

Service Quality and Customer Loyalty in Software Companies of Iran: A Canonical Correlation Analysis

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Abstract: This study was an attempt to investigate the relationship between service quality and customer loyalty in the software companies in Iran by using CCA. For this investigation, first available literature as well as relationships between service quality and customer loyalty were reviewed. Then data was gathered from the customers of six large software companies in Iran, subsequently, analyzed output by utilizing CCA. The research method used for this article was descriptive-correlation. According to research findings, the service quality is strongly related to the customer loyalty and all dimensions in both sets have a high canonical cross loading in creating a canonical variable in their dimensions. In fact, this study tries to increase the insight of managers about the effects of service quality on customer loyalty in order to improve their performance.

Keywords: Canonical correlation analysis, customer loyalty, service quality, software companies

INTRODUCTION

Needs for research: Developing profitable and long-term relationships with customers is a major objective in business-to-business (b2b) sector. A number of academicians and practitioners consider customer loyalty to have an enormous impact on the performance of a company (Lam *et al.*, 2004). It is argued that there is a growing awareness that, especially in business-to-business markets, firm performance can be improved by concentrating on present customers instead of focusing on attracting new ones (Holmlund and Kock, 1996). Loyal customers build businesses by buying more, paying premium prices and providing new referrals through positive word of mouth with the passage of time (Ganesh *et al.*, 2000).

In a B2B environment, suppliers and/or service providers should be aware of the nature and circumstances of their customers due to the unique characteristics of the customers acting as organizations (Rauyruen and Miller, 2007). On the other hand, the lack of research in B2B service markets has created a need for conceptual and empirical research in this area. Research in services has primarily focused on consumer contexts and B2B product contexts. Compared to retail/consumer services, industrial services are generally more complex, uncertain and characterized by interdependence (Vickery *et al.*, 2004).

Having taken these considerations into account, it appears so important for the service industry to improve service quality. The core value provided by the service industry to customers includes not only the uniqueness

of products, but also various factors involved in service processes (Lin, 2007). Superior service quality enables a firm to differentiate itself from its competitors, to gain a sustainable competitive advantage and to enhance efficiency. The benefits of service quality include increased customer satisfaction, improved customer retention, positive word of mouth, reduced staff turnover, decreased operating costs, enlarged market share, increased profitability and improved financial performance (Ladhari, 2009). The evaluation of quality for services is more complex than that for products because they are by heterogeneous, perishable and intangible. In addition, production and consumption are inseparable (Frochot and Hughes, 2000). Taking these into account, although a plethora of research has been conducted on service quality in the context of customer services, business-to-business services have rarely been addressed (Woo and Ennew, 2005).

The relationship between service quality and loyalty has been investigated in a number of studies; for example, Jayawardhena *et al.* (2007) demonstrated that overall service quality is positively related to loyalty to the organization. One explanation for this could be that greater perceptions of overall service quality would increase the possibility of customers' engagement in behaviours beneficial to the firm, for instance, loyalty to the firm (Boulding *et al.*, 1993),

Browsing through the literature shows that the significance of the issue at hand has given rise to a lot of research on examining the relationship between customer loyalty and its antecedents (Dick and Basu, 1994; Woodruff, 1997; Lam *et al.*, 2004; Aydin and

Ozer, 2005; Rauyruen and Miller, 2007; Molinari *et al.*, 2008; Clotey *et al.*, 2008; Fiol *et al.*, 2009; Lai *et al.*, 2009; Wang, 2010; Gracia *et al.*, 2011; Velazquez *et al.*, 2011). However, three gaps remain and worth pointing out; first, most of the studies have often addressed B2C. Second, studies on customer loyalty in high-tech industries have been few and far between. Third, few research has been conducted on the roles played by dimensions of major factors (i.e., service quality) in relationships with other major factors (i.e., loyalty).

