

Full Length Research Paper

Evaluating the impact of marketing strategy on customer satisfaction through game theory: A mathematical model and empirical research

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This study attempts to develop a theoretical model and associated method for researching the impact of marketing strategy on customer satisfaction. It also examines the indirect effects of a marketing strategy on consumer satisfaction via the price and service quality. To clarify, it employs the concept of natural logarithms and the Lagrange function to develop a conceptual model and form an optimal marketing strategy. In addition, the study develops a model based on the conception of game theory to identify the global marketing strategy in a competitive environment. In order to illustrate the viability and contributions of the mathematical model; the empirical research employs the structural equation modeling to test the interrelationships among research constructs. The mathematical and empirical results offer an optimal guideline for a global marketing strategy to provide direction for allocating strategic resources in a competitive environment. The results of the structural equation model support the intermediary roles of price and service quality in the relationship between marketing strategy and customer satisfaction. A coordination-integration strategy can reduce price, and both standardization and coordination-integration strategies can reduce price and enhance service quality and then enhance customer satisfaction in the global service market.

Key words: Marketing strategy, customer satisfaction, service quality, price, mathematical model, empirical research.

INTRODUCTION

The relationship between customer satisfaction and the financial performance of a firm has been illustrated by many previous studies (Dabholkar and Abston, 2008; de Jager et al., 2010; Kotler and Lane, 2009; Neilson and Chadha, 2008; Oliver and Shor, 2003; Pancras and Sudhir, 2007). Previous studies have also revealed that price and service quality are closely related to customer satisfaction with service providers and have examined the direct impacts of price and service quality on a firm's profits and market share and on consumer purchasing behavior (Zeithaml, 2000). However, the relationship between marketing strategy and customer satisfaction

continues to draw attention from both academics and practitioners, in view of the fact that repeat purchase tend to decrease (Smith and Bolton, 2002). In general, service providers manipulate their price or service quality strategy to influence customer satisfaction, and further build their competitive advantage in the relevant market. Both price strategy and service quality strategy pertain to the tactical planning covered by the firm's overall strategy planning. In other words, the specific levels of price and service quality hinge on the planning of resource allocation within the firm.

In addition, as the internationalization of business activities becomes more and more prevalent, global marketing strategies (GMS) are receiving considerable attention from academics and practitioners. Zou and Cavusgil (2002) contend that the success or failure of a business in the twenty-first century will depend on

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whether it can compete effectively in global markets. Previous studies have discussed GMS from three perspectives (that is, standardization, configuration-coordination, and integration) and suggest that the purpose behind the development of GMS is to enhance a firm's global performance (Aspelund et al., 2007; Atasu et al., 2008; Dishman and Calof, 2008; Hauser and Shugan, 2008; Izquierdo and Samaniego, 2007; Samiee and Roth, 1992; Zou and Cavusgil, 2002).

However, the mechanisms of the relationship between GMS and customer satisfaction have not yet been explored in detail. It is particularly difficult to assess the effects of GMS for service industries characterized by intangibility, perishability, variability, and inseparability. Apart from clarifying the intermediary role of price and service quality in the relationship between a GMS and customer satisfaction, the study considers the impacts of varied proportions of different facets of GMS. Each facet is different but not mutually exclusive (Zou and Cavusgil, 2002). Hence, the standardization perspective and coordination-integration perspective should be studied simultaneously by varying their weights. Specifically, the effect of a GMS depends on the weight of each aspect of the GMS. Therefore, this study focuses on the indirect effects of marketing strategy on consumer satisfaction via the price and service quality. It is argued that consumer satisfaction is the key to financial performance, and firms can utilize strategies in relation to price and service quality to influence consumer satisfaction directly, which in turn will affect financial performance. A conceptual framework is developed on the basis of a series of literature reviews. Additionally, Shugan (2002) strictly proposes that mathematics, as the language of science, allows interplay between empirical and theoretical research. Accordingly, a mathematical model is essential to link theory and empirical study in order to evaluate the effectiveness of GMS. Subsequently, the mathematical model is applied to explain the mediating roles of price and service quality. Furthermore, the methodology of empirical analysis is described.

Furthermore, one of the challenges a firm needs to face is competition in the global market. Although recent research has made a substantial contribution to our knowledge on marketing strategy making, they seldom consider the influence of customers' or rivals' attitudes and the impact of intermediary variables, such as price or service quality. In a highly competitive environment, the monopoly model will incur unavoidable controversy and question. To model advanced marketing strategy to enhance customer satisfaction in a competitive environment, this study attempts to develop the mathematical model based on the conception of game theory. Therefore, the first purpose of this study is to apply game theory to analyze the role of customers' and rivals' attitudes in achieving a dominant marketing strategy. To develop the integrated conceptual framework for marketing strategy, the second purpose is to examine

the intermediary roles of price and service quality on the relationship among marketing strategy and customer satisfaction by means of a mathematical model and an empirical study. In addition, the impact of marketing strategy on customer satisfaction under given resources deserves further consideration. The third purpose is to identify the optimal guideline of marketing strategy under given resources.

