consumer surplus can be reduced.

*5.3 Service lifecycle and experience marketing*

New marketing methods are important for the promotion of tariff packages. First, companies should analyse the life cycle of tariff package, and adopt different marketing strategies for different stages of life cycle. At the stage of service introduction, companies can use penetrating pricing to enter the market and enhance brand awareness of their tariff packages. A new tariff package can even be sent to customers as a free gift, or it can be free to customers for a limited amount of time. At the stage of service growth, the company should adjust the price of tariff package, and establish a minimal flat rate in order to maximize their market share, and look for subsidiary markets. This is based on analysis of customer data. At the stage of service maturity, the company should provide preferential prices for customers to maintain their market share and maximize profit. On the one hand, they should segment the market and differentiate tariff packages. On the other hand, they should pay more attention to personalization of service, and integrate service ideas into the tariff package design process. At the stage of service decline, the company should cut down the price and/or bundle services together to sell.

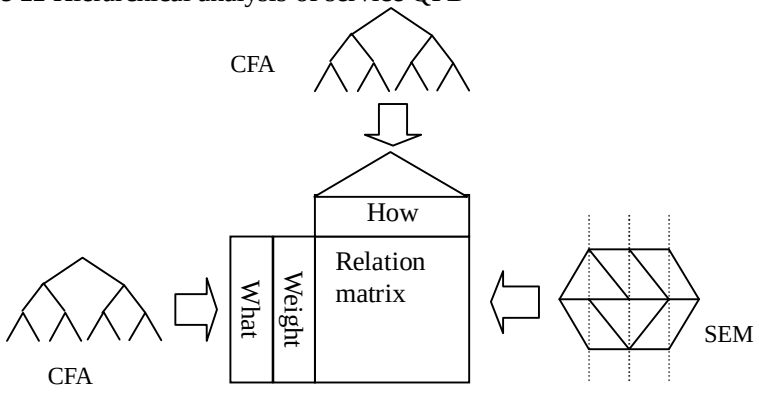
Secondly, companies should make experience marketing to culture potential demands of customers. Iceberg Theory in psychology indicates that 95 per cent of human thinking activities are at the potential conscious level, while only 5 per cent are at conscious level. The thinking activities at the potential conscious level can be drawn into the conscious level by external impetus. Most customer demands are potential, and can be brought out by external force (or marketing means). In the Kano model, voice service is regarded as a basic demand in telecommunications; digital service is usually a performance demand; and some intelligent service, for example, is attractive demands. In fact, most high-level demands and personalized demands have not been satisfied. Through real experience and free use of tariff package, customers' potential demands can weaken. Experience marketing also encourages customers to participate in the tariff package design process. Therefore, companies should pay attention to customer psychology, study customer's subconscious needs, establish unique selling-points within their tariff package, and use experience marketing to bring out potential demands.

## 6. Conclusion

With the development of service industry, people pay more attention to service innovation and / or new service development. The idea of SQFD originates from manufacturing, but it is reasonable and meaningful to apply it to service. Also it faces challenges in application. Most GAP studies focus on GAP 1 and GAP 5, while few studies are directly focused on GAP 2 to GAP 4. QFD has been integrated with GAP theory to establish a 5-stage GAP-based SQFD model (Figure 3). The five stages are: identifying customer demands, translating customer demands into service specifications, delivering/providing service according to service specifications, perception of the delivered service, and contrast with perceptions and expectations. As a result, HOQ is provided for each stage, and the stages are linked in a circle. Therefore, GAP-based SQFD provides new ideas and approaches for new service development.

However, there are some limitations as well as further directions. Firstly, in the input of QFD, all weighting evaluation of one-dimension indexes may be structured to coordinate with the structural psychological analysis of service management. The activities include element design, weight design, testing of reliability, validity, matrix analysis, and so on. This affects the reliability of methodology. Moreover, other empirical analyses and scales of service management may be applied to this problem. For example, when we perform the hierarchical analysis of SQFD, confirmation factor analysis (CFA) can be introduced to analyse the feasiblilty of SQFD. The hierarchical analysis includes the relationship among SQFD elements and the relation matrix of HOQ. Furthermore, we can use the structural equation model (SEM) to describe the relation matrix of Gaps. However, the feasibility, validity and suitable of statistic structure analysis of SQFD should be analysed (Figure 11).

**Figure 11** Hierarchical analysis of service QFD




Secondly, the many potential changes in the process of SQFD, e.g. service developer, should consider the cooperation of front-office and back-office while the tangible product development is almost a linear process. However, we still study SQFD along the linear process: customer deployment, VOC deployment, quality deployment, function deployment, process deployment, and production deployment. Finally, the conditions of SQFD application should be discussed carefully. The approach applied

in manufacturing should be adjusted to adapt to the service environment. The usage ranges need to be confirmed. The differences, relationships and connections between SQFD and service quality management should be studied further. Besides, the theory of servicescape and service recovery can be integrated into SQFD study.

## Acknowledgements

This study is sponsored by Natural Science Fund of China (Grant No. 70402016) and Natural Science Fund of Zhejiang Province (Grant No. Y605404). We also acknowledge Ms. Yan Lu's kindly permission on the use of a review paper writen by Li and Lu (2005). Ms. Xin Liu and Ms. Qi Wang also gave us help on some figures and tables.

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