FACTORS IMPACTING CUSTOMER SATISFACTION IN FOOD TESTING SERVICES: A CASE STUDY IN QUALITY ASSURANCE AND TESTING CENTER 1

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Abstract: ***Purpose: This research is to investigate the factors that impact customer satisfaction in the competitive food testing industry to help companies improve their services and attract and retain customers.***

Theoretical Framework: This study examines factors influencing customer satisfaction in food testing services, including price, corporate image, service quality, employee behavior, and service innovation. The framework incorporates previous research models to understand customer expectations and perceptions.

Design/Methodology/Approach: The research employed a quantitative methodology, and a self-structured questionnaire was developed and administered to a convenience sample of 150 customers who use the food testing service of Quality Assurance and Testing Center 1 (Quatest1). The gathered primary data was screened, processed, and analyzed using SPSS.

Findings: The results indicated that while reasonable price factors, corporate image, service quality, employee behaviors, and service innovation significantly influence customer satisfaction, in which service quality and affordable price have the most significant impact.

Research, Practical & Social implications: To improve customer satisfaction and reputation, Quatest1 should prioritize service quality, maintain reasonable prices, innovate testing experience, promote ethical and professional behavior, and monitor service performance.

Originality/Value: The current paper study on factors that impact customer satisfaction in food testing services. The study's findings reveal that service quality and affordable prices are the most significant factors affecting customer satisfaction. The study's research model and self-structured questionnaire can be helpful for future research in this field. The results can aid conformity assessment companies in improving their services, attracting and retaining customers, and maintaining competitiveness in the market.

• Keywords: *customer satisfaction, food testing service; quality assurance.*

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1. Introduction

Food safety is a major concern for the public, with high levels of anxiety being expressed following high-profile food safety incidents. The importance of food testing has therefore become paramount, with demands from both authorities and consumers for assurance that food is free of physical, chemical, and biological hazards. The significance of food testing is highlighted by the report on the global burden of food-borne diseases released by the WHO, which suggests that the level of food-borne illnesses is comparable to the "big three" diseases - HIV/AIDS, tuberculosis, and malaria (Havellar et al., 2010). The critical role of food testing in ensuring the safety of food cannot be overstated, as it helps to build trust among consumers.

While many authors have studied various factors that affect customer satisfaction, such as service quality, employee behavior, expertise, brand image, and billing accuracy (Rana & Medha, 2013; Gustafsson et al., 2005; Dhurup et al., 2006), there is a lack of research in Vietnam, particularly in relation to food testing services. Although some companies have conducted surveys to gauge customer opinions on service quality, these surveys typically focus on all the services provided by the companies, rather

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than specifically on food testing. Therefore, this study aims to identify the factors that influence customer satisfaction in the food testing service of Quatest1, and to evaluate the relationship between these factors and customer satisfaction. The study will also provide recommendations for improving customer satisfaction.

2. Literature review

The definition of customer satisfaction remains a topic of lively debate among marketing scholars despite extensive research in the field (Chauhan & Limbad, 2013; Fornell, 1992; Biesok & Wyród-Wróbel, 2011; Baruk, 2002). While some scholars argue that it is a measure of how well a firm's products and services meet or exceed customer expectations, others claim that it encompasses the overall purchasing experience, including pre-and post-sales interactions. However, it is widely accepted that maintaining customer satisfaction is crucial for a company's success, as customers play a vital role in determining a firm's market position and delivering its products or services (Fornell, 1992; Deng et al., 2009; Al-Msallam, 2015). Additionally, a significant increase in customer satisfaction has been linked to higher returns on investment, productivity growth, market value-added, and stock market performance (Anderson et al., 1994, 1997, 2004; Fornell et al., 2006).

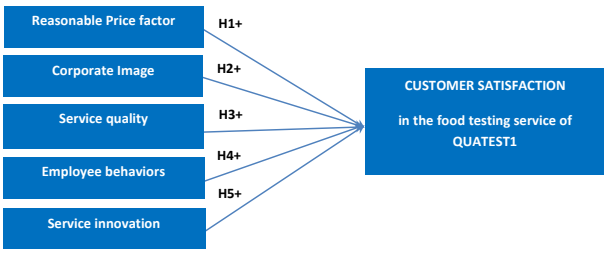
The concept of services has undergone a significant shift over time, with varying definitions offered by scholars (Solomon et al., 1985; Lovelock, 1991; Zeithaml & Bitner, 2003; Kotler & Armstrong, 2001; Quinn & Gagnon, 1986). However, services are generally understood as activities, deeds, processes, and interactions that provide benefits or satisfaction and are offered for sale in connection with the sale of goods (American Marketing Association, 1960).

In the conformity assessment industry, testing services are crucial in ensuring product quality and compliance with standards and regulations (Kim, 2013). Testing is also a practical tool for manufacturers and service providers to meet customer demands without incurring costs from quality failures in the market. It provides a measure for regulatory bodies to enforce safety and environmental laws and support state inspection when necessary. The importance of testing services has given rise to numerous food testing providers, highlighting the need to capitalize on opportunities arising from market changes.