For clarity, this study raises four issues related to marketing strategy on the basis of a mathematical model and empirical study. Firstly, the influence of marketing strategy is contingent on the share of the firm's of loyal customers. Secondly, the firm's rivals' price and service quality policies may dominate its marketing strategy. Thirdly, the optimal guidelines of marketing strategy, given limited resources, will be derived to provide a direction for allocating strategic resources. Finally, structural equation modeling will be employed to examine the interrelationships among research constructs in order to illustrate the viability and contributions of the mathematical model.

THEORETICAL CONSIDERATIONS AND HYPOTHESES

Current literature has expressed strong interest in global strategy. Numerous studies proposed that a firm's global strategy has a positive effect on its global performance (Craig and Douglas, 2000; Zou and Cavusgil, 2002). In the context of global marketing, Zou and Cavusgil (2002) developed a broad conceptual model to integrate three major perspectives of global marketing strategy: standardization, configuration-coordination and integration. The standardization perspective suggests that, to acquire economic of scales and to maximize cost efficiency, a firm should provide a standardized marketing mix across different countries, including product offering, promotional mix, price, and channel structure (Kotler and Lane, 2009; Zou and Cavusgil, 2002). Zou and Cavusgil (2002) further suggested that the ability to standardize and produce high-quality and low-price products is a key way to gain the competitive advantage. In addition, the integration of marketing activities is regarded as another competitive strategy to move across major global markets (Birkinshaw et al., 1995; Kotler and Lane, 2009). Numerous studies proposed that, to gain more performance and competitive leverage, a global company must be able to integrate its competitive moves and resources across the major global markets (Zou and Cavusgil, 2002). To clarify, Zou and Cavusgil (2002) stated that the integral strategy of global marketing is concerned with how a firm's competitive battles are planned and executed across country markets.

Customer retention is central to the development of business relationships. Kotler and Lane (2009) argued that the identification of the determinants of customer

satisfaction is a key concern for service management. Satisfaction is a psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience (Hansen and Sand, 2008; Liu and Tsai, 2010; Martínez-Ruiz et al., 2010; Mehra and Ranganathan, 2008; Oliver and Shor, 2003; Zhang et al., 2009). Smith and Bolton (2002) stated that satisfaction with service is related to the confirmation or disconfirmation of expectations. Customer satisfaction is related to service quality, in that, incidents of satisfaction over time result in perceptions of service quality (Liu and Tsai, 2010; Lu et al., 2009; Parasuraman et al., 1988). As mentioned earlier, firms are able to raise prices when they have highly satisfied consumers. However, higher prices become a cost for customers to obtain service and thus, decrease satisfaction. Alam and Khalifa (2009) suggested that higher price may limit the consumption capacity of underprivileged group. They further indicated the poorer groups of societies were unable to afford to purchase the highly-products. Thus, the product or service provider can allow more customers access to the benefits of that particular product or service by reducing its price. In addition, Kotler and Lane (2009) proposed that there is a positive relationship between perceived price fairness and satisfaction. The more consumers perceive a price as gain, the higher their satisfaction. These findings also supports the idea that higher price may reduce customer satisfaction or consumption capacity.

Many empirical studies have identified quality as an antecedent of customer satisfaction (Lu et al., 2009; Mehra and Ranganathan, 2008; Oliver and Shor, 2003; Singh and Singh, 2009). It has been suggested that perceived higher service quality will result in customers evaluating a product and/or service in a more positive way and as having higher value. Higher perceived values and positive evaluation of a product and/or service will in turn enhance customer satisfaction. Parasuraman et al. (1988) contend that as customers perceive service quality as being higher than expected, the gap becomes positive and customer satisfaction is enhanced. Therefore, the following hypotheses are tested:

H₁: Price increase reduces customer satisfaction in the global service market.

H₂: Service quality increase increases customer satisfaction in the global service market.

Numerous studies have focused on how a firm's global strategy impacts its market performance (Craig and Douglas, 2000; Lages et al., 2008; Zou and Cavusgil, 2002). In an influential article on global marketing strategy, Levitt (1983) forcefully argued that communication and transportation technologies enhance the emergence of global markets for standardized consumer products on a previously unimagined scale of magnitude. The strategy of standardization not only responds to

worldwide homogenized markets but also expands those markets through aggressively low pricing (Craig and Douglas, 2000). Samiee and Roth (1992) addressed a key controversy concerning the suitability of global standardization and found that market coverage and capacity utilization are important considerations for firms that emphasize global standardization. Birkinshaw et al. (1995) found that stronger performers are precisely those with more globally integrated strategies. Zou and Cavusgil (2002) adopted the viewpoint of the industrial organization theory and resource-based theory to formulate a global strategy, and asserted that the implementation of global strategies not only affects a firm's financial performance in global markets, but also helps improve the strategic position of a business in global competition. Additionally, Zou and Cavusgil (2002) focused on the constitution and impact of global marketing strategies and developed a broad conceptualization of global marketing strategies that integrate three major perspectives: standardization, configuration-coordination, and integration.

For the intermediary variables of price and service quality as stipulated in this study, we followed Zeithaml (2000), who defines price as what is given up or sacrificed to obtain a product. Price is a "give" component rather than a "get" component: that is, price is a monetary cost given up to get goods or services. The concept of an assortment of "give and get" components is equivalent to the concept of value. Further, service quality is a measure of how well the service level delivered matches customer expectations (Parasuraman et al., 1988).

