A combined QFD, AHP and ANP approach for quality improvement and capacity expansion in the Greek Banking sector: Some Preliminary Results

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STRUCTURED ABSTRACT

Purpose

This paper proposes the utilisation of Quality Function Deployment (QFD) in order to detect and translate bank customers' needs into actionable goals for capacity expansion. Specifically, this study aims to identify the selection criteria -"wants" of banks' customers in Greece. Customers "wants" are also related to key market segments to develop the First House of Quality.

Methodology/Approach

A specific questionnaire was designed based on a list of selection criteria that was drawn from previous surveys as well as on the professional experience of the authors. Five hundreds forty nine (549) questionnaires were personally administered to customers of major banks in Thessaloniki, Greece. A total of 1770 customers were approached, yielding a response rate of 31%.

Findings

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223

Exploratory factor analysis revealed six dimensions regarding bank customers selection criteria. These are: "Simple and effective service", "Innovation Products", "Pricing", "Working Hours", "Network Sufficiency", and "Location". Customers were categorized in six key market segments, based on their most frequently used bank products. These were: a) Housing Loans, b) Consumer Loans, c) Credit Cards, d) Savings Deposits, e) Time Deposits, and f) Funds.

Research limitations

Distributing questionnaires personally did not allow the creation of a completely representative sample of customers of the Greek bank industry.

Practical implications

Measuring customers' perceptions in terms of the six selection criteria dimensions that emerged can support decision making regarding initiatives to be taken. Findings were related to specific bank product categories assisting managers to customize key banking processes to meet customer needs.

Originality/value of paper

The findings of this study provide insights into customers' priorities when selecting a specific banking institution. Furthermore, they relate customer wants to specific market segments based on primary data, forming thus, a robust background for the next steps of the research.

Keywords: QFD, Banks, Customer criteria, Factor Analysis, Greece

Research Paper

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Excellence; 20-22 August; 2008 in Helsingborg; Sweden

224

1. Introduction

During the last decade the Greek banking system is characterized by increased level of competition. Competition has become even more intense since Greek Economy joined the Euro currency system. Thus, it becomes increasingly important to investigate methods and techniques that may improve banks' competitive position and as a result, increase their market share and profitability. Retail banking is one of the most important sectors that affect the economic life of any country (Zineldin, 1996). Banks operating in Greece enjoy high profitability levels and there are many opportunities for further development (The Bank of Greece, 2007)

The growing competition of the Greek banking sector as well as the variety of product and services offered by banking organizations have increased the need to identify the selection criteria of financial services' providers. Thus, a key prerequisite for quality improvement of banks' activities is the accurate determination and understanding of customers' needs and selection criteria (Cohen, 1995). Moreover, the translation of these needs/criteria into specific operational and/or strategic goals and actions are equally important for banking strategies' successful implementation.

Quality Function Deployment (QFD) provides a structured way for service providers to assure quality and customer satisfaction while maintaining a sustainable competitive advantage. QFD focuses on delivering "value" by seeking out both spoken and unspoken customers' needs, translating them into actionable service features and communicating them throughout the organization (Akao, 1990).

The aim of our research is to develop a Quality Function Deployment (QFD) model that supports capacity expansion decisions for banks based on customers' needs and bank selection criteria.

Despite its wide implementation in various service industries, higher education, public sector, hospitality industry, healthcare industry, retail sector etc., accurate determination of customers' wants continues to be an issue in QFD design services. This is mainly a result of the failure in prioritizing customer requirements and determining accurate importance levels of service requirements. In order to avoid these problems, the Analytic Hierarchy Process (AHP) is utilized to determine the intensity of the relationship between row and column variables for each house of quality whereas ANP plays also an important role in determining the intensity of synergistic effects among column variables at each phase.

The model proposes the construction of four houses of quality. The interconnected rows and columns of the four QFD matrices (houses of quality) relate market segments, customers' wants, critical banking processes, critical success factors for banking operations and alternative capacity expansion strategies. More specifically the first house of quality relates key market segments to customer wants. The second house relates customer wants to critical banking processes. The third house relates critical banking services to critical success factors for banking operations and the fourth house relates these factors to alternative capacity expansion strategies. The ultimate goal of these interrelated matrices is to help bank managers in shaping the appropriate, consumer based strategy for improving their capacity and network.