Customer satisfaction is a well-researched area, with studies showing the impact of service quality on customer satisfaction in various sectors, including mobile banking (Khadim & Islam, 2022), online transactions in home brokers (Jorge et al., 2014), and retail banking (Ahmad Jamal & Kamal Naser, 2003). For instance, Jorge et al. (2014) found that perceived security and trust strongly influenced customer satisfaction with online home broker services. Jamal and Naser (2003) found a strong correlation between service quality and customer satisfaction in the retail banking sector but did not convincingly demonstrate the link between tangible aspects of service environments and customer satisfaction. Rana's (2013) study on the satisfaction level of customers of fast-food retailers in Dhaka City indicated that menu variety, social status, cleanliness, and price significantly impacted customer satisfaction, with menu variety being the most crucial factor.

After analyzing the studies mentioned above, it is evident that several factors contribute significantly to customer satisfaction in the service industry. These factors include Reasonable Price, Corporate Image, Service Quality, Employee behaviors, and Service innovations. Accordingly, a model was developed to assess the factors influencing customer satisfaction in Quatest1's food testing services. The model identified five key determinants that significantly impact customer satisfaction.

Figure 1: Conceptual model of the study



Source: Prepared by the authors

Kotler and Armstrong (2012) defined price as "the sum of all the values that customers exchange for the benefits of having or using the product or service." This definition acknowledges that the price of a product or service can vary depending on the sacrifices made or benefits received. Bei and Chiao (2001) also noted this variation in their research cited by Razak (2016). The role of price in determining customer satisfaction has been a topic of interest among scholars, with

several studies (Ehsani and Ehsani, 2015; Malik et al., 2012; Hanzaee and Yard, 2010) finding a positive relationship between price and customer satisfaction. Hermann et al. (2007) also supported this claim, showing a direct relationship between price perception and customer satisfaction. However, Bei and Chiao (2001) argued against this correlation, while Wairimu (2011) suggested that a perceived price-performance inconsistency could negatively impact customer satisfaction. Scholars have identified various factors that could influence price, such as fair price, customer expectations, price sensitivity, price suitability, clarity in price calculation, competitor price, and discounted price (Kotler and Keller, 2012; Kusdiyah, 2012; Nguyen et al., 2018; Wairimu, 2011).

Hypothesis 1: There is a positive relationship between the reasonable price factor and customer satisfaction in the food testing service of Quatest1.

According to Balmer and Greyser (2006), the concept of corporate image emerged in the 1950s and 1960s and has since been a popular topic among academic scholars in the business world. Corporate image is commonly defined as "the impression, beliefs, feelings, and knowledge about a corporation in the minds of people" (Boyle, 1997; Furman, 2010; Worcester, 1997, cited in Nguyen et al., 2018).

Several scholars have highlighted the strong link between corporate image and customer satisfaction. Bolton and Drew (1991) argued that customer satisfaction is formed based on accumulated purchase experiences and corporate image plays a significant positive role in this process. This observation has been supported by other scholars, including Hu and Huang (2011), Lai et al. (2009), Nguyen and Leblanc (2001), and Kandamplully and Hu (2007). Andreassen and Lindestad (1998) further emphasized that corporate image can also impact customers' perception of quality, value, and satisfaction.

While Walters (1978) suggested that the corporate image can be classified into three aspects - corporate image, functional image, and merchandise image, Keller (2000) proposed four significant corporate image elements - merchandise image, customer-oriented image, corporate citizen image, and corporate reputation. Nguyen and Leblanc (2001) argued that based on customers' understanding of the corporation, other elements such as corporate name, history, management philosophy, and product diversification could also be considered.

Hypothesis 2: There is a positive relationship between corporate image and customer satisfaction in the food testing service of Quatest1.

According to Bitner and Hubbert (1994), service quality is generally understood as "the customer's impression of the relative superiority/inferiority of a service provider and its services" (cited in Prakash and Mohanty, 2012), although there may be divergent opinions among scholars. Many previous studies have established a positive relationship between service quality and customer satisfaction, with some suggesting that service quality is the dominant determinant of customer satisfaction (Lin et al., 2005; Davis and Mentzer, 2006; Zeithaml and Bitner, 1996; de Ruyter et al., 1997). Furthermore, improving service quality can have indirect impacts on customer loyalty, positive word of mouth, employee turnover reduction, lower operating costs, higher market share, and profitability (Hossain, 2012; Al Khattab & Aldehayyat, 2011; Karunaratne & Jayawardena, 2010; Kandampully & Suhartanto, 2000; Sureshchandar et al., 2002; Kang & James, 2004; Ladhari, 2009).

While various frameworks and scales have been introduced to assess service quality, the SERVQUAL (Parasuraman et al., 1988) and SERVQUAL scale (Cronin & Taylor, 1992) are widely accepted among academic researchers. The SERVQUAL scale consists of five constructs for quantitative measures: reliability, responsiveness, assurance, empathy, and tangibles. However, the accuracy of the SERVQUAL model in yielding precise results has been questioned by Cronin and Taylor (1992), which led to the introduction of the SERVPERF scale, which focuses solely on evaluating customer motivation and behavior based on performance alone.