As for standardization strategy in a global service market, researchers suggest that as a firm's marketing mix offered across different countries becomes standardized, it should include the 4Ps marketing mix for the traditional sector, as well as an additional 3Ps marketing mix (that is, people, physical evidence, and process) in the service sector (Kotler and Lane, 2009). Zou and Cavusgil (2002) further suggested that enhancing the ability to produce high-quality and low-priced products are the main ways to gain a competitive advantage and should be the standardization objective in a global marketing strategy (Zou and Cavusgil, 2002). Therefore, the following propositions will be tested:

H₃: A standardized strategy reduces prices in the global service market.

H₄: A standardized strategy enhances service quality in the global service market.

For the coordination-integration of marketing strategies in the global service market, numerous studies have proposed that a good strategy is to integrate and participate in the firm's competitive moves and resources across the major markets in the world in order to acquire performance and competitive leverage (Birkinshaw et al., 1995). Previous studies have shown that through the coordination and integration of marketing activities, firms

can enhance customer satisfaction through market participation, product offerings, location of value-added activities, and other marketing approaches (Alam et al., 2010). To clarify, the success of a coordination-integration strategy can be defined as the extent to which a firm's marketing activities, competitive marketing moves, and resources in different countries, are interdependent. The advantages of coordination and integration strategies are to synthesize different marketing activities into a unique marketing mix in order to acquire synergistic effects. These synergistic effects can also be obtained through lowering prices and increasing service quality.

Moreover, most researchers treated these different facets as a whole rather than different constructs in their works (Cavusgil et al., 2004; Zou and Cavusgil, 2002). Thus, this study attempts to consider the different facets of GMS and separates GMS into two parts: standardization strategy and coordination-integration strategy. These two parts of GMS are different but not independent. The study specifically addresses the respective effect of different facets of GMS, rather than the synergistic effect. This study is also interested in the correlations among global marketing strategies. Using the preceding reasoning as a basis, it asserts the following:

H₅: A coordination-integration strategy reduces price in the global service market.

H₆: A coordination-integration strategy enhances service quality in the global service market.

H₇: Standardization strategies are associated with coordination-integration strategies in the global market.

Mathematical model

Shugan (2002) argued that mathematics, as the language of science, allows interplay between empirical and theoretical research. To analyze the model simply, some assumptions are needed. First, consider the law of diminishing marginal utility, $U' > 0$ and $U'' < 0$. This study assumes that the impact of price and service quality on customer satisfaction, as well as the combined effect of the impacts of a global marketing strategy, a standardization strategy (ST) and a coordination-integration strategy (CI), on price and service quality will be close to that suggested by the law of diminishing marginal utility. To clarify, this study employs the concept of natural logarithms and the Lagrange function to develop a conceptual model and form an optimal external marketing strategy.

Based on the law of diminishing marginal utility, the marginal effects among constructs in this study must be diminishing. In other words, the marginal impact of price and service quality on customer satisfaction (H₁ and H₂) must be diminishing. Similarly, the marginal effects of standardization strategy (ST) and coordination-integration strategy (CI) on price (H₃ and H₅) and service quality (H₄ and H₆) must be diminishing. According to H₁ and H₂,

price (P) and service quality (SQ) may influence customer satisfaction (CS), and thus, the function of customer satisfaction, CS (P, SQ), can be written as follows:

$$CS(P, SQ) = f_1(P, SQ) = \beta_{20} - \beta_{21} \ln P + \beta_{22} \ln SQ \quad (1)$$

β_{20} represents the intercept term of the function of customer satisfaction. The extents of the influences of price strategy and service quality in equation (1) on customer satisfaction are β_{21} and β_{22} , respectively. Similarly, according to H₃, H₄, H₃, and H₅, the standardization strategy (ST) and coordination-integration strategy (CI) may influence price (P) and service quality (SQ). Furthermore, H₇ implies that the standardization strategy (ST) may associate with a coordination-integration strategy (CI). Therefore, the function of price (P) can be written as follows:

$$P(ST, CI) = f_2(ST, CI) = \gamma_3 + \alpha_{31} \ln ST + \alpha_{32} \ln CI + \lambda \ln(ST)(CI) = \gamma_3 + \gamma_{31} \ln ST + \gamma_{32} \ln CI \quad (2)$$

γ_3 represents the intercept term of the function of price, and λ indicates the correlation coefficient between standardization strategy and coordination-integration

strategy. α_{ij} and γ_{ij} represent the degree of impact of a global marketing strategy on price. In other words, the extent of the influences of standardization strategy and coordination-integration strategy on price are γ_{31} and γ_{32} , respectively.

$\ln ST$ implies that the ratio of standardization strategy relative to global marketing strategy (that is,

$$\ln ST = \frac{ST}{GMS}),$$

and the ratio of coordination-integration strategy relative to global marketing strategy, $\frac{CI}{GMS}$, can

be written as $\ln CI$. Similarly, the global marketing strategy may influence service quality, and the function of service quality can be written as follows:

$$SQ(ST, CI) = f_3(ST, CI) = \gamma_4 + \alpha_{41} \ln ST + \alpha_{42} \ln CI + \lambda \ln(ST)(CI) = \gamma_4 + \gamma_{41} \ln ST + \gamma_{42} \ln CI \quad (3)$$

γ_4 represents the intercept term of the function of service quality. The extent of the influences of standardization strategy and coordination-integration strategy on service quality are γ_{41} and γ_{42} , respectively. Secondly, in order to develop advanced external marketing strategies to

Table 1. Gain of ratio of customer that be impacted by price and service.