Within the context of this research, this paper presents the results regarding the first house of quality. This house relates key bank market segments to customer wants. For this reason, a field survey was conducted among retail customers of Greek banks in order to identify the key bank selection criteria. These criteria were used as a mean to echo customer needs and wants (voice of customers) from retail banking services. The

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Excellence; 20-22 August; 2008 in Helsingborg; Sweden

225

study adds to the very limited knowledge presently available on the bank selection criteria among Greek retail bank customers.

The rest of the paper is organised as follows: The following section reviews previous research efforts to identify bank selection criteria for retail customers. The next section presents the methodology followed for the survey. Section four presents a description of the QFD model and introduces the first house of quality for this model. Then, a thorough description of the results follows which are finally discussed and briefly compared to those of previous surveys.

2. Literature review

The bank selection criteria used by customers have been largely overlooked in the relevant literature. However, a number of studies have attempted to investigate these criteria, mainly through empirical surveys in different countries and market segments. For example, Anderson et al (1976) presented a determinant attribute analysis of bank selection criteria. Specifically, the analysis assessed the principal factors considered in bank selection decisions and their relative importance. These factors were: Recommendation; Reputation; Availability of credit; Friendliness; Service charges on checking accounts; Interest charges on loans; Location; Overdraft privileges on checking accounts; Full service offering; Parking; Hours of operation; Interest payment on savings account; Special services for youths; Special services for women and New accounts premiums or gifts.

Holstius and Kaynak (1995) surveyed 258 bank customers in Finland in order to determine the importance of selected patronage factors used by Finnish customers in choosing their banks. Results indicated that the most important factors were: reception at the bank; fast and efficient services; lower services charges; friendliness of personnel; and perceived confidentiality.

Kennington et al (1996) studied the impact of marketing strategies on the "new" restructured market of the Polish banking system in order to determine customers' key selection criteria for banks. Results showed that the most important variables influencing customer choices are reputation, price, service and convenience.

Zineldin (1996) investigated the role of positioning in guiding the development of marketing strategy for products/services that compete on a number of dimensions, apart from image. The study showed that other important dimensions include substantive attributes that relate to product performance, price, customer relationship, and service availability.

Mylonakis et al (1998) studied 811 bank customers in Athens, Greece, in order to identify the important bank selection criteria of urban customers - holders of saving accounts - in the Hellenic bank market. The results indicated that Greek customers behave in a similar way to those in more advanced bank markets and economies, who are seeking quality service in a safe, fast, and technologically modern environment. The factors with the highest scores were location convenience and quality of services.

Kaynak and Kucukemiroglu (1992) conducted a study in Hong Kong to define the importance of selection criteria used by consumers in selecting domestic and/or foreign banks. The findings were similar to those of previous surveys. More specifically, the most important criteria were found to be: location, availability of parking space, vault location, loans and mortgages.

A relevant study from the customer satisfaction point of view in the Greek Bank sector can be found in Mihelis et al (2001), which indicates that the main customer

satisfaction criteria from commercial banks consist of: "personnel", "bank products", "image", "service to customers", and "access", while another study related to efficiency measurement – using the SERVQUAL dimensions as perceived measures of quality - was conducted in commercial banks in Cyprus (Soteriou and Zenios, 1999).

Moreover, a number of authors have investigated the effect of specific demographic factors, such as age, on the bank selection criteria. For example, Boyd et al (1994) investigated bank selection criteria in terms of the age of the head of the household. Their findings indicate that for customers aged under 21 years old, reputation plays a significant role in selecting a bank, followed by location, hours of operation, interest rates on savings accounts, and provision of convenient and quick services. Also, Almossawi (2001) studied the bank selection criteria employed by specific customer segments (i.e. college students) of young potential customers (aged 19-24) in Bahrain. Findings revealed that the five most influential factors for bank selection were: convenient ATM locations; availability of ATM in several locations; bank reputation; 24-hours availability of ATM services, and availability of nearby parking space.

Finally, some authors demonstrated the use of the hierarchical approach to analyze consumer preferences for product and service attributes in banks and explored the managerial decision-making implications of the results. For example, Javagli et al (1989) used the Analytic Hierarchy Process (AHP) to assess consumer preferences for bank selection. The results showed that location; reputation; quality; security; and interest on savings (pricing) had the highest rankings. In similar lines, Phuong et al (2000) carried out a survey on bank selection preferences in undergraduates' population. Using AHP, they structured a three level hierarchy decision problem, which showed that undergraduates place high emphasis on the pricing and product dimension of bank services.

