

# ASSESSMENT OF SERVICE QUALITY USING SYNERGIES OF FUZZY SERVQUAL, FUZZY KANO'S MODEL, AND FUZZY ANALYTIC NETWORK PROCESS INTO QFD

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Original research



## ABSTRACT

*The essence of banking service will always be service quality. To gain customer satisfaction, enhance market rivalry, and achieve sustainable performance. The primary goal of this article is to identify the primary factor contributing to high customer dissatisfaction and poor service quality in bank services. This article synergies fuzzy SERVQUAL, fuzzy Kano model, and fuzzy analytic network processing into QFD. Structured survey questions based on SERVQUAL and Kano models were developed and disseminated to collect data. According to the findings, the bank should offer the promised service within the time range, respond to client concerns immediately, and supply appropriate service within the time frame. Furthermore, an employee should give timely care to the client; the employee should never be too busy to respond to customer demands and inform the consumer when service is delivered. In conclusion, focusing on customer requirements can enhance the bank's service level, which increases customer satisfaction.*

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## 1. INTRODUCTION

In today's competitive market, businesses lose customers owing to the poor quality of services or products they provide (Tesfaye, 2015). Meanwhile, the primary reason for client loss is that service providers frequently fail to adequately comprehend their customers' expectations, resulting in dissatisfaction with the service they receive. However, to overcome these issues, service providers must focus on customer service (Berushie, 2014). Hence, "the longer a customer stays with a bank, the more utility the customer generates" (Kebede, 2017). Customers recreate a significant persona in business performance (Basari & Shamsudin,

2020; Hamzah & Shamsudin, 2020; Ilias & Shamsudin, 2020). In line with this, customer satisfaction increases as the quality of services/products offered by the firm advances (Hasfar et al., 2020).

Goldstein et al. (2002), define and pinpoint the concept of services in the following ways: Services operations: a method of extraditing services; services experiences: the client directly uses the services; services outcomes: the welfare and success of the services; the value of the services: the benefits the client perceived to be inherent in the service's consideration of the service's cost. Furthermore, Grönroos (2001) defines the service concept as "an idea of how the quality-generating resource should function and what result they should

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achieve for the customer." On the other hand, Herson and Nitecki (2001) define service quality from a different perspective; these include excellence, value, conformance to specification, and meeting or exceeding expectations. Also, Ramya et al. (2019) describe service quality as the capacity of a service provider to satisfy clients in a way that improves its commercial performance. The services sector encompasses a diverse and complex range of businesses and initiatives. Subsequently, Ghobadian et al. (1994) sort the services sector into three categories: national and local government, which includes areas like education, health, social security, police, military, transport, legal, information, and credits; non-profit private services, which includes institutions like charities and churches; mutual societies and art foundations; and for-profit private services, which includes utilities, hotels, airlines, architects, restaurants, solicitors, retailers, entertainment, banks, insurance companies, advertising agencies, consulting firms, market research companies, and communications. In short, several different types of research were done to determine what aspects affect service quality in the banking industry. For example, Gebre (2017) primary causes of poor service quality in the banking services sector are a lack of customer database management and inadequate infrastructure and technology. Furthermore, "employee competence and skills, the reliability of the electronic system, the reliability of the service system, the impeccability of the banking system's integrity, and the accountability instrument were among the other factors that affected the excellence of service quality of the bank services" (Pourmohammad et al., 2016). However, despite extensive research on the many facets of service quality, no study provides solid advice on how customer-oriented service businesses could raise customer satisfaction by combining various quality measurement tools with customer-oriented approaches. Therefore, this article uses an optimal decision framework for bank services based on the synergies of fuzzy SERVQUAL, fuzzy Kano's model, and fuzzy analytic network processing into the QFD model.

## **2. LITERATURE REVIEW**

### **2.1 Service Quality**

Concepts of service quality have been contested for centuries and are still a prominent area of study today. In many academic works of literature, service quality is also primarily defined in terms of the superiority of the service (Gera et al., 2017; Marković et al., 2015). Harvey and Green (1993) summarized quality into two distinct relative concepts: first, quality has multiple meanings for different individuals, and second, quality is related to "process" or "outcomes." As a result, they reflected exceptional quality, fitness for purpose, value for money, and transformative. Considering this, the concept of quality leads to a meeting between what customers expect and perceive (Saghier & Nathan,

2013). Ghobadian et al. (1994) categorized the definition of quality into five broad categories based on how crucial they are to service businesses, including transcendence, product, process or supply, customer, and value approaches. While Mackay & Crompton (1990) defined service quality as "the relationship between what customers desire from a service and what they perceive that they receive." On the other hand, Lenka et al. (2009) specified that service quality is the discrepancy between customer expectations and perceived service. Accordingly, Elmayar (2011) defines the degree of service quality from the customer's perspective, and there is a relationship between anticipated and perceived service quality. Likewise, Sawant (2016) defines service quality as "the overall assessment of service by the customer." Ali (2018) stated that definitions of service quality differ and are subject to various models, customer expectations, and satisfaction. Following that, Gupta et al. (2018) defined service quality as "the consumer's level of satisfaction from the service encounter; the consumer's expectations before taking the service; and how the service is conveyed concurrently." Satisfaction, in particular, is the result of a correlation between consumers' expectations and their views of the service's implementation (Shayestehfar & Yazdani, 2018). Furthermore, meeting or exceeding customers' service requirements will result in higher service quality and customer satisfaction (Uppal, 2019). Given that customer expectations are influenced by their perceptions of a company's image, and corporate image is the outcome of how customers perceive a company, improving the technical and functional quality of service by businesses increases customer satisfaction