Strategy	Gain	Strategy	Your company (firm)	
			Low (quality/ price)	High (quality/ price)
Competition (rival)	Low (quality/ price)		$\left(\frac{1 - \delta_1 + \delta_2}{2}, \frac{1 + \delta_1 - \delta_2}{2} \right)$	$(\delta_2, 1 - \delta_2)$
	High (quality/ price)		$(1 - \delta_1, \delta_1)$	$\left(\frac{1 - \delta_1 + \delta_2}{2}, \frac{1 + \delta_1 - \delta_2}{2} \right)$

Gain: (firm, rival).

enhance customer satisfaction in a competitive environment, this article develops a model based on the concept of game theory. It considers the types of customers, price and service quality policies along with the rivals' attitudes.

For the types of customers, δ_1 and δ_2 are used to denote the ratio of loyal customers of the service business and rivals in the global market, respectively.

Since strategies using both low and high price and service quality policies may be adopted by service providers, θ_1 and θ_2 denote the probability of rivals using strategies based on low price and service quality, respectively. Table 1 considers the gain in the ratio of customers that may result from price strategies and service quality strategy in the competitive market between service businesses and rivals, ceteris paribus.

The expected ratio of customers that can be affected by low and high price strategies in service businesses are E (low price) and E (high price), respectively. The expected ratio can be written as follows:

$$E(\text{low price}) = 1 - \delta_2 - \frac{1}{2}\theta_1(1 - \delta_1 - \delta_2) \tag{4}$$

$$E(\text{high price}) = \frac{1}{2}\theta_1(1 + \delta_1 - \delta_2) - \frac{1}{2}\theta_1(1 - \delta_1 - \delta_2) \tag{5}$$

Since $1 - \delta_2 \geq \frac{1}{2}\theta_1(1 + \delta_1 - \delta_2)$ is the expected ratio of customers that may be impacted by the low price strategy of a service business, E (low price), will be more than the expected ratio of customers that may be impacted by the high price strategy of service business, E (high price). Price strategy can directly influence customer satisfaction. However, the extent of the influence will depend on the types of customers' and rivals' attitudes.

The parameter $\left[1 - \delta_2 - \frac{1}{2}\theta_1(1 - \delta_1 - \delta_2) \right]$ can represent the mediation effect of types of customers and rivals' attitudes. Specifically, disregarding the types of customers and rivals' attitudes, the extent of the influence

of price strategy on customer satisfaction is β_{21} . Comparatively, given the types of customers and rivals' attitudes, the extent of the influence of price strategy on customer satisfaction is

$$\beta_{21} \left[1 - \delta_2 - \frac{1}{2}\theta_1(1 - \delta_1 - \delta_2) \right]$$

Similarly, ceteris paribus, the expected ratios of customers that would be affected by low and high service quality strategies of service businesses are E (low SQ) and E (high SQ), respectively. The expected ratio can be written as follows:

$$E(\text{low SQ}) = \delta_1 + \theta_2 \left(\frac{1 - \delta_1 - \delta_2}{2} \right) \tag{6}$$

$$E(\text{high SQ}) = \frac{1 + \delta_1 - \delta_2}{2} + \theta_2 \left(\frac{1 - \delta_1 - \delta_2}{2} \right) \tag{7}$$

Since $\frac{1 + \delta_1 - \delta_2}{2} \geq \delta_1$, a high service quality strategy will

strictly dominate a low service quality strategy. Comparatively, given the types of customers and rivals' attitudes, the extent of influence of service quality on customer satisfaction is

$$\beta_{22} \left\{ \frac{1 + \delta_1 - \delta_2}{2} + \theta_2 \left(\frac{1 - \delta_1 - \delta_2}{2} \right) \right\}$$

Accordingly, mediation effect of price on service quality from competitive environment is larger than that of service quality on customer when the value of $\frac{1 + \delta_1 - \delta_2}{2}$

$1 - \delta_1 - \delta_2$ is large than the probability of rivals using strategies based on low price and service quality (that is, $(\theta_1 + \theta_2)$). This result represents that the service provider should focus on the low price strategy if the value of $\frac{1 + \delta_1 - \delta_2}{2}$ is large than the probability of rivals using strategies based on low price and service quality (that is,

$\frac{1 + \delta_1 - \delta_2}{1 - \delta_1 - \delta_2} \geq \theta_1 + \theta_2$). According to these hypotheses, the function of customer satisfaction (CS) can be rewritten as follows:

$$CS = f1(P, SQ, \delta_1, \delta_2, \theta_1, \theta_2) = \beta_{20} - \beta_{21} \left[1 - \delta_2 - \frac{1}{2} \theta_1 (1 - \delta_1 - \delta_2) \right] \ln P + \beta_{22} \left[\frac{1 + \delta_1 - \delta_2}{2} + \frac{1}{2} \theta_2 (1 - \delta_1 - \delta_2) \right] \ln SQ \tag{8}$$