This study aims to evaluate the relationship between service quality and customer loyalty through the canonical correlation analysis on the data obtained from the customers of six large software companies in Iran. This study is an attempt to answer the following questions: Is there any meaningful relationship between Service quality and Customer Loyalty? If there is any meaningful relationship, which one of the dimensions of Service quality and Customer Loyalty has the most and which one has the least impact on creating the meaningful relationship? In fact, this article tries to increase the insight of managers about the effects of Service quality on Customer Loyalty in order to improve their performance.

Customer loyalty: Customer loyalty is considered by many service providers as a significant source of competitive advantage (Woodruff, 1997). Empirical studies demonstrate that keeping a customer can be up to 10 times cheaper than capturing a new one Heskett *et al.* (1990). This importance is accentuated when it is coupled with the claim that the customer's loyalty behavior takes the form of greater collaboration, fewer complaints, less sensitivity to price and, in sum, greater profitability of the customers (Dick and Basu, 1994; Zeithaml *et al.*, 1996; Fiol *et al.*, 2009; Wang, 2010).

Customer loyalty has attracted a considerable attention in the literature in a way that a number of definitions have been proposed for it. Zeithaml *et al.* (1996) define it as a customer's intent to stay with an organization. In another study, it has been defined as a construct that measures the probability that the customer will return and is ready to perform partnering activities such as referrals (Bowen and Shoemaker, 2003). Reichheld (2003) believes that the strongest evidence of customer loyalty is the percentage of customers who are ready to recommend others to a particular product or service. According to Dick and Basu (1994) sustained loyalty is attainable when customers exhibit both positive attitude toward the object and repeat patronage behaviour. Oliver (1997) defines customer loyalty as:

... a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future, thereby causing repetitive same-brand

or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior.

All in all, loyalty conceptualization has two dimensions, namely attitudinal and behavioral. Attitudinal loyalty mirrors a situation whereby different feelings create an individual's overall attraction to a product, service or organization (Fornier, 1994). The attitudinal components of customer loyalty are determined as price sensitivity, brand allegiance and the frequency of purchasing a particular brand (Rundle-Thiele and Mackay, 2001). The other dimension is behavioural which Garnefeld *et al.* (2011) defines as the intention to stay with the service provider in the future.

As Pollack (2009) puts, loyal customers incline to show two behaviors: repurchase behavior and favorable word-of-mouth. Based on the related literature, word of mouth can be interpreted as the frequency or potential to recommend others to patronize the services of a customer's primary company. Repeat purchase, as the other factor, is consistent repeat purchase of a company's product and services. This is demonstrated in the intention to stay with the company for a long term.

Service quality: Service quality is an important issue in service management (Clotey *et al.*, 2008); besides, with the development of the service sector, the notion of service quality has become increasingly significant. Ma *et al.* (2005) plausible definitions for service quality have been suggested, Parasuraman *et al.* (1988) define Customer perceived service quality as a global judgment or attitude related to the superiority of a service relative to competing offerings. According to Bitner and Hubbert (1994) it is the customer's overall impression of the relative inferiority/superiority of the organization and its services Zeithaml and Bitner (1996) see service quality as the delivery of excellent or superior service relative to customer expectations. Gronroos (1984) depicts the concept as "the outcome of an evaluation process, where the consumer compares his expectations with the service he perceives he has received".

Among the related literature two main theoretical constructs seem outstanding. The European school of thought led by the work of Gronroos (1984), undoubtedly serves as the pivot on which studies on the conceptualization of service quality turn. This school of thought put forward that customers perceive service quality from two viewpoints: the technical quality and the functional quality of the service. Technical quality has to do with the question if the service meets

Table 1: Definition of SERVQUAL dimensions (Zeithaml *et al.*, 1990)

Dimension	Definition
Tangibles	Physical facilities, equipment and appearance of personnel
Reliability	Ability to perform the promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy	Caring, individualized attention the firm provides its customers

customers' expectations. The functional quality measures how customers perceive the production and delivery of the service. While this dichotomy is technically viable, both are required to influence customers' service quality evaluations and loyalty behaviors (Richard and Allaway, 1993). The European school has been criticized on the grounds that it excludes the service physical environment. The other conceptualization of service quality- the American school of thought hinges upon the work of Parasuraman *et al.* (1985, 1988, 1994) and Parasuraman *et al.* (1991). This view has been adopted by a number of scholars researching service quality.