Hypothesis 3: There is a positive relationship between service quality and customer satisfaction in the food testing service of Quatest1.

Hanna et al. (2004, p.1167) defined employee behaviors as "various sequences of actions carried out by employees within the organization". Positive employee behaviors contribute to a positive image of the company in the eyes of customers, while destructive behaviors can cause harm to the business (Bowen and Shoemaker, 1998). Employee behaviors

have been extensively studied as a mediator of customer satisfaction, with a focus on the positive impact of friendly and polite employees on customer satisfaction (Lemmink and Mattsson, 1998; Brown, 1996). Kong and Jogaratnam (2007) argued that customer satisfaction can be predicted by employee personalization and politeness, and Jones and Dent (1994) found that a smiling face can significantly improve customer satisfaction. Examples of friendly employee behaviors include "friendliness, familiarity, caring, politeness, responsiveness, trustworthiness, helpfulness, and understanding" (Spark, 1994). Mattsson and Lemmink (1998) also found that the degree of personal warmth displayed by service employees towards customers has a positive relationship with service quality perceptions and customer satisfaction. Providing extra support to customers (Bitner et al., 1990) and displaying confidence, friendliness, empathy, and attentiveness (Specht, Fichel & Meyer, 2007) are some specific actions that can leave a good impression on customers.

Van Dolen, DeRuyter, and Lemmink (2004) classified employee behaviors into two types: employee-specific and interaction-induced. This classification depends on whether cooperation with customers is involved or not. Vo (2012) suggested that other indicators of employee behaviors were delivering services, friendly attitude, and willingness to help.

Hypothesis 4: There is a positive relationship between employee behaviors and customer satisfaction in the food testing service of Quatest1.

Betz (1987) defined innovation as the introduction of new products, methods, and technological innovations. On the other hand, Menor et al. (2002) suggested that innovation encompasses a company's contribution to additional services or changes in service ideas to meet customers' demands for new offerings. Scholars have widely acknowledged the importance of understanding the relationship between innovation and customer satisfaction for organizational success (Athanassopoulos et al., 2001; Mahmoud, 2017; Ganesan, 2016). According to Tang (1999), innovation plays a vital role in enhancing a company's competitive position by sustaining customers, which is supported by research findings indicating innovation's positive impact on customer satisfaction (Anderson et al., 1994; Agarwal et al., 2003; Hu and Huang, 2011). However, Caner and Banu (2015) have argued against the notion that innovation affects customer satisfaction. Innovation can be measured using items adapted from the Oslo Manual (OECD, 2005), such as product, process, organization, and marketing innovation. Several researchers have implemented these items on a larger scale for data collection and analysis, while other approaches include market innovation, input innovation, and strategic innovation (Kurniawan et al., 2019).

Hypothesis 5: There is a positive relationship between service innovation and customer satisfaction in the food testing service of Quatest1.

3. Material and methodology

In the proposed research model, the author developed a scale based on previous studies by scholars such as Nguyen et al. (2018), Wairimu (2011), Vo (2015), and Simon & Yaya (2012). The author then conducted qualitative research through open interviews with 5 customers and 5 experts to explore the factors influencing customer satisfaction with the food testing service. The interview questions were designed based on the theoretical framework summarized in the literature review, and the author recorded and noted the responses. The author used the interview results to supplement the scale and ensure its suitability in the context of Vietnam.

To ensure the quality of the study, the author determined the necessary sample size of 135 observations based on 27 observed variables of the scale (Hair et al., 1998). However, to improve the quality of the research, the author chose a larger sample of 170 surveys, and 150 valid responses were received and used for analysis.

The final questionnaire consisted of two parts. The first part focused on personal information of the respondents, such as age, gender, occupation, and type of company. The second part investigated the factors influencing customer satisfaction with Quatest1's food testing service using a 5-point Likert rating scale. Descriptive statistics were used to analyze the collected data, followed by reliability and validity testing, exploratory factor analysis (EFA), Kaiser-Meyer-Olkin (KMO) measure, and multiple regression model to determine the relationship between independent and dependent variables and determine the degree of influence using R2 and β values.

4. Results and discussion

Descriptive statistics

As time was restricted and the customer base was limited, the authors dispatched 170 surveys to Quatest1's food testing service users. Out of these, 150 surveys were successfully returned and deemed valid, providing accurate answers that could be utilized for analysis.