In summary, all the above studies designated a number of key bank selection criteria on which banks should focus in order to increase competitiveness and attract a wider consumer base. This list of criteria echoes customers' needs and they should be seriously considered in key bank strategic decisions for those banks that seek to improve quality and customer orientation. Thus, the investigation of these criteria in the Greek context is the starting point of our research.

3. Methodology

For the purpose of our study, in order to investigate the bank selection criteria utilized by Greek customers, a special questionnaire was designed based on a list of selection criteria that was drawn from previous surveys as well as on the professional experience of the authors.

The questionnaire consisted of two sections. The first part elicited demographic information and data regarding the market segment to which customers belonged, which was deemed necessary in order to achieve the objectives of the study. Thus, customers were categorized in six key market segments, based on their most frequently used bank products (this classification is also in accordance with the reports of the Bank of Greece). These were: a) Housing Loans, b) Consumer Loans, c) Credit Cards, d) Savings Deposits, e) Time Deposits, and f) Funds.

In the second part of the questionnaire respondents were asked to rate the relative importance of 43 potential influencing factors regarding their selection decision of

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Excellence; 20-22 August; 2008 in Helsingborg; Sweden

227

commercial bank. Responses were measured using a seven point importance scale ranging from "not important at all" to "extremely important".

The questionnaires were interviewer administered. Twenty trained interviewers participated in the research. The population was drawn from customers of major bank institutions in Thessaloniki, approaching every other customer entering a bank institution, for a period of three weeks. Customers from a variety of bank branches were approached, in an effort to form a representative sample, and they were kindly requested to devote some time for the interview. A total of 549 valid questionnaires were collected out of 1770 customers that were approached, yielding a response rate of 31%. While high response rates enable researchers to generalize their findings, response rates of over 20 per cent are considered acceptable (Yu and Cooper, 1983).

The demographics of the participants are presented in Table I. The sample was equally distributed between men and women and among different age groups, thus forming a representative sample of the whole population.

The survey was conducted between November and December 2007 and the data was analyzed with the use of SPSS. Exploratory factor analysis (EFA) revealed the important dimensions of customer "wants" which are then related to key banking processes (First House of Quality).

Finally, in order to reduce the initial number of 43 bank selection criteria and to identify a smaller set of factors to represent the relationships among these parsimoniously (i.e. to explain the observed correlation with fewer factors) exploratory factor analysis was employed (Tabachnick and Fidell, 1996). Principal component analysis with eigenvalues greater than one was used to extract factors, and varimax rotation with Kaiser Normalization was emloyed. Only absolute values over 0.5 were considered. From the original 43 variables which were used in the questionnaires, only 17 were related to each other in order to form dimensions. All variables are valued high from the participants in the research, based on their mean scores. Other parameters regarding reliability were confirmed. Specifically, we confirmed the determinant correlation value. The value of this parameter must be greater than 0.0001 as defined by the literature. In this study the value is 0.006 and is judged as acceptable.

	Frequency	Relative Frequency	Valid Relative Frequency	Cumulative
Men	266	48.5	49.0	49.0
Women	277	50.5	51.0	100.0
Total	543	98.9	100.0	
Missing	6	1.1		
Total	*549*	*100.0*		
Ages 18-25	163	29.7	29.7	29.7
Ages 26-35	135	24.6	24.6	54.4
Ages 36-50	148	27.0	27.0	81.4
Ages 50-Over	102	18.6	18.6	100.00
Total	548	99.8	100	
Missing	1	0.2		
Total	*549*	*100*		

Table I: Sample Demographics

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Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

228

The Bartlett Test of Sphericity (to test the null hypothesis that the correlation matrix is an identity matrix) and the Kaiser-Meyer-Olkin measure of the sampling adequacy (where a small value of KMO indicates factor analysis is inappropriate) were used to validate the use of factor analysis. The reliability of the extracted factors was assessed using Cronbach alpha coefficient (Cronbach, 1984). The reliability of a measurement instrument determines its ability to yield consistent measurements (Flynn et al, 1994). Reliabily is operetionalized as internal consistency, which is the degree of inter-correlation among the items which comprise a scale (Nunnally, 1978).