Parasuraman *et al.* (1985, 1988) conceptualized service quality as overall assessment of the difference between perception and expectation of service delivery. In this model, which has been regarded as the most prominent, through a series of focus group sessions, 10 dimensions of service quality that are generic and relevant to services in general were uncovered. These dimensions are tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding the customer and access. In later studies, the dimensions were condensed into five ones by using factor analysis: tangibles, reliability, responsibility, assurance and empathy (Parasuraman *et al.*, 1988). The definition of each dimension is presented in Table 1.

Service quality and loyalty: It has previously been indicated that both product quality and service quality are important for customers in relation to customer loyalty and repurchase intentions (Mittal and Lassar, 1998; Eskildsen *et al.*, 2004; Anton *et al.*, 2007; Gracia *et al.*, 2011). Besides, Service quality perceptions are likely to be positively associated with customers' attitudes toward the service provider and their likelihood of remaining a customer (Wang, 2010). This is to the extent that Spreng *et al.* (2009) opine that one negative transaction outcome may not be sufficient to cause the customer to switch if the cumulative levels are sufficiently positive. Therefore, a negative outcome

may be disregarded by the user if it is seen as a mistake that happens rarely. However, a series of consequent negative transaction outcomes may cause the cumulative constructs to become less positive, leading to lower intentions to repurchase from the same supplier. In the same line of argument, Zeithaml *et al.* (1996) conclude that overall service quality is negatively related to complaining behaviour and to switching behaviour, but positively related to a willingness to pay more and to loyalty. In addition, in the context of business-to-business, Narayandas and Rangan (2004) report that a decision maker's favorable evaluations of performance lead the firm to increase its commitment to the supplier and similar findings have been published by Bolton *et al.* (2008).

Quality service has an impact on a client's repurchase intentions. This seems justifiable for quality has been found to be correlated to repurchase intentions in studies throughout the marketing literature (Dawkins and Reichheld, 1990; Zeithaml *et al.*, 1996; Spreng *et al.*, 1996). Spreng *et al.* (2009) advocate this view stating the fundamental proposition in customer satisfaction and service quality research is that high customer satisfaction and perceived service quality result in high customer repurchase intention. Service quality has been indicated to have a significant influence on customers' intention to repeat purchase in both business-to-consumer contexts (Cronin *et al.*, 2000) and business-to-business contexts (Bendapudi and Leone, 2002; Jayawardhena, 2010). Moreover, service quality enhances customers' tendency to buy again, to buy more, to buy other services, to become less price-sensitive and, to tell others about their favorable experiences (i.e., word of mouth) (Venetis and Ghauri, 2000). Therefore, the claim that quality influences word of mouth wouldn't be an extravagant claim (Dawkins and Reichheld, 1990; Spreng *et al.*, 1996; Molinari *et al.*, 2008). To confirm this Boulding *et al.* (1993) reports that overall service quality is negatively related to complaining behavior and switching, but positively related to willingness to recommend.

Proposed model: This proposed model is composed of two types of variables: service quality and customer loyalty as shown in Fig. 1.

Based on the above-mentioned figure, the main research question that will be tried in this study is:

Is there any meaningful relationship between service quality and customer loyalty?

The following questions will be also investigated:

- Is there any correlation between service quality dimensions and customer loyalty dimensions?