Table 1: Demographic information of the Target Respondents

Demographic		No	%	Demographic		No	%
Gender	male	80	53.3	Occupation	State officer		
	female	70	46.7		Staff	15	10
Age					Manager	83	55.3
	Under 30	13	8.7		Deputy Director/ Director	19	12.7
	30 to 40	77	51.3			12	8.0
	40 to 50	48	32.0		Others	21	14.0
	over 50	12	8.0	Company type	State agency		
					Manufacturing enterprise	18	12.0
						76	50.7
					Importer/ exporter	46	30.7
					Individual	10	6.7

Source: SPSS, prepared by the author

Table 2. Descriptive statistics of Service quality scale

Code	Valid	N	Minimum	Maximum	Mean	Std. Deviation
SQ1	The company provides access to information on services offered including testing items, methods and criteria.	150	1	5	3.37	.618
SQ2	The company performs the services as promised.	150	1	5	3.33	.609
SQ3	The terms and the clauses of the service contract or testing request form are clear and easy to understand.	150	1	5	3.27	.587
SQ4	The company always provides documentation correctly.	150	1	5	3.36	.594
SQ5	The company provides customer service quickly and gives attention to each customer's needs.	150	1	4	3.19	.692

Source: SPSS, prepared by the author

According to Table 2, the food testing service of Quatest1 is highly appreciated by the customers, average under mark 4. Specifically, the access to information on services offered in Quatest1 has the highest mark (3.37). The performance of service as promised takes the second position (3.33). The company's quick customer service has the lowest effect (3.19).

Table 3. Descriptive statistics of Corporate Image scale

	Valid	N	Minimum	Maximum	Mean	Std. Deviation
CI1	The company frequently appears in media channels (website, e-news).	150	1	5	3.09	.543
CI2	The company has a good reputation.	150	1	5	3.07	.564
CI3	The company is open and always interacts well with customers.	150	1	5	3.07	.580
CI4	The company always shows business ethics.	150	1	5	3.10	.553

Source: SPSS, prepared by the author

According to the statistics, the customers acknowledge the average mark for the "corporate image" factor with elements above 3. The highest impact is business ethics (3.10), while the figure for frequent appearances in media channels is lower at 3.09. It can be justified by the fact that customers put a high value on the business ethics of state-owned companies. The lowest mark factors are Reputation (3.07) and customer interaction (3.07).

Table 4. Descriptive statistics of Reasonable Price Factor scale

	Valid	N	Minimum	Maximum	Mean	Std. Deviation
RP1	The price for services is very reasonable.	150	1	5	3.41	.615
RP2	The calculation of testing fees is easy to understand.	150	1	5	3.40	.591
RP3	The price is in line with the services provided to you.	150	1	5	3.40	.635
RP4	The price of the service meets my expectation.	150	1	5	3.38	.598
RP5	The price of the services is good value relative to other available services.	150	1	5	3.36	.627
RP6	The price offered is fair.	150	1	5	3.33	.585

Source: SPSS, prepared by the author

As for the Reasonable price factor, customers are pretty satisfied with the reasonability of price (3.41), followed by calculation of fee (3.40) and the price in line with the services (3.40). The lowest mark (3.33) is the fair price.

Table 5. Descriptive statistics of Employee behaviors scale

	Valid	N	Minimum	Maximum	Mean	Std. Deviation
EB1	Employees are helpful and friendly at your request.	150	1	5	3.41	.557
EB2	Employees are always ready and willing to serve.	150	2	5	3.41	.533
EB3	Your questions are answered in a sincere and enthusiastic manner.	150	1	5	3.40	.579

Source: SPSS, prepared by the author

The friendliness and willingness of the employees are evaluated most positively with 3.41, while the lowest mark is left for the way they answer the questions from customers (3.40). However, the average impact is relatively high, demonstrating that customers still highly appreciate Quatest1's employee behaviors.

Table 6. Descriptive statistics of Service innovation scale

	Valid	N	Minimum	Maximum	Mean	Std. Deviation
SI1	The company has adopted new or significantly improved logistics.	150	1	5	3.31	.557
SI2	The company has adopted new or significantly improved methods of testing.	150	1	5	3.39	.588
SI3	The company has new business practices for organizing procedures.	150	2	4	3.34	.529
SI4	The company has implemented new or significantly improved methods of manufacturing.	150	1	5	3.23	.677
SI5	The company has adopted new methods of organizing human resources.	150	1	4	3.34	.566

Source: SPSS, prepared by the author

As shown in Table 6, the average mark for "service innovation" is relatively high with factors above 3, which offers the company success thanks to great effort in constantly researching and providing value-added services to customers. While the highest mark is the adoption of new or improved methods of testing (3.39), the lowest spot is new or improved methods of manufacturing (3.23). However, the difference between the highest and lowest is relatively little.

Table 7. Descriptive statistics of Customer satisfaction scale

	Valid	N	Minimum	Maximum	Mean	Std. Deviation
SA1	Overall, I feel satisfied with the food testing service provided.	150	1	5	3.49	.599
SA2	Overall, I feel satisfied after each testing service of the company.	150	1	5	3.41	.592
SA3	Overall, I feel satisfied with the relationship between me and the company.	150	1	5	3.39	.612
SA4	In short, I feel satisfied with the company.	150	1	5	3.37	.608

Source: SPSS, prepared by the author

Table 7 reveals that customers are highly content with the food testing service, with a score of 3.49, which is closely followed by satisfaction with other testing services, with a difference of only 0.08. The remaining items in the table, namely those pertaining to the company and pleasure in general, are rated at 3.39 and 3.37, respectively.