The results regarding KMO and Bartlett's test of sphericity are summarized in Table II. Bartlett's test of sphericity was large and the associate significance level was zero. According to Kaiser (1974) values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great, and values above 0.9 are superb. The Kaiser-Meyer-Olkin measure for this study was middling (≈ 0.79) suggesting that factor analysis was appropriate for these data sets. Factor loadings were higher than 0.50 indicating their being conceptualized as pertaining to the same construct (Leech *et al.*, 2005). Moreover, the extracted factors had alpha values over 0.78 confirming their high reliability (Nunnally, 1978).

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,787
Bartlett's Test of Sphericity	Approx. Chi-Square	2728,469
	df	136
	Sig.	,000

Table II: KMO and Bartlett's test

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Excellence; 20-22 August; 2008 in Helsingborg; Sweden

229

4. Results and Discussion

SPSS lists the eigenvalues associated with each linear component (factor) before extraction, after extraction and after rotation. Before extraction, 17 linear components were identified within the data set. The mean scores and standard deviations for these variables are presented in Table III.

	Mean	Std. Deviation	Analysis N
Working Hours	4.1955	1.46115	532
Branches Number	4.5451	1.44577	532
Hours for customers	3.9492	1.65341	532
Effective Service	5.6128	0.74185	532
Errors	5.4981	0.83361	532
Fast correct errors	5.4906	0.86461	532
Deposit Rate	5.1372	1.27040	532
Loans Rate	4.9041	1.51086	532
ATM Network	5.0977	1.37294	532
Debit Card	4.6598	1.66803	532
Flexible Loans	4.4041	1.61450	532
Low Charges	5.2650	1.18658	532
Benefits Accounts	4.3910	1.50622	532
Products for Youths	3.8985	1.79585	532
Location near Home	3.8083	1.61353	532
Location near work	3.7124	3.20751	532
Service good turn	5.3609	0.83328	532

Table III: Descriptive Statistics for important variables

The eigenvalues associated with each factor represent the variance explained by that particular linear component; for example factor 1 explains 26.88% of total variance (Table IV). The first few factors explain relatively large amounts of variance (especially factor 1) whereas subsequent factors explain relatively smaller amounts of variance. In the final part of the Table IV, the rotation sums of square loadings are presented. Rotation can optimize the factor structure and for these data the cumulative relative importance for the six factors is equal in both solutions (first extraction and rotated). However, the distribution of the relative importance in individual factors has changed (for example, after rotation factor 1 accounts for 15.34% of the variance).

Based on the results of factor analysis, the initial set of 43 bank selection criteria was reduced to six underlying factors. The titles of the factors were given based on the "descriptive approach" reflecting the nature of the items that belong to them (Kim & Mueller, 1978). More specifically, the following six factors were extracted (Table V):

The first factor: "Simple and effective service"
The second: "Innovation Products",
The third factor: "Pricing",
The forth factor: "Working Hours",
The fifth factor: "Network Sufficiency"
The sixth factor: "Location"

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Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

230

C o m po ne nt	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of Squared loadings		
	Total	%of Varian ce	Cumul ative%	Total	%of Varian ce	Cumul ative%	Total	%of Varian ce	Cumul ative%
1	4.570	26.884	26.884	4.570	26.884	26.884	2.608	15.341	15.341
2	1.781	10.474	37.358	1.781	10.474	37.358	2.268	13.339	28.681
3	1.700	9.999	47.357	1.700	9.999	47.357	2.171	12.769	41.450
4	1.287	7.570	54.927	1.287	7.570	54.927	1.594	9.377	50.827
5	1.099	6.465	61.392	1.099	6.465	61.392	1.524	8.964	59.790
6	1.070	6.295	67.686	1.070	6.295	67.686	1.342	7.896	67.686
7	0.773	4.549	72.236						
8	0.681	4.005	76.240						
9	0.656	3.857	80.097						
10	0.563	3.312	83.409						
11	0.547	3.215	86.624						
12	0.497	2.922	89.546						
13	0.441	2.596	92.142						
14	0.429	2.521	94.663						
15	0.380	2.233	96.896						
16	0.278	1.636	98.532						
17	0.250	1.468	100.00						