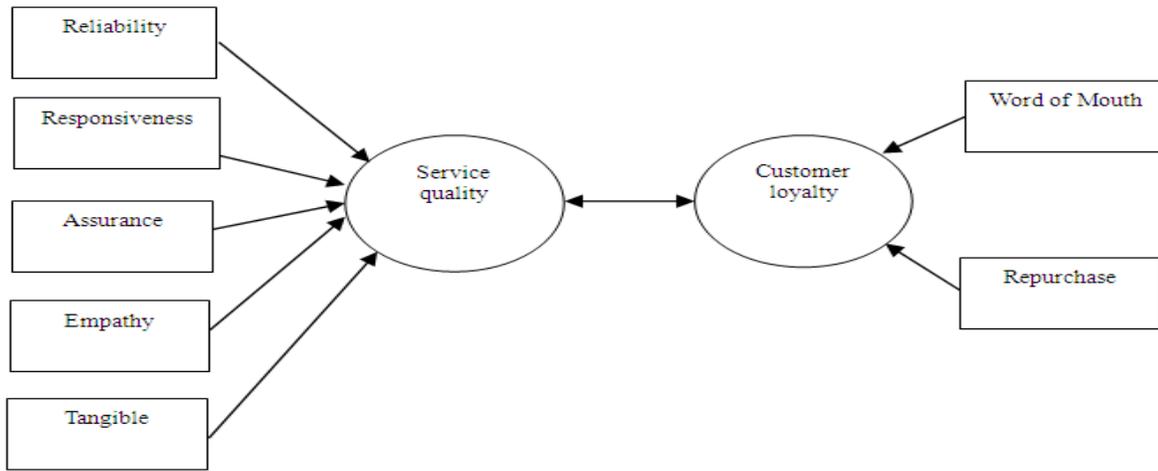


Fig. 1: Proposed model

Table 2: Correlation coefficient between service quality dimensions and customer loyalty dimensions

Correlation coefficient	Reliability	Responsiveness	Assurance	Empathy	Tangible	Word of mouth	Repurchase
Reliability	1						
Responsiveness	0.607	1					
Assurance	0.334	0.570	1				
Empathy	0.502	0.647	0.624	1			
Tangible	0.459	0.442	0.365	0.413	1		
Word of mouth	0.287	0.320	0.194	0.446	0.238	1	
Repurchase	0.359	0.384	0.255	0.603	0.387	0.701	1

- In a set of Perceived service quality, which one has the most and which one has the least impact on creating a meaningful relationship between service quality and Customer loyalty?
- In a set of customer loyalty, which one has the most and which one has the least impact on creating a meaningful relationship between service quality and customer loyalty?

MATERIALS AND METHODS

Sample population of the study included the customers of six large software companies in Iran. Data was gathered from the customers of six large software companies in Iran. The research method used for this article was descriptive-correlation. Two questionnaires were adopted; one from Zeithaml *et al.* (1996) for customer loyalty dimension and one from Kettinger and Lee (1997) and Kettinger *et al.* (2009) for measuring service quality. The formal survey was conducted based on the preliminary survey. This took approximately six months, from July to December 2011 to assess the relations between the sets of service quality and customer loyalty, Canonical Correlation Analysis (CCA) was used. CCA is a multi-variables statistical approach for measuring linear relationship between

different groups of variables. This approach can play an important role in exploratory mean when multi attribute variables have some relations to an analytical category (Lima *et al.*, 2004). CCA is obtaining linear composition of predicting variables that has the highest correlation with linear combination of dimensions variables. These combinations are shown as follow (LeClere, 2006):

$$W = a_1x + a_2x^2 + \dots + a_px^p$$

$$V = b_1y + b_2y^2 + \dots + b_qy^q$$

The number of dependent variables (two) or the number of independent variables (five), whichever is smaller, determines the maximum number of canonical functions. Thus the analysis is based upon the derivation of two canonical functions (Li-Wei and Ness, 1999). It is worth mentioning that SAS 9 software was used to run CCA method.

RESULTS

The results of correlation coefficient: According to the SAS outputs, correlation coefficient between service quality dimensions and Customer loyalty dimensions was shown in the Table 2.

Table 3: Canonical correlation analysis summary

354 = N	Service quality	Customer loyalty
Number of variables	5	2
Extracted variance	54.84%	100%
Redundancy total	17.35%	32.07%
Variables: 1	Reliability	Word of mouth
2	Responsiveness	Repurchase
3	Assurance	
4	Empathy	
5	Tangible	

Regarding the first sub-question, based on Table 2, a meaningful positive correlation can be seen between service quality dimensions and customer loyalty dimensions. Several interesting relationships were detected in Table 2. For instance, 'Repurchase' and 'Word of Mouth' have the strongest correlation and 'Assurance' and 'Word of Mouth' have the least correlation in this table. Also in service quality, 'Empathy' has the most and 'Assurance' has the least correlation with both 'Repurchase' and 'Word of Mouth'.