Table 8. Analysis of Cronbach Alpha of dependent and independent variables

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Service Quality Factor: Cronbach alpha = 0.801				
SQ1	13.15	3.352	.722	.718
SQ2	13.19	3.441	.687	.730
SQ3	13.25	3.533	.674	.735
SQ4	13.16	3.585	.635	.747
SQ5	13.33	4.114	.275	.863
Corporate Image Factor: Cronbach alpha = 0.889				
CI1	9.24	2.318	.698	.879
CI2	9.26	2.247	.710	.875
CI3	9.25	2.083	.803	.839
CI4	9.23	2.136	.819	.834
Reasonable Price Factor: Cronbach alpha = 0.896				
RP1	16.87	6.157	.731	.875
RP2	16.88	6.469	.649	.888
RP3	16.88	6.079	.730	.876
RP4	16.90	6.426	.654	.887
RP5	16.92	5.980	.781	.867
RP6	16.95	6.179	.772	.869
Employee Behaviors Factor: Cronbach alpha = 0.895				
EB1	6.81	1.092	.777	.865
EB2	6.81	1.164	.746	.890
EB3	6.82	.981	.863	.788

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Service Innovation Factor: Cronbach alpha = 0.746				
SI1	13.29	2.866	.571	.680
SI2	13.22	2.737	.602	.667
SI3	13.27	3.043	.505	.705
SI4	13.38	3.110	.287	.795
SI5	13.27	2.720	.650	.650
Customer satisfaction: Cronbach alpha = 0.843				
SA1	10.17	2.319	.700	.792
SA2	10.26	2.328	.707	.789
SA3	10.27	2.361	.649	.814
SA4	10.29	2.356	.658	.810

Source: SPSS, prepared by the author

Table 8 that the "service quality" variable is measured by 05 observation items having 0.801 Cronbach Alpha. However, as item SQ5 correlates with 0.275 <0.3, the author decided to remove item SQ5 and keep the rest to analyze the following EFA.

- The "Corporate Image" variable measured by 04 observed items (with the code from CI1-CI4) has 0.889 Cronbach Alpha. This figure satisfies the correlation requirement as the correlation is more than 0.3, so four observed items are kept in the following EFA.

- The Reasonable Price Factor variable measured by 06 observed items (with the code from RP1-RP6) has 0.896 Cronbach Alpha >0.7, so its reliability is high. Observed objects correlate more than 0.3, satisfying the requirement; therefore, all experimental items are kept.

- The "Employee Behaviors" variable has Cronbach Alpha 0.895 with all the observed items higher than 0.3; therefore, it completely meets the requirement of regression analysis. All of the items will be kept to analyze EFA.

- As for the Service Innovation variable measured by five items from SI1 to SI5, although the Cronbach Alpha is 0.746, the observed item SI4 is 0.287 <0.3. Otherwise, when removing this item, Cronbach Alpha increases to 0.795. Therefore, the author decided to remove item SI4 and keep the rest to analyze the following EFA.

- "Customer satisfaction" dependent variable is measured by four items (SA1-SA4) having Cronbach Alpha as 0.843 > 0.7; therefore, it meets the requirement. The correlation is higher than 0.3, so all items will be kept to analyze EFA.

After removing two items SQ5 and SI4, because of inappropriate scale, we rerun Cronbach Alpha with two variables, "service quality" and "service innovation".

Table 9. Analysis of Cronbach Alpha

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Service Quality Factor: Cronbach alpha = 0.863				
SQ1	9.96	2.347	.732	.817
SQ2	9.99	2.383	.723	.821
SQ3	10.06	2.446	.721	.822
SQ4	9.97	2.502	.670	.842
Service Innovation Factor: Cronbach alpha= 0.795				
SI1	10.07	1.808	.662	.715
SI2	9.99	1.805	.606	.744
SI3	10.04	2.066	.503	.791
SI5	10.04	1.797	.655	.718

Source: SPSS, prepared by the author

After adjusting, we only have 25 items belonging to 5 factors affecting customer satisfaction in the food testing service of Quatest1. All of these variables are > 0.7 and correlation is > 0.3.

Exploring factors analysis (EFA)

When running EFA for independent variables through SPSS software, the rotated component matrix shows that both EB3 and SI5 have 2-factor loading, but the difference between the two-factor loading of SI5 is less than 0.3; therefore, SI5 will be removed. After removing items SI5, because of inappropriate scale, we rerun EFA and have this Table:

Table 10. The result of KMO analysis and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.866
Bartlett's Test of Sphericity	Approx. Chi-Square	1,715.608
	df	190
	Sig.	.000

Source: SPSS, prepared by the author

KMO = 0.866 > 0.5 means that the factors are appropriate for data analysis with the meaning level 0.000 in Bartlett's testing. It can be concluded that there is a correlation among these factors and the requirement of factor analysis is satisfied. Then a rotation matrix with these loading factors is implemented.