Additionally, a global marketing strategy may influence price, and thus, the function of price can be written as follows:

Let,

$$\beta_{31} = \beta_{21} \left[1 - \delta_2 - \frac{1}{2} \theta_1 (1 - \delta_1 - \delta_2) \right]$$

$$\beta_{32} = \beta_{22} \left[\frac{1 + \delta_1 - \delta_2}{2} + \frac{1}{2} \theta_2 (1 - \delta_1 - \delta_2) \right]$$

The simpler model of customer satisfaction (CS) can be rewritten as follows:

$$CS = \beta_{20} - \beta_{31} \ln P + \beta_{32} \ln SQ = \beta_{20} - \beta_{31} \ln (\gamma_3 + \gamma_{31} \ln ST + \gamma_{32} \ln CI) + \beta_{32} \ln (\gamma_4 + \gamma_{41} \ln ST + \gamma_{42} \ln CI) \tag{9}$$

$$\frac{\beta_{22} [(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1](\gamma_{42} - \gamma_{41})(\gamma_3 - \gamma_{32}) - \beta_{21} [(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1](\gamma_{31} - \gamma_{32})(\gamma_4 + \gamma_{42})}{(\gamma_{31} - \gamma_{32})(\gamma_{41} - \gamma_{42})\{(\beta_{21} [(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1] - \beta_{22} [(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1])\}}$$

Comparatively, the optimal ratio of coordination integration strategy will be equal to:

$$\frac{\beta_{22} [(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1](\gamma_{42} - \gamma_{41})(\gamma_3 - \gamma_{32}) - \beta_{21} [(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1](\gamma_{31} - \gamma_{32})(\gamma_4 + \gamma_{42})}{(\gamma_{31} - \gamma_{32})(\gamma_{41} - \gamma_{42})\{(\beta_{21} [(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1] - \beta_{22} [(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1])\}}$$

Furthermore, if the optimal ratio of coordination-integration strategies relative to global marketing strategies ($\ln CI^*$) is more than the optimal ratio of

This study employs the concept of the Lagrange function to gain an optimal external marketing strategy. To maximize customer satisfaction (CS) which is subject to a constraint, the ratio of standardization strategy plus coordination-integration strategy relative to a global marketing strategy must be less than, or equal to, one. Therefore, to maximize customer satisfaction, the Lagrange function in this study can be written as follows:

$$L = \beta_{20} - \beta_{31} \ln (\gamma_3 + \gamma_{31} \ln ST - \gamma_{32} \ln CI) + \beta_{32} \ln (\gamma_4 + \gamma_{41} \ln ST + \gamma_{42} \ln CI) + \epsilon(1 - \ln St - \ln CI) \tag{10}$$

Based on the Lagrange function, the optimal ratios of a standardization strategy and coordination-integration strategy relative to global marketing strategy will be evaluated (*i.e.*, $\ln ST^*$ and $\ln CI^*$). In terms of optimal guidelines for marketing strategies leading to maximum customer satisfaction (CS), this study analyzes the impact of each parameter of the optimal ratio of the standardization and coordination-integration strategies in relation to global marketing strategy. Specifically, it attempts to evaluate not only the impact of the share of loyal customers for a firm but also the impact of the firm's rivals' price and service quality polices on the proportion of the marketing strategy. Thus, the optimal ratio of a standardization strategy relative to a global marketing strategy, $\ln St^*$, is equal to:

standardization strategies relative to global marketing strategies ($\ln St^*$), that is, $\ln CI^* \geq \ln St^*$, then:

$$\frac{\beta_{21} \left[1 - \delta_2 - \frac{1}{2} \theta_1 (1 - \delta_1 - \delta_2) \right] (\gamma_{31} - \gamma_{32})}{2\gamma_3 - \gamma_{31} - \gamma_{32}} \geq \frac{\beta_{22} \left[\frac{1 + \delta_1 - \delta_2}{2} + \frac{1}{2} \theta_2 (1 - \delta_1 - \delta_2) \right] (\gamma_{42} - \gamma_{41})}{2\gamma_4 + \gamma_{41} + \gamma_{42}} \tag{11}$$

Thus, the optimal guideline of global marketing strategy is that the service business must focus on coordination-

integration strategy in the global market to gain the optimal customer satisfaction if, and only if, the value of

$$\frac{\beta_{21} \left[1 - \delta_2 - \frac{1}{2} \theta_1 (1 - \delta_1 - \delta_2) \right] (\gamma_{31} - \gamma_{32})}{2\gamma_3 - \gamma_{31} - \gamma_{32}}$$

more than the value is of

$$\frac{\beta_{22} \left[\frac{1 + \delta_1 - \delta_2}{2} + \frac{1}{2} \theta_2 (1 - \delta_1 - \delta_2) \right] (\gamma_{22} - \gamma_{21})}{2\gamma_2 + \gamma_{21} + \gamma_{22}}$$

. Otherwise, the service business must focus on standardization strategy in the global market.

