

The Effect of Interaction and Product Quality on Customer Satisfaction: Multi-Group Structural Equation Modelling

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Abstract: The aim of this article is to investigate the differences in the effect of personal interaction quality and product quality on customer satisfaction between supermarkets and discount markets. To evaluate the data and test the measurement and structural invariance, multi-group structural equation modelling is used. The data used in this study were comprised of 52.6% supermarket customers and 47.4% discount market customers. Our results show strong measurement invariance of the scale. There is no significant difference in the construct validity of product and personal interaction quality and customer satisfaction between supermarkets and discount markets. The product and personal interaction quality scores are significantly higher in supermarkets than in discount markets; however, the customer satisfaction scores are significantly lower in supermarkets. The product and personal interaction quality have a significant positive effect on customer satisfaction for both the supermarkets and discount markets. Significant differences are found between the two types of markets in terms of the relationship between personal interaction quality and product quality on customer satisfaction. While the direct effect of product quality on customer satisfaction is higher in discount markets, the direct effect of personal interaction quality on customer satisfaction is the same in discount and supermarkets.

Keywords: customer satisfaction; measurement invariance; multi-group structural equation modelling; personal interaction quality; product quality

1 INTRODUCTION

Today's rapidly increasing competition, constantly changing technological developments and consumer demanding businesses are pushing to develop more intensive and customer-focused management strategies. Just as in all sectors, the retailing sector is in harmony with these developments. As a requirement of modern marketing, customers have become the focus of business management strategies. Starting from the research and development stage, the companies place customer satisfaction (CS) in the centre of all business activities such as production and sales [1]. Studies show that satisfying and retaining existing customers will be more profitable and less costly than acquiring new customers. In this case, it is becoming very important for businesses to satisfy the customers and make them loyal customers. Satisfied customer will become a loyal customer over time [2]. To ensure customer satisfaction, businesses must know customer expectations and develop products and services in line with these expectations.

The quality of the products and services will motivate the purchasing by increasing the satisfaction. The first stage of improvement and development of product and service quality is the measurement of current qualification. If accurate measurements can be made about the current quality level, more effective decisions can be made about the steps to be taken. Therefore, measurable factors are needed to enable customers to better understand their experience with the product or service they are receiving. Measuring the service quality of enterprises operating in the service sector is much more difficult than the operations in the manufacturing sector, since the service is an abstract concept and impossible to be directly touched, seen and felt. In the case of supermarkets and discount markets, customers' perceptions of service and product quality need to be explored. There may be differences between the product variety offered to customers and the quality and quantity of service offered in retail environments. Supermarkets have an advantage over their competitors with the policies they apply to attract

customers, the diversification of prices and a wide range of products. In contrast, discount markets offer a limited product and limited service with a low pricing management policy. These different characteristics of the markets cause differences especially in customer perceptions and service and product quality behaviours [3]. It is very important to test the measurement invariance of scales before comparing the markets. Measurement invariance evaluates the psychometric equality of a structure across groups or across time. Measurement non invariance indicates that a construct has a different structure or meaning to different groups or on different measurement situations in the same group. Thus the construct cannot be meaningfully tested or interpreted across groups or across time. As a result, in this study the measurement invariance was investigated. And then, the differences in the effects of product quality (PQ) and personal interaction quality (PIQ), which were the most important dimensions of service quality, were investigated on CS between supermarkets and discount markets using Multi-group Structural Equation Modelling (Multi-group SEM).

2 THEORY AND HYPOTHESES

Due to severe competition from new actors that enter the retail sector and increase the number of new providers, supermarkets adopt different customer-oriented strategies so they can be distinguished from other competitors and control the sector. In today's highly competitive marketing environment, CS has become an important factor for any actor in retail sector, especially discounts and supermarkets [4].

In the marketing literature, CS is a well-known and established concept. CS is an evaluation of the perceived discrepancy between a customer's expectations prior to purchase and the actual performance of the same product or service after it has been received [5, 6]. It is an affective reaction to the overall service experience [7-9]. In other words, CS represents the relationship between customers' perceived performance of a product or a service and their expectations [10]. CS can be defined as the cognitive and

affective reaction to the long-term service experiences [11]. Accordingly studies in the service management literature have shown that service quality is an antecedent of CS [12-16].