Table 11. Rotated Component Matrix

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
RP6	.838				
RP5	.817				
RP1	.764				
RP3	.746				
RP2	.737				
RP4	.706				
CI4		.895			
CI3		.872			
CI2		.840			
CI1		.806			
SQ2			.843		
SQ3			.786		
SQ1			.783		
SQ4			.703		
EB3	.309			.854	
EB1				.849	
EB2				.834	
SI3					.781
SI1					.758
SI2			.301		.735

Source: SPSS, prepared by the author

The value of the factors is more significant than 0.5 means that the requirement of factors is met. Therefore, five factors with 20 measurement items influence customer satisfaction.

- The 1st Component consists of six observed items from RP1-RP6, so the 1st scale is unchanged, and component 1 will be named the "Reasonable Price" variable.

- The 2nd Component consists of four items with the code from CI1-CI4, so "Corporate Image" is unchanged.

- The 3rd Component consists of four items from SI1-SI4 so that the factor will remain as "service quality."

- The 4th Component includes three observed items from EB1-EB3, so the factor "Employee Behaviors" will be unchanged.

- The 5th Component includes three observed items, namely SI1, SI2, SI3, so the last factor of the model will remain as "Service Innovation."

The author's research model is based on five independent variables and one dependent variable. Four observed items measure the dependent variable.

KMO = 0.781 means it analyzes the relevant factors to data, with the meaning level 0.000 in Bartlett's testing. Therefore, the author completely rejects the hypothesis that uniform factors are dismissed. They correlate and meet the requirement in analyzing factors.

- Total extracted variance 68.096 % >50%

- Value of factors is > 0.5

Therefore, in conclusion, there is a component of dependent variables, and it is named customer satisfaction.

After conducting an analysis of Cronbach Alpha and EFA for both the dependent and independent variables, it has been determined that all variables meet the necessary requirements for regression analysis. The preservation model, which includes five independent variables that impact one dependent variable, is now ready for further analysis.

Multivariate regression model

Before a multivariate regression model, the correlation coefficient Pearson must be tested to verify the relation among dependent and independent variables.

Table 12. Correlations

		SA	RP	CI	SQ	EB	SI
SA	Pearson Correlation	1	.605**	.317**	.691**	.520**	.526**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	150	150	150	150	150	150
RP	Pearson Correlation	.605**	1	.288**	.459**	.480**	.261**
	Sig. (2-tailed)	.000		.000	.000	.000	.001
	N	150	150	150	150	150	150
CI	Pearson Correlation	.317**	.288**	1	.189*	.078	.173*
	Sig. (2-tailed)	.000	.000		.020	.343	.034
	N	150	150	150	150	150	150
SQ	Pearson Correlation	.691**	.459**	.189*	1	.456**	.459**
	Sig. (2-tailed)	.000	.000	.020		.000	.000
	N	150	150	150	150	150	150
EB	Pearson Correlation	.520**	.480**	.078	.456**	1	.282**
	Sig. (2-tailed)	.000	.000	.343	.000		.000
	N	150	150	150	150	150	150
SI	Pearson Correlation	.526**	.261**	.173*	.459**	.282**	1
	Sig. (2-tailed)	.000	.001	.034	.000	.000	
	N	150	150	150	150	150	150
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Source: SPSS, prepared by the author

The result reveals that all independent variables correlate with a 0.01 meaning level. In detail, SA has the correlation coefficient of 1, RP is 0.605; CI is 0.317, SQ is 0.691, EB is 0.520, SI is 0.526. The

Pearson coefficient of all variables is appropriate for regression model analysis.

Table 13. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.809[a]	.654	.642	.29758	2.085
a. Predictors: (Constant), SI, CI, EB, RP, SQ					
b. Dependent Variable: SA					

Source: SPSS, prepared by the author

R^2 = 0.642 means that 64.2% variability of the dependent variable can be explained, and sig = 0.00 confirms that the model has statistical significance.

Table 14. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	-.421	.255		-1.650	.101		
1	RP	.272	.061	.270	4.460	.000	.654	1.530
	CI	.121	.053	.118	2.287	.024	.896	1.116
	SQ	.369	.061	.376	6.048	.000	.621	1.609
	EB	.144	.058	.147	2.486	.014	.688	1.454
	SI	.246	.062	.221	3.963	.000	.774	1.291
a. Dependent Variable: SA								

Source: SPSS, prepared by the author

The above table shows that all five independent variables have Tolerance > $(1 – R^2)$, and all VIF are < 2 if multicollinearity doesn't affect the regression result.

Beta is positive, indicating that all independent variables in the model positively affect customer satisfaction in the food testing service of Quatest1. The Sig value of independent variables RP, CI, SQ, EB, SI is < 0.5, so the hypotheses H1, H2, H3, H4, H5 are accepted. In other words, reasonable price factors, service quality, corporate image, service innovation, and employee behaviors positively affect customer satisfaction in the food testing service of Quatest1.

The result of testing the hypothesis

Hypothesis 1: There is a positive relationship between reasonable price factor and customer satisfaction in the food testing of Quatest1.

Null Hypothesis: there is no relationship between Reasonable Price factor and customer satisfaction in the food testing of Quatest1.