The results of canonical correlation analysis: Table 3 shows the extracted variance of the data by CCA. The extracted variance for service quality and customer loyalty indicates that 54.84% of internal variations in service quality are covered by canonical roots and also 100% of internal variations in customer loyalty are covered by canonical roots.

The level of significance of a canonical correlation generally considered to be the minimum acceptable

level for interpretation is the 0.05 level, which (along with the 0.01 level) has become the generally accepted level for considering a correlation coefficient statistically significant (Hair *et al.*, 1998). In this study, both canonical correlations are statistically significant ($p < 0.05$). In addition, multivariate tests like Wilk's lambda, Pillai's trace, are also performed (Table 4). The results of these tests also prove that both correlations are significant at 0.0001 levels. Canonical function 1 has been found significant from the significance tests and redundancy values. Function 2 has not been taken into consideration since it is significant but poor redundancy percent with lower loadings. Only the canonical and cross-loading coefficients for the first canonical variable pair are statistically significant (Table 5). This means that the individual contributions of the dimension and predictor variable set in the second canonical function are not significantly different from zero and, consequently, only the first variable pair may be interpreted.

To answer the research question, we refer to the Table 4. The magnitude of the relationships between the service quality and the Customer loyalty sets is determined by the canonical correlation (R_c) and the eigenvalue (λ_i) (Table 5). The R_c of the first canonical function is 0.648 and the eigenvalue is 0.419 meaning that the service quality dimensions as a whole account for more than 41% of the underlying variance in the Customer loyalty dimensions. This can be interpreted as an evidence of a strong relationship between the service quality and Customer loyalty in software companies in Iran.

Table 4: Canonical correlation analysis relating levels of service quality and customer loyalty

Canonical function	Canonical correlation	Canonical R^2	F statistics	Probability
1	0.64800	0.4199	6.7500	0.0010
2	0.11640	0.0135	2.0000	0.9530
Multivariate test of significance	Value	F statistics	Probability	
Wilks' lambda	0.14230	7.6400	0.0001	
Pillai's trace	1.13365	5.6500	0.0001	
Hotelling-lawley trace	5.53861	12.3200	0.0001	
Roy's greatest root	5.15243	19.7200	0.0001	

Table 5: Canonical results

	Canonical variable 1		Canonical variable 2	
	Loading	Cross loading	Loading	Cross loading
Customer loyalty				
Word of mouth	0.7156	0.6704	0.6984	0.1254
Repurchase	0.9997	0.8893	0.0205	0.0712
Extracted variance (%)	75.5800		24.4100	
service quality				
Reliability	0.5559	0.4945	0.3659	0.2107
Responsiveness	0.6155	0.5601	0.5406	0.0068
Assurance	0.3947	0.3477	0.1434	0.1789
Empathy	0.9316	0.8589	0.1810	0.3211
Tangible	0.5966	0.5233	0.4682	-0.0812
Extracted variance (%)	40.8600		13.9700	
Canonical coefficient	0.6480		0.1164	
Redundancy index (%)	0.3174		0.0033	

To carry out interpretation of the CCA, we analyzed the magnitude of the redundancy Total (Table 3). This index shows that the average ability of the set of service quality to explain the variation of the customer loyalty is almost 32%. These results can be interpreted as a measure of ability of the service quality in influencing the set of customer loyalty. Put another way, they can be interpreted as a measure of the capability of the business to obtain better customer loyalty by managing the service quality dimensions. Table 5 represents canonical results of the dependent and independent sets for both functions.

To answer the second and third sub questions, canonical cross loading was used for evaluating the importance of every dimension in meaningful canonical variable. In general, the researcher faces the choice of interpretation of the functions using canonical weights (standardized coefficients), canonical loadings (structure correlations) or canonical cross loadings. Given a choice, it is suggested that cross loadings are superior to loadings, which are in turn superior to weights (Hair *et al.*, 1998).