The quality of goods and services that are sold in markets is an important factor that influences CS. Quality is the ability of a product to meet certain wants of customers [17]. Perceived quality is a consumer's evaluation of products or brands that satisfy a consumer's expectations [18]. For retailers, and especially supermarkets, perceived PQ is an appropriate PQ approach [19]. Garvin (1987) defines "product characteristics" in terms of qualities such as the shape, colour, size and design of products [20]. The quality of a product is generally measured by the product's features and benefits as well as its ability to satisfy required needs [17]. It is considered to be one of the important determinants of customer satisfaction. It has been observed that PQ and service quality are modelled as two separate factors in studies that have been conducted in Turkey [21-24].

The freshness of the product, the variety of the brand for the same product, hygiene, the availability of new products, the availability of new brands, the availability of products with expiry date, the ease of returning and changing products and the availability of expensive branded products exert influence on the quality of the products sold in the market. In addition to this, the quality and diversity of products bearing market brands are also of influence on product quality.

Supermarkets offer a wide range of products with a variety of pricing whereas discount markets offer a limited number of brands and product types with a low pricing management policy. This difference between the discount markets and supermarkets creates differences in product quality. Thus, we propose:

H1: PQ has a direct effect on CS within supermarkets and discount markets.

H2: The direct effect of PQ on CS is invariant between discount market customers and supermarket customers.

There has been substantial research in the definition and measurement of service quality [25, 26], and no consensus has yet been attained for these terms [14, 25]. Perceived service quality can be defined as the result of a comparison between the expectations of a service and the perceptions of the actual performance of that service [27].

Dabholkar et al. [28] studied important dimensions of service quality within the retail sector and they proposed a Retail Service Quality Scale (RSQS) with five hierarchical dimensions (physical aspects, reliability, PIQ, problem solving, policy). RSQS has been used in several studies, such as on supermarket consumers in Singapore [29], a department store in Hong Kong [30], the cultural context for discount stores across the USA and South Korea, apparel stores in India [31], departmental stores, discount stores, and supermarkets in Kazakhstan [32], a window curtain retailer in Hong Kong [33], discount stores and supermarkets in Turkey [3], apparel stores in Malaysia [34] and hypermarkets in the Kingdom of Saudi Arabia [35].

The quality of the products sold in the discount markets, as well as the quality of the services offered, especially the staff behaviour, affect customer satisfaction [36]. Supermarkets try to earn competitive advantage by offering good customer service. Unlike supermarkets, in

discount markets very limited customer service is offered (there will be only one cashier in a simpler store atmosphere).

In terms of CS, differences between the two types of markets create differences in service quality. Especially personal assistance service for customers in the discount markets is not meeting the service expectation [3]. Sales personnel are more influential than the other dimensions of service quality on CS in discount markets. Vázquez et al. [37] and Anselmsson and Johansson [38] concluded that the most important dimension of service quality and satisfaction is PIQ. Sales persons' knowledge of new products, prices, and other store offerings plays a pivotal role in a customer's service experience [39]. Das et al. [32] and Yuen and Chan [33] found that helpful professional staff have a strong impact on customer satisfaction. Das et al. [32] and Kitapçı et al. [16] found that personal interaction has the strongest effect on returning customers to the retail store. Starting from this point, the current article analysed the effect of PIQ, which represents the dimension of service quality, on the CS between supermarkets and discount markets in Turkey.

H3: PIQ has a direct effect on CS within supermarkets and discount markets.

H4: The direct effect of PIQ on CS is invariant between discount market customers and supermarket customers.

3 RESEARCH METHODOLOGY

3.1 Conceptual Model

Supermarkets and discount markets have distinct characteristics. The supermarkets are a form of retailing in which different types of the same product group are used, high self-service is used, a competitive price policy is applied, and multiple writers are paid in cash [40]. Discount retailers are a form of retail that offers a wide range of products through low prices and limited customer service. In discount markets, because of high sales volume, customer self-service shopping and very few customer services, products can be offered at a low price [41].