EMPIRICAL RESEARCH

Sample and data collection

To survey the applicability of the conceptual model, this study constructed a questionnaire and distributed it to a randomly drawn sample of customers with the experience of consuming in the global service business, such as airlines, banks, and insurance companies. Two hundred and fifty two valid responses were collected, and Table 2 shows the sample distribution. More than 56% of the respondents were male; more than 57% of them were married; more than 59% were less than 30 years old; more than 71% had graduated from college; about 71% earned USD 21,000 to 40,000 per year; about 63% worked in a business or service sector; and about 79% used less than USD 15,000 dollars for consumption.

Measurement of the constructs

Previous research related to research constructs was reviewed to develop the empirical measures for the study. The items were selected and filtered according to the definitions of constructs. The survey questionnaire items were developed in the following stages. First, the integration of previous studies and theories was done to formulate the key components of marketing strategy in an international market. To integrate the constructs of a marketing strategy, this study used standardization strategy, coordination-integration strategy, price, quality, and customer satisfaction as its variables. Second, the participants were asked to rate the relevance of each item to their company for five research constructs on a seven-point Likert scale, anchored from "strongly disagree" to "strongly agree".

As to marketing strategy, Zou and Cavusgil (2002) had developed a broad conceptualization that integrated three major perspectives: standardization, configuration-coordination and integration perspectives as the components of global marketing strategy. This study adopted a standardization strategy and coordination-integration strategy to identify the concept of global marketing strategy. A standardization strategy in a global service market can be defined as the degree of standardization of the marketing mix that a service business globalizes in its marketing actions across country markets (Cavusgil et al., 2004). Accordingly, the seven items for standardization marketing mix variables include the traditional 4Ps: product, price, place, and promotion, and an additional 3Ps: people, physical evidence, and process (Kotler and Lane, 2009; Lages et al., 2008; Neilson and Chadha, 2008). In addition, eight items for coordination-integration strategy, assessing the extent to which firm's marketing activities, competitive marketing moves, and interdependence of resources in different countries.

As for intermediary variables, price is defined as what is given up or sacrificed to obtain a product (Zeithaml, 2000). Pricing is a critically important management activity with major strategic and operational implications (Shipley and Jobber, 2001). Bernstein and

Table 2. Characteristics of the respondents.

Variable	Frequency	Percentage
Gender		
Male	143	56.7
Female	109	43.3
Marriage		
Single	106	42.1
Married	146	57.9
Age (years old)		
< 25	67	26.7
26 ~ 30	83	32.9
31 ~ 35	57	22.6
36 ~ 40	26	10.3
41 ~ 45	15	5.9
> 46	4	1.6
Education		
Senior high school	6	2.4
Vocational school	18	7.1
College	181	71.8
Graduate school	47	18.7
Annual income (US dollars)		
< 20 thousand	17	6.8
21-30 thousand	84	33.3
31-40 thousand	96	38.1
41-50 thousand	42	16.7
> 51 thousand	13	5.2
Occupation		
Public officers	19	7.5
Education sector	13	5.2
Business sector	84	33.3
Industrial sector	31	12.3
Service sector	76	30.2
Students	16	6.4
Others	13	5.1
Amount of consumption in the service trade per year		
< 10 thousand	97	38.5
11-15 thousand	103	40.9
16-20 thousand	34	13.5
21-25 thousand	13	5.2
> 26 thousand	5	1.9

Macias (2002) claimed that the pricing process was the foundation for a set of key marketing. Price is a "give" component rather than a "get" component: that is, price is a monetary cost given up for getting goods or service. Ailawadi et al. (2001) argued that price consciousness was one dimension to measure price. It comprises

Table 3. Correlation, reliabilities, and validities of constructs.

Variable	Number of items	Reliability	Validity	ST	CI	P	SQ
Standardization strategy (ST)	7	0.86	0.73				
Coordination-integration strategy (CI)	8	0.82	0.79	0.34*			
Price (P)	2	0.94	0.83	-0.18*	-0.38**		
Service quality (SQ)	22	0.86	0.72	0.35**	0.55**	-0.14*	
Consumer satisfaction (CS)	4	0.80	0.76	0.16*	0.11*	-0.25**	0.19*

*correlation significant at P < 0.05, and ** correlation significant at P < 0.01. Reliability figures are calculated by the formula of Cronbach's

$$\alpha = \left[\frac{k}{k-1} \right] \left[\frac{S_T^2 - \sum S_i^2}{S_T^2} \right].$$

Validity figures are calculated by the explained variance of each factor from confirmatory factor analysis.

of comparing prices, checking the prices, getting the best price, and making an extra effort to find lower prices. Kotler and Lane (2009) defined price search as another method to measure price. Whether the price of a specific product is high or low depends on the comparison with market price. Accordingly, price here is measured by an index, which developed by this study, that is, value of price (P). This index is equal to the ratio of actual payment (P_a) and the reference price (P_r). Respondents were asked how much they paid and what they thought would be a rational price for the service in relation to their latest purchase. Service quality has been regarded as a critical variable to enhance the value of services in the services sector (Durvasula et al., 2002). Parasuraman et al. (1988) revealed that the criteria used by consumers assessing service quality fall into three discrete areas (that is, tangibles, reliability, and responsiveness) and two combined areas (that is, assurance and empathy). Accordingly, this study uses SERVQUAL to measure service quality (SQ).