Table IV: Total Variance Explained

The first factor, "Simple & Effective Service" (mean score 5.49), accounted for 15.34 per cent of the variance in the data. The second factor "Innovation Products" (mean score 4.34) accounted for 13.33 per cent, the third factor "Pricing" (mean score 5.10) accounted for 12.76 per cent, the fourth factor "Working hours" (mean score 4.07) accounted for 9.37 per cent, the fifth factor "Network Sufficiency" (mean score 4.82) accounted for 8.96 per cent, and the sixth factor "Location" (mean score 3.76) accounted for 7.89 percent of the variance. These six factors together accounted for 67.68 per cent of the total variance in the data.

Table V shows the exact criteria that were grouped under each factor. "Simple and effective service" consisted of the variables: errors, rapid error correction, effective service and service good turn. "Innovation Products", consisted of the variables: flexible loans, benefit accounts, debit cards and products for younger persons. "Pricing" consisted of the variables: loan interest, deposit interest and low charges. "Working Hours", consisted of the variables: working hours and hours for customers. "Network Sufficiency" consisted of the variables: branches number and ATM network. "Location" consisted of the variables: work location and home location.

	Component					
	1	2	3	4	5	6
Errors	.850					
Rabid error correction	.827					
Effective service	.804					
Service good turn	.599					
Flexible loans		.738				
Benefits accounts		.713				
Debit card		.704				
Products for Youths		.681				
Loans Interest			.852			
Low charges			.739			
Deposit interest			.737			
Working hours				.823		
Hours for customer				.786		
ATM Network					.835	
Branches number					.742	
Work location						.855
Home location						.711

Table V: Rotated Component Matrix

The findings that were derived from the Greek banking sector are consistent to those of previous surveys. Some deviations regarding the specific factor structure are attributed to issues related to the Greek culture and mentality.

In summary, the study confirmed as critical selection criteria for Greek customers: the appropriate pricing, the quality of services, the ability of banks to offer innovative products and services, their operating hours and flexibility, their network and finally their location.

5. Concluding Remarks and Integration of the results into the overall research

The six factors explaining the underlying pattern of the bank selection criteria for Greek customers provide input data for the first house of quality in our proposed QFD model.

This House (Table VI) relates the market segments to the "wants" of the customers. The six factors describing bank selection criteria form the columns of the House and market segments form its rows. Market segments were defined by using the product categorisation of the Bank of Greece, which is an internationally acceptable method.

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Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

232

Bank Selection Criteria

	Market Segment	1 %Market Mix	2 Simple and effective service	3 Innovation Products	4 Pricing	5 Working Hours	6 Network Syffiency	7 Location	8 Current Situation	9 Competitors	10 Goal	11 Improvement Ratio	12 Weighting Factor	13 Normalized Score %	14
1	Housing Loans														
2	Consumer Loans														
3	Credit Cards														
4	Savings Deposit														
5	Time Deposit														
6	Funds														
	Importances														

Table VI: The first house of quality (HOQ)

More specifically, the market segments are shown in the first column on the left side and their "wants" (bank selection criteria) are shown in columns 3 through 8. The six columns on the right (columns 9-14) represent the results of competitive analysis. In each row a comparison between the market share for X bank and the market share of the competitors will be made using a 0-100 scale. This percentage corresponds to how well X bank is doing compared to the competitors in that market segment. Furthermore, column 11 (Goal) will indicate where managers of X bank aspire to be in the future with respect to the competition in each customer segment. These percentages will be determined based on the external and the internal analysis for X bank. The last three columns on the right (12-14) represent the outcomes of the related computations. Specifically, the desired "Improvement Ratio" is calculated by dividing the "Goal" by "Current Situation". Column 13 is computed for each market segment by multiplying the "Market mix" by the "Improvement Ratio". This weighted factor indicates the importance of a particular market segment and is then converted into "Normalised Scores" (column 14) that will be used later in the process to calculate the importance of customer wants. The results of this process will be the input for the next house of quality which will relate customer "wants" with critical "banking Processes".