Through table 4.4.2.1, we can see that beta = 0.270 >0, indicating a positive relationship between independent and dependent variables. Besides, t – value = 4.460, and p-value = 0.0000 < 0.05, the H1 hypothesis has statistical meaning; therefore, the null hypothesis is rejected and accept**s hypothesis H1**.

Hypothesis 2: There is a positive relationship between corporate image and customer satisfaction in the food testing of Quatest1.

Null hypothesis: there is no relationship between Corporate Image and customer satisfaction in the food testing of Quatest1.

From table 4.4.2.1, we can see that beta = 0.118 >0, indicating a positive relationship between Corporate image and Customer satisfaction in the food testing of Quatest1. Besides, t –value = 2.287, and p-value = 0.024 < 0.05, the H2 hypothesis has statistical meaning, so we can conclude that the null hypothesis is rejected and accept **the hypothesis H2**.

Hypothesis 3: There is a positive relationship between service quality and customer satisfaction in the food testing of Quatest1.

Null hypothesis: there is no positive relationship between Service Quality and customer satisfaction in the food testing of Quatest1.

From table 4.4.2.1, beta = 0.376 >0, indicating a positive relationship between Service Quality and Customer satisfaction in the food testing service of Quatest1.

Besides, t –value = 6.048, and p-value = 0.0000 < 0.05, the H3 hypothesis has the statistical meaning, so we can conclude that the null hypothesis is rejected and accept**s hypothesis H3**.

Hypothesis 4: There is a positive relationship between employee behaviors and customer satisfaction in the food testing of Quatest1.

Null hypothesis: there is no positive relationship between Employee behaviors and customer satisfaction in the food testing of Quatest1.

Table 4.4.2.1, beta = 0.147 >0, indicating a positive relationship between Employee behaviors and Customer satisfaction in the food testing of Quatest1. Besides, t –value = 2.486, and p-value = 0.014 < 0.05, the H4 hypothesis has the statistical meaning, so we can conclude that the null hypothesis is rejected and accept**s hypothesis H4.**

Hypothesis 5: There is a positive relationship between service innovation and customer satisfaction in the food testing of Quatest1.

Null hypothesis: there is no positive relationship between Service innovation and customer satisfaction in the food testing of Quatest1.

From table 4.4.2.1, beta = 0.221>0, indicating a positive relationship between Service innovation and customer satisfaction in the food testing of Quatest1. Besides, t –value = 3.963, and p-value = 0.0000 < 0.05, the H5 hypothesis has statistical meaning, so we can conclude that the null hypothesis is rejected and accept**s hypothesis H5.**

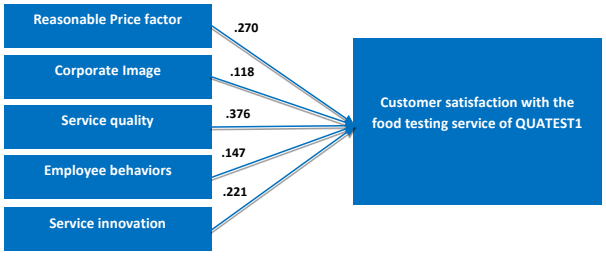
From the regression table, we can draw the equation showing the relation between customer satisfaction in the food testing service of Quatest1 and independent variables including reasonable price factor, service quality, corporate image, service innovation, employee behaviors as follows:

SA = - 0.421 + 0.272* RP + 0.121*CI + 0.369*SQ + 0.144* EB + 0.246 * SI

In short, after testing the regression model, we have the final model of Factors affecting customer satisfaction in the food testing service of Quatest1, including five factors with 20 items criteria.

In this study, ANOVA is applied for items including age, gender, occupation (see the Appendix), but there is no difference in these groups when assessing customer satisfaction. However, it is not the case for company types.

Figure 2. Final model of factors affecting customer satisfaction in Quatest1



Source: SPSS, prepared by the author

Discussion of the research findings

The research aims to study the relationship and influence of factors on customer satisfaction. The thesis has a research model with one dependent variable and five independent variables to verify five hypotheses. The result is summarized as follows:

Table 15. Summary of hypothesis testing

Hypothesis	Beta	Sig.	Hypothesis	Tested results
There is a positive relationship between reasonable price factor and customer satisfaction in the food testing of Quatest1	.270	.000	H1	Supported
There is a positive relationship between corporate image and customer satisfaction in the food testing of Quatest1.	.118	.024	H2	Supported
There is a positive relationship between service quality and customer satisfaction in the food testing of Quatest1.	.376	.000	H3	Supported
There is a positive relationship between employee behaviors and customer satisfaction in the food testing of Quatest1.	.147	.014	H4	Supported
There is a positive relationship between service innovation and customer satisfaction in the food testing of Quatest1.	.221	.000	H5	Supported