In service markets, the importance of assessing and managing customer satisfaction is widely recognized (Hansen and Sand, 2008; Matzler et al., 2004). Oliver and Shor (2003) argue that satisfaction is a summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the buyer's prior feelings about the consumption experience. Kotler and Lane (2009) propose that there is a positive relationship between perceived price fairness and satisfaction. The more fair industrial buyers perceive the price, the higher their satisfaction. They also regard customer satisfaction as the function of perceived quality, product quality, and price, and they measured it through the industrial buyer's overall judgment. Four items were revised from Hansen and Sand (2008) and Matzler et al. (2004) to measure customer satisfaction.

To evaluate the dimensionality and reliability of the measures, the study adopted principal component factor analysis, item to total correlation analysis, and Cronbach's alpha. Factor analysis examined the basic structure of the data, and item to total correlation analysis assessed the degree of multicollinearity among variables. Cronbach's alpha measured the internal consistency of each identified dimension. The reliabilities and validities for the constructs are shown in Table 3. The coefficients of Cronbach's alpha for all variables are greater than 0.8, showing a high reliability coefficient. Furthermore, the cumulative percentage of total variance extracted by factors, and the discriminate validity of the research variables, follow the requirements suggested by Hair et al. (2010), indicating that the reliabilities and validities of these

constructs are acceptable. Thus, using these constructs, tests of hypotheses were undertaken to assess the interrelationships among the research variables.

RESULTS

In order to assess the hypothesized relationships, structural equation models were employed using AMOS 5.0 to investigate the relationships among the research variables. This study assumed that the relationships among the research constructs confirmed the law of diminishing marginal utility. Accordingly, it took logarithm as standardization strategy and coordination-integration strategy, and adjusted the data with respect to customer satisfaction by exponential function. Chi-square and fit indices were employed to examine the overall fit of the model. The results are shown in Figure 1. Further, an excellent overall fit of the measurement model was suggested by the comparative fit index (CFI = 0.97) and the goodness-of-fit index (GFI = 0.95). The residual index such as root mean square error of approximation (RMSEA = 0.048) was less than 0.05. These results suggest an adequate fit of the proposed model to the data (Hair et al., 2010). Therefore, the aforementioned indices reveal an acceptable fit, further supporting the hypothesized structure.

The results of the structural equation modeling supported most of the research hypotheses. While H_1 , H_2 , H_4 , H_5 , H_6 , and H_7 were supported, H_3 was unsupported by empirical analysis. In other words, while the standardization strategy can enhance service quality, a coordination-integration strategy can both reduce price and enhance service quality. As shown in the existing literature, increased prices will reduce customer satisfaction, and good service quality will enhance customer satisfaction in the global service market. Further, we can replace the symbols of the mathematical model can be replaced. The $\ln S_i^*$ and $\ln CI^*$ will be equal to:

$$\frac{0.01 [(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1] + 0.21 [(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1]}{0.123 \{0.202 [(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1] - 0.088 [(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1]\}}$$

and

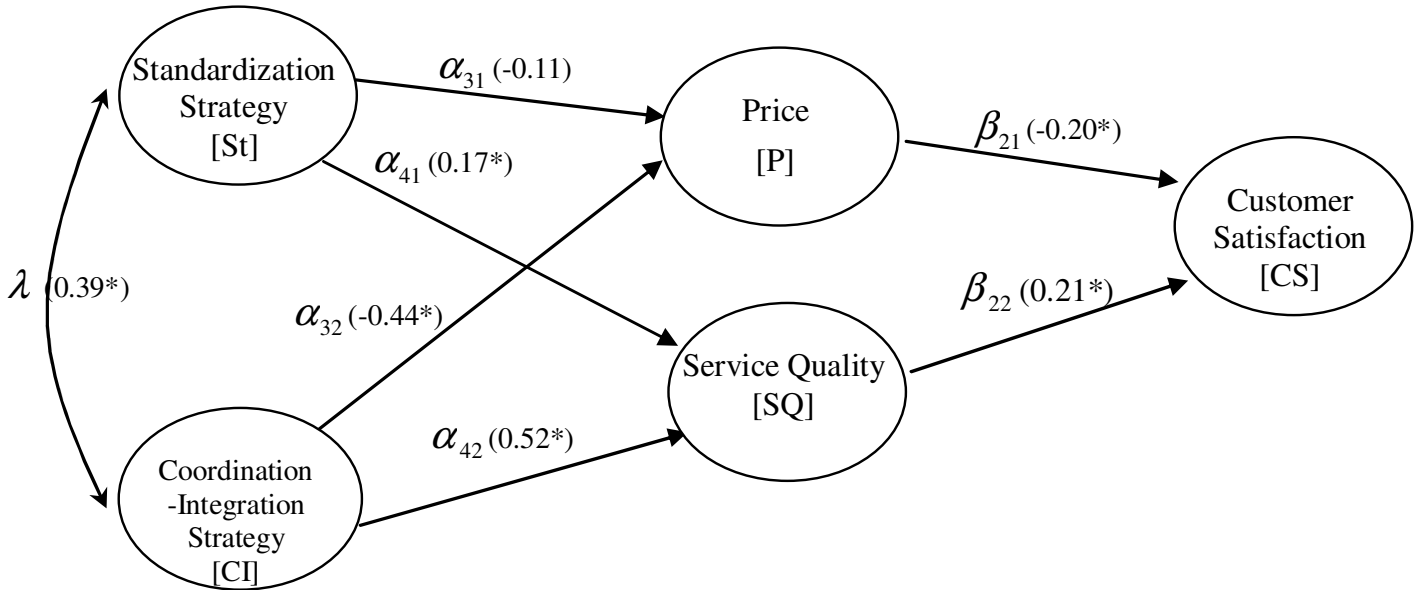


Figure 1. The results of SEM. *P < 0.05, **P < 0.01. Chi-square = 32.78; df =16; Probability level= 0.005; CFI= 0.97; GFI=0.95; RMSEA=0.048.