Finally, non-accurate customer needs' identification continues to be an issue in QFD design services. It has been argued that this is mainly a result of the failure in prioritizing customer requirements and determining correct importance levels of

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Attaining Sustainability From Organizational Excellence to Sustainable
Excellence; 20-22 August; 2008 in Helsingborg; Sweden

233

service requirements. In order to avoid these problems, the Analytic Hierarchy Process (AHP) is utilized to determine the intensity of the relationship between row and column variables in the first house of quality, whereas Analytic Network Process (ANP) plays an important role in determining the intensity of synergistic effects among column variables at each phase (Partovi 2002).
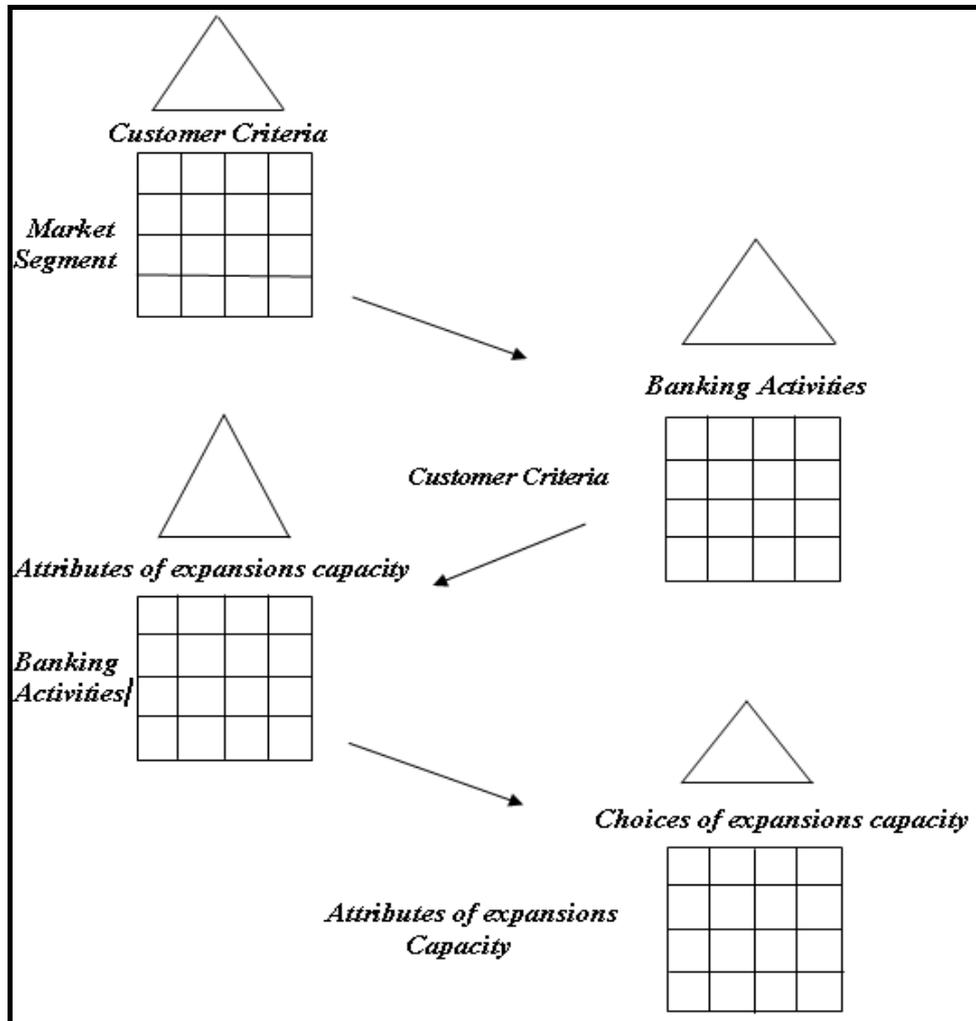
Figure 1: Quality function deployment for capacity expansion in a bank

As a final word, the proposed model, which is based loosely on QFD, (Cohen, 1995; Partovi, 2002, 2006), will ultimately consist of four interrelated matrices (Figure 1): (a) The market segments and selections criteria matrix; (b) The selection criteria and critical banking processes matrix; (c) The critical banking processes and critical success factors for banking operations matrix; and (d) The critical success factors for banking operations and alternative capacity expansion strategies. The choice of specific rows and columns employed in the matrices is determined by external and internal factors applicable to the particular banking organization.

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234

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235

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236