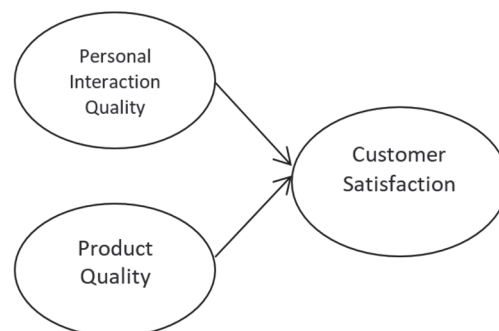


Figure 1 Conceptual model

The first notable difference between these service organizations is the quality of personal service that they offer. The second notable difference is the quality of products in these markets. Based on these differences, the conceptual model that was tested in this paper consists of two major latent constructs: PIQ and PQ that affect CS. The measurement items of the latent constructs are shown in Tab. 2. As seen in Fig. 1, in our proposed model, PIQ

and PQ have a direct effect on CS within supermarkets and discount markets.

3.2 Characteristics of Sample and Data

We tested the presented proposed conceptual model on data that were collected from 855 customers who shop at 57 stores that belong to two Turkish supermarket and discount market chains in Istanbul. The data were obtained by applying a questionnaire to 15 customers for each of the 57 stores that are located in 31 different districts in Istanbul. Hierarchical sampling was used for which the 57 stores are the primary sampling units, and the 15 customers from each store are the secondary sampling units.

Table 1 Demographic profile of the respondents

	Discount Market		Supermarket	
	n (450)	%	n (405)	%
Gender				
Female	136	33.6	150	33.3
Male	269	66.4	300	66.7
Marital status				
Single	151	37.3	168	37.3
Married	254	62.7	282	62.7
Education				
Less than high school	211	52.1	146	32.5
High school	128	31.6	161	35.8
Vocational school (2 years) or Bachelor's degree	55	13.6	119	26.4
Master's or Doctoral degree	11	2.7	24	5.3
Age				
18 - 24	79	20.7	77	17.3
25 - 35	109	28.5	149	33.4
36 - 45	98	25.7	97	21.7
46 - 55	57	14.9	76	17.0
56 - 65	27	7.1	32	7.2
66 - 75	11	2.9	13	2.9
76 - 85	1	0.3	2	0.4
SES				
A	17	4.2	26	5.8
B	56	13.8	118	26.2
C1	101	24.9	101	22.4
C2	97	24.0	121	26.9
D	134	33.1	84	18.7

A face-to-face interview survey was conducted to collect the data. The mean age of the respondents was 37.3 years, 66.5% of the respondents were male and 33.5% of the respondents were single. Tab. 1 gives an overview of the demographics of the sample.

As seen from Tab. 1 the demographic profile of the respondents in terms of gender, marital status and age was found similar in the two types of markets. However some remarkable differences occurred between the discount markets and supermarkets regarding education level and social-economic status (SES) of the customers. Supermarket customers were seen as highly educated, with university degree or more (31.7%) compared to customers in the discount market (16.3%). In supermarkets, the percentage of the high (AB) segment (32.0%) was higher than the percentage in the discount markets (18%), and the percentage of the low (D) segment (18.7%) was less than in the discount markets (33.1%), while the percentage of the medium (C1C2) segment was nearly equal at supermarkets (49.3%) and discount markets (48.9%).

4 DATA ANALYSIS AND RESULTS

4.1 Internal Consistency and Validity Test

Exploratory factor analysis (EFA) was conducted on a total of 30 items to determine the factors. The value of the KMO Measure of Sampling Adequacy was 0.975 (it should be larger than .5) which indicated that factor analysis was appropriate. Bartlett's test of sphericity was rejected ($p = 0.000$) and it was concluded that data set was appropriate for factor analysis. The results that were obtained from the EFA using Principal Components Factoring with Promax rotation show three significant factors that had an eigenvalue greater than 1 on all the construct items and a second eigenvalue that was lower than 1. The results showed that 77.206% of the total variance was accounted for by these three factors.