$$\frac{0.117[(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1] + 0.21[(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1]}{0.123\{0.202[(2 - \theta_1)(1 - \delta_2) + \theta_1\delta_1] - 0.088[(1 + \theta_2)(1 - \delta_1 - \delta_2) + 2\delta_1]\}}$$

Additionally, a service business should focus on a coordination-integration strategy in the global market to gain optimal customer satisfaction if, and only if, the

value of $\frac{0.068 \left[1 - \delta_2 - \frac{1}{2} \theta_1 (1 - \delta_1 - \delta_2) \right]}{7.661}$ is more than the value of $\frac{0.032 \left[\frac{1 + \delta_1 - \delta_2}{2} + \frac{1}{2} \theta_2 (1 - \delta_1 - \delta_2) \right]}{25.808}$.

Otherwise, the service business in the global market should focus on the standardization strategy.

DISCUSSION

Apart from clarifying the intermediary role in the relationship between GMS and financial performance, this study makes other contributions. First, it considers the impact of different proportions of different factors of a GMS. Each approach is different but not mutually exclusive (Zou and Cavusgil, 2002), and hence, firms can pursue these three approaches simultaneously. However, the effect is different if one approach of GMS dominates the others. The study examines the impact of different GMS portfolios containing different proportions of different approaches and obtains the optimal one. Second, it adds other aspects to the standardization perspective of GMS.

Besides the conventional four Ps, an additional three Ps (related to service, including process, people, and physical evidence) are needed in a focus on the service industry. Third, it combines two analytical techniques, including a mathematical model and a multivariate technique. The main aim was to create a conceptual framework for an optimal global external marketing strategy in the service industry, and prove the contribution of this model with empirical analysis. Finally, the study applies game theory to its analysis of the model to characterize the competitive factor. In the global market, one of the challenges a firm needs to face is competition. Hence, the monopoly model will incur unavoidable controversy and questions. In addition, the study also considered the consumer diversity rather than homogeneity.

The mathematical model reveals several interesting findings. First, the quantity of a firm’s loyal customers is negatively associated with the proportion of the standardization strategy, but positively associated with the proportion of the coordination-integration strategy. Secondly, the probability that rivals will choose a low-oriented strategy in respect to price and service quality policies is positively associated with the proportion of the standardization strategy. Thirdly, the optimal guideline of a global external marketing strategy in equation (9) provides a direction for allocating the strategic resources for that strategy. The results of the structural equation modeling mode support the intermediary roles of price, service quality, and customer satisfaction in the

relationship between a GMS and financial performance. Thus, consumer satisfaction tied to price and service quality can fill the theoretical gap between a GMS and performance. Although the effect of a standardization strategy on price is not significant, the pattern is consistent with the study's expectations. Furthermore, both standardization and coordination-integration strategies can reduce price and enhance service quality in the global service market. This result is consistent with the positive correlation between standardization and coordination-integration strategies in that both possess a similar influence on price and service quality policies. Therefore, as Zou and Cavusgil (2002) observe, different GMS approaches are not mutually exclusive, and hence can be pursued simultaneously.

MANAGERIAL IMPLICATIONS

The main contribution of this study is to develop a mathematical model and test it by empirical evidences. The findings of this study have several implications for marketing managers of multinational enterprises. First, an optimization of the mathematical model has indicated that firms can adopt standardization and coordination-integration simultaneously. Based on the criteria as developed from this study, marketers can derive the optimal proportion of standardization and coordination-integration strategies. The optimized formula not only considers the firm's loyal customers but also integrates the competitive moves of its rivals. The parameters in the optima denote the magnitude of the influence of GMS on the price, service quality, and customer satisfaction. Thus, marketers can determine the optimal GMS as long as they examine the magnitude of influence among GMS, price, service quality, and customer satisfaction. Secondly, if a firm or new entity locates itself in a more drastically competitive environment, it should place more emphasis on a standardization strategy if its loyal customer base is smaller than that of its rivals. On the other hand, firms having a larger market share should stress a coordination-integration strategy that offers high quality service to satisfy customers' needs.

Thirdly, if a firm's rivals are providing services with low price to satisfy low-end customers, the firm should contemplate putting more resources into a standardization strategy in respect to its portfolio of global marketing strategies. In addition, if the relationship between price and customer satisfaction is more powerful, the firm should increase the proportion of its coordination-integration strategy. Finally, based on game theory, the marketing strategy of a firm could be divided into four quadrants. For instance, when both the firm and its major rival provide low-value services, the firm that embraces more loyal customers should place more emphasis on coordination-integration strategy. Otherwise, the firm should place more emphasis on standardization strategy, when its loyal customers are smaller.

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