Source: SPSS, prepared by the author

All five factors influence customer satisfaction in the food testing of Quality Assurance and Testing center 1. The findings confirmed the research hypothesis, in which the most prominent factor is Service quality with .376. While this result correlates with previous research studies (Nguyen et al., 2018; Lin et al., 2005; Davis and Mentzer, 2006; Zeithaml and Bitner, 1996; de Ruyter et al., 1997), it also gave an interesting view on the importance of service quality. Regarding service quality, while the provision of information access and the capability to perform service as promised seems to impact customers in this research significantly, Nguyen et al. (2018) asserted that the provision of the document has the highest degree of impact on customers. Based on a depth discussion with Associate Professor VU Tri Dung, this difference can be justified by the characteristics of the service area, more specifically, the conformity assessment sector. The subsequent factors are the reasonable price (with .270) and innovation (.221). This finding is identical to past studies of Vo (2015), Ehsani and Ehsani (2015), Malik et al. (2012), Athanassopoulos et al. (2001), Mahmoud (2017). Trying to interpret these results, according to KIM Duc Thu - Director of Quatest1, the nature of this conformity assessment industry and the need for innovation contribute to these results as customers pay much attention to the testing price and the ability to keep updated with the new testing methods that meet their demands.

Surprisingly enough, the influence of employee behaviors (.147) and corporate image (.118) was still positive but with a lower degree. Hu and Huang (2011) found similar results, although, in their research, the corporate image had a more significant impact statistically. Contrary to Lemmink and Mattsson (1998) and Brown (1996), it was not expected that the effect of employee behaviors on customer satisfaction would be minimal.

5. Conclusion and recommendation

The aim of the research was to determine the satisfaction level of customers with the food testing services of Quatest1 and to identify the factors that influence customer satisfaction. Five independent variables were examined, including service quality, employee behavior, service innovation, reasonable price, and corporate image, with customer satisfaction as the dependent variable. The results revealed that all five variables had a significant relationship with customer satisfaction, with service quality having the most significant impact, followed by reasonable price, service innovation, employee behavior, and corporate image. To attract more customers, Quatest1 should focus on improving service quality, reasonable price, and service innovation, while also addressing issues related to employee behavior and corporate image. The implementation of several practices, such as providing access to information on services offered, performing services as promised, introducing service contracts or testing requests clearly, and providing documents correctly, can help improve service quality and innovation. Additionally, implementing online testing requests, online tools to monitor service performance, and other practices can make the testing experience more interactive and convenient for customers. Improving the company's image on various media channels can also enhance customer satisfaction by improving the company's reputation and interaction with customers.

Managerial implications

The research findings suggest several managerial implications that Quatest1 should consider to improve customer satisfaction and enhance its reputation in the market. Firstly, the company should prioritize improving service quality, which is the most critical factor influencing customer satisfaction. Quatest1 should develop training programs for its employees to improve their skills and knowledge in providing high-quality services and regularly monitor and evaluate their performance to ensure they meet the required standards. Secondly, the company should maintain its strength in providing reasonable prices for its services and provide clear explanations and justifications to customers if it needs to increase prices. Thirdly, Quatest1 should focus on innovation to improve the testing experience for customers by introducing online testing requests, developing new testing methods, and providing more accessible and user-friendly testing reports. Fourthly, the company should address shortcomings related to employee behavior and corporate image by promoting ethical and professional behavior in its employees and improving its corporate image on various media channels. Finally, Quatest1 should regularly monitor and evaluate its service performance to ensure it meets customers' expectations by implementing an online tool to monitor service performance and providing easy access to testing results and feedback mechanisms for customers. By implementing these measures, Quatest1 can improve customer satisfaction, attract new customers, and enhance its reputation in the market.

Limitations and recommendations for future research

Despite the valuable insights gained from this study, there are several limitations that need to be acknowledged. *Firstly,* the sample size used in this study is relatively small and limited to customers of a single testing laboratory, Quatest1. This may limit the generalizability of the findings to other food testing service providers. Future studies should aim to use larger and more diverse samples to increase the generalizability of the results.

Secondly, this study only focused on customer satisfaction in the food testing service industry, without considering other factors that may influence customer loyalty, such as trust and perceived value. Future research could explore the impact of these additional factors on customer satisfaction and loyalty.

Thirdly, the study relied on self-reported data collected through a questionnaire, which may be subject to response bias. Future studies could consider using objective measures of customer satisfaction, such as customer retention rates, to complement self-reported data.

Based on the limitations identified, there are several recommendations for future research in this area. Firstly, future studies could adopt a

longitudinal design to explore changes in customer satisfaction over time, which could provide a more comprehensive understanding of the factors that influence customer satisfaction.

Secondly, future research could explore the impact of cultural differences on customer satisfaction in the food testing service industry. Cultural factors, such as communication style and service expectations, may vary across different regions and could influence customer satisfaction.

Thirdly, future studies could explore the impact of emerging technologies, such as artificial intelligence and automation, on customer satisfaction in the food testing service industry. These technologies have the potential to transform the industry and may have a significant impact on customer satisfaction.

Overall, further research is needed to provide a more comprehensive understanding of the factors that influence customer satisfaction in the food testing service industry. This would enable companies to develop effective strategies to attract and retain customers in an increasingly competitive market.

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