Table 2 Factor loadings for the items and Cronbach's α

	Factor Loadings	Cronbach's α
PIQ [28, 45]		
PIQ1. Staff have clean and neat appearance.	0.85	0.974
PIQ2. Staff are concerned with customers.	0.89	
PIQ3. Staff have knowledge about products and campaigns.	0.86	
PIQ4. Staff have enough experience to help customers.	0.89	
PIQ5. Staff are affable.	0.89	
PIQ6. Staff are polite and respectful.	0.89	
PIQ7. Staff are easy to reach.	0.89	
PIQ8. Easy to communicate with staff.	0.89	
PIQ9. Staff give understandable responses to questions.	0.90	
PIQ10. Staff are reliable.	0.86	
PIQ11. There is a sales person who is ready to help at any moment.	0.82	
PIQ12. Staff strive to understand my needs.	0.85	
PIQ13. Staff service friendly and sincerely.	0.86	
PQ [21, 19]		
PQ1. The products of vegetable-fruit department are very high in quality.	0.86	0.955
PQ2. The products of meat-fish department are very high in quality.	0.87	
PQ3. Hot/frozen ready-made foods are very high in quality.	0.90	
PQ4. The products of bakery department are very high in quality.	0.91	
PQ5. Packaged-frozen products are very high in quality.	0.90	
PQ6. Not packaged dried foods (dried beans, pasta, grain) are very high in quality.	0.83	
PQ7. Milky products are very high in quality.	0.84	
PQ8. In general, products of this supermarket are very high in quality.	0.86	
CS [46]		
CS1. I think, shopping at this supermarket is a good decision.	0.88	0.965
CS2. This supermarket takes CS as a goal.	0.88	
CS3. I am satisfied with preferring this supermarket.	0.90	
CS4. I am satisfied with shopping at this supermarket.	0.92	
CS5. In general, I am satisfied with this supermarket.	0.89	
CS6. I am satisfied with pricing to PQ by this supermarket.	0.87	
CS7. I am really satisfied with this supermarket.	0.90	
CS8. I am satisfied with the service that I received from this supermarket.	0.90	
CS9. I am satisfied with the quality of products in this supermarket.	0.80	

The factor loadings for the items were illustrated in Tab. 2. As shown in Tab. 2, all the item loadings were excellent [42]. All the items were loaded on the related factors which support convergent validity [43]. There was no item with noticeable cross loadings that might cause the discriminant validity to be questionable. In sum, there were no potentially problematic items that might subsequently cause a poor CFA fit. The internal consistency of the measures was assessed with the Cronbach's alpha and was found to be more than the suggested threshold of 0.60 [44]. Thus, the scale was accepted as reliable.

Before comparing the markets, it was important to ensure that the proposed model provided a good fit for both groups. Thus, the first step was to test whether the proposed baseline three-factor model fitted the data from each group.

CFA was applied to the supermarkets and discount markets separately to validate the baseline model in Mplus 6.1. To evaluate the proposed measurement model fit, we used chi-square (χ^2/df), Root Mean Square Error of Approximation (*RMSEA*), Comparative Fit Index (*CFI*) and Standardized *RMR* (*SRMR*). The results showed an acceptable fit for the discount markets ($\chi^2 = 1211.322$; $df = 402$; $\chi^2/df = 3.01$; *RMSEA* = 0.071, *SRMR* = 0.028; *CFI* = 0.944) as well as for the supermarkets ($\chi^2 = 1652.428$; $df = 422$; $\chi^2/df = 4.11$; *RMSEA* = 0.083; *SRMR* = 0.049; *CFI* = 0.917), which showed that the three-factor model of CS was supported in both markets.

After the baseline model had been determined for each sample, a configural model was tested for whether the proposed structure of CS would be equal across the two groups by Multi-Group Confirmatory Factor Analysis (MGCFA). The model included the same number of factors and the same pattern of fixed and free factor loadings that are specified in each of the markets. As shown in Tab. 3, Model 1 provided acceptable fits for

the data, which indicated that the factorial structure of the PIQ, PQ and CS was equal across discount and supermarkets.