According to Table 5, all variables in both sets have a high canonical cross loading in creating a canonical variable in their sets. So they are very effective in creating a meaningful relationship between service quality and Customer loyalty. Among the service quality dimensions, 'Empathy' and 'Responsiveness' have the highest effect and 'Assurance' has the lowest effect in creating this relationship. Also among Customer loyalty dimensions, 'Repurchase' have higher effects than 'Word of Mouth' on creating a meaningful relationship. In addition, based on the high level of canonical cross loading in both sets, it can be concluded that service quality dimensions have a positive and strong impact on Customer loyalty dimensions.

Furthermore, for CCA validity, sensitivity analysis was used on independent variables. For this validation, one of service quality variables was eliminated every time and CCA was utilized. Outputs depicted no impression change in construct coefficient of variables. So we assured that data were valid.

DISCUSSION

This study was an attempt to investigate the relationship between service quality and Customer loyalty in the software companies in Iran by using CCA. For this investigation, first available literature, relationships between service quality and Customer loyalty and literature review were studied. Then Data was gathered from the customers of six large software companies in Iran, subsequently, analyzed output by

utilizing CCA. In fact, this paper presents a new perspective for examining the linkages between the service quality and customer loyalty dimensions in depth.

Most of the studies in the literature have often addressed B2C; besides, studies dealing with customer loyalty in high-tech industries and the roles played by dimensions of service quality in relationships with loyalty have been scarce. The study at hand was an attempt to bridge these gaps.

According to research findings, service quality is strongly related to the customer loyalty and all dimensions in both sets have a high canonical cross loading in creating a canonical variable in their dimensions. Therefore, they are very effective in creating a meaningful relationship between service quality and customer loyalty. So, a balanced approach in the development of the service quality dimensions makes it possible to maximize the correlation between service quality dimensions and customer loyalty dimensions. Hence, companies should not focus on few dimensions of service quality only; rather they also should pay attention to every dimension, considering the service quality as a whole.

This is consistent with the studies into the relationship between service quality and loyalty such as Anton *et al.* (2007), Gracia *et al.* (2011), Zeithaml *et al.* (1996), Eskildsen *et al.* (2004), Jayawardhena *et al.* (2007) and Boulding *et al.* (1993). Since this paper confirms existence of a positive correlation between 'service quality' and 'customer loyalty' when all the dimensions are considered simultaneously, it extends those conclusions.

Also when we assume a causal approach between the service quality and Customer loyalty, the "service quality" explains, on average, 32% of the variance in the 'customer loyalty' in the mentioned industry. These results can be interpreted as a measurement of the ability of the service quality to exert an influence on the Customer loyalty.

Accordingly the results show that, among service quality dimensions; 'Empathy' and 'Responsiveness' have the highest impact on creating a meaningful relationship. So is the 'Repurchase' on customer loyalty. It seems that the reason of high impact of 'empathy' on creating a relationship between service quality and loyalty has been that in the context of B2B a long-term relationship with service provider is important for customers. In addition, taking the complexity of them in B2B into account, customers expect service providers to know their characteristics.

Another important conclusion is that the exploration of the relationships between the elements of the 'service quality' and 'customer loyalty' dimensions is

facilitated through the use of a multivariate technique such as CCA.

All in all, practitioners are recommended that they should consider service quality in customer loyalty programs. Among other dimensions of service quality, responsiveness and empathy need more attention since they play key roles in boosting customer loyalty.

The findings should be interpreted with caution due to the sample includes customers which are the form of six large software companies in Iran. Studies in other countries should be conducted to ensure the reliability of the results obtained. Also, there might be other variables and moderators (e.g., customer perceived value, customer satisfaction, corporate image, etc.) that might influence the relationship between service quality and customer loyalty. Despite those limitations, however, the study does shed light on a very important issue, the study of the relationship between service quality and customer loyalty in software companies in Iran. On the whole, the findings of this study increase the insight of managers about the effects of service quality on customer loyalty in terms of developing loyalty programs in order to improve their performance.

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