The configural model was served as a baseline model for comparisons in factorial invariance. After the configural invariance was supported, the factor coefficients were then constrained to be equal across all the groups to test for metric invariance. Maximum likelihood estimation (ML) was used for all the analyses; thus, the model comparisons were conducted with LR tests. Model 2 had an acceptable fit indices (e.g., $\chi^2/df < 5$; *RMSEA* < 0.08; *CFI* > 0.90); but the chi-square test between the configural model and the metric invariance model indicated that all the factor loadings invariances were rejected. Next, we examined the partial metric invariance model.

In model 3, some factor loadings were invariant across groups by allowing the factor loadings for items PIQ3, PIQ6, PIQ7, PQ8, CS3, CS4, CS5, CS7 and CS9 to differ between markets. The partial metric invariance model fit was found to be acceptable and did not result in a significant decrease in fit relative to the configural model ($\Delta\chi^2 = 10.273$, $df = 18$, $p = 0.9226$). In addition, ΔCFI was less than or equal to 0.01. The fact that partial metric invariance was held indicated that the items were related to the latent factors equivalently without 9 items.

Partial metric invariance held, the partial scalar invariance model (Model 4) was examined. Some factor loadings and some item intercepts were constrained to be equal across groups. The partial scalar invariance model fit was found to be acceptable. We also conducted LR test with the current model ($\Delta\chi^2 = 16.840$, $df = 18$, $p = 0.5341$) and change in ΔCFI was smaller than 0.01, which indicated that partial scalar invariance was held. Thus, both the factor loadings and the item intercepts without 9 items of CS, PQ and PIQ were invariant across discount markets and super markets.

Table 3 Fit indices for invariance tests of measurement model

Model	χ^2/df	<i>RMSEA</i>	<i>CFI</i>	<i>SRMR</i>	$\Delta\chi^2$	Δdf	<i>p</i> value	ΔCFI
Recommended value	$\leq 5.00^a$	$\leq 0.08^b$	$\geq 0.90^c$	$\leq 0.1^d$	-	-	-	$\leq 0.01^e$
Model1. Configural Model	3.56	0.08	0.93	0.04	-	-	-	-
Model2. Metric Model	3.55	0.08	0.93	0.05	82.62	27.0	0.00	0.00
Model3. Partial Metric Model	3.50	0.08	0.93	0.04	10.27	18.0	0.92	0.00
Model4. Partial Scalar Model	3.44	0.08	0.93	0.04	16.84	18.0	0.53	0.00
Model5. Partial Error Variance Invariance Model	3.58	0.08	0.93	0.05	194.69	22.0	0.00	0.01

After strong measurement invariance held, item variance invariance was examined. The tests of differences in fit between model 5 and model 4 ($\Delta\chi^2 = 194.690$, $df = 22$, $p = 0.000$) indicated that the item variances were non-invariant across the two groups. If the error variances are not equal, the groups can still be compared on the latent variable; but this is measured with different amounts of error between groups.

We demonstrated strong measurement invariance (partial metric and scalar invariance) of the scale with 3 factors and 30 items across the two groups; thus, we could proceed to structural invariance. When we investigated the structural invariance, we only tested the factor mean invariance using the method that was recommended by Vandenberg and Lance [47] after the measurement invariance was confirmed.

4.2 Multiple Group-Invariance Analysis of Structural Model

To compare the relationship between the latent variables, we needed to measure invariance. Therefore, after obtaining partial invariance measurement, by testing the equality or invariance of the path coefficients across the two types of markets, we used a Multi-Group SEM (MGSEM) model. Before comparing the path coefficients across the groups, each of the two groups was modeled separately. The discount market model was fitted data acceptable ($\chi^2/df = 3.01$; *RMSEA* = 0.071; *SRMR* = 0.028; *CFI* = 0.944). PIQ (0.364; $p = 0.00$), and PQ (0.562; $p = 0.00$) had a significant positive effect on CS. The supermarket model also was fitted data acceptable ($\chi^2/df = 4.11$; *RMSEA* = 0.083; *SRMR* = 0.049;

$CFI = 0.917$). As in the discount market model, PIQ (0.274; $p = 0.00$) and PQ (0.287; $p = 0.00$) had a significant positive effect on CS in the supermarket model. First, we investigated the configural SEM model that modelled the two groups simultaneously without any equality constraint on the structural path coefficients. The SEM model of the two groups, which was defined as a baseline model, showed an acceptable fit for the data ($\chi^2/df = 3.42$; $RMSEA = 0.075$; $SRMR = 0.041$; $CFI = 0.931$).

As the MGSEM model was supported, the direct effect of PQ on CS was then restricted across the groups. The Wald test ($\chi^2 = 17.789$; $df = 1$; $p = 0.00$) indicated that H2 could be rejected. Thus, the direct effect of PQ on CS was non invariant for discount market and supermarket customers. The direct effect of PQ on CS was higher in discount markets (0.573, $p = 0.00$) than in supermarkets (0.275, $p = 0.00$). Therefore, discount markets should particularly focus on the quality of products for higher satisfaction.

After that, the direct effect of PIQ on CS was constrained to be equal across the groups to test H4. The Wald test ($\chi^2 = 0.943$; $df = 1$; $p = 0.33$) indicated that H4 could not be rejected; that was, the direct effect of PIQ on CS was invariant for discount market and supermarket customers. PIQ had a positive effect on CS both for super markets and discount markets; however it did not have a discriminating competitive advantage between these two types of markets. The results that were obtained from this research were found to be in line with the studies that were conducted by Anselmsson and Johansson [38], which showed that PIQ had a positive effect on CS for both supermarkets and discount markets. Thus, both types of market should improve their performance on the PIQ.

5 DISCUSSION AND CONCLUSIONS

The main purpose of this research was to investigate the effects of PQ and PIQ on CS across supermarkets and discount markets conditional to the sufficient degree of measurement invariance. Until now, little research had compared only the customer perception of the service quality of two types of grocery retailers. This paper compared the customer perception of PQ and PIQ for supermarkets and discount markets. In addition, it also compared the effect of these determinants on the CS between these two types of stores. This research contributes to the field of marketing management strategies both because it shows that the proposed CS model is comparable and because it shows the effects of PQ and PIQ on CS separately between these two markets.

In this study, firstly the measurement invariance was investigated. This empirical study concluded that there was no significant difference in the construct validity of PIQ, PQ and CS between supermarkets and discount markets. Thus, the proposed scale that was adopted by the previous researches was valid and applicable in both types of markets. After that, we compared the perceptions of the customers: the supermarket customers gave more importance to PIQ and PQ than the discount market customers. The findings suggested that there was no significant difference in the structural strength of quality constructs on CS between the two types of markets. PIQ

and PQ had a significant positive effect on CS for both the supermarkets and discount markets. However, the direct effect of PQ on CS was higher in discount markets than it was in supermarkets. In conclusion, the main competitive advantage to satisfy customers for discount markets is the quality of product which includes a wide variety, quality, and well-known brands.

Managers must run intense marketing campaigns based on product quality for attracting customers to their own discount markets. These campaigns will really help customers attract their own discount markets. The general expectation of the discount market customers is that you can find all the products you need in the market. For this reason, numerous and high quality product variety should be kept in the market at the price level that customers should be willing to pay. In this way, an increment in the amount of customers' shopping will be achieved through increasing satisfaction. In addition, the direct effect of PIQ on CS was constrained to be equal across both types of markets. It cannot be assumed that PIQ evaluation differs based on the type of markets. Hence, both discount markets and supermarkets should improve their personal interaction quality performance. This study results highlight the importance of developing personal interaction quality to satisfy customer at two types of markets. The market personnel should work on their attitudes towards the customers. Staffs are more concerned, kindly and patient with customers. Staffs are the face of the market and their role in shopping experience is great. According to the results of the research market staffs should be trained and motivated to approach all customers with the same sensitivity and strive to be satisfied with the market. Continuous training programs on product information and sales techniques can be recommended to improve the personal interaction dimension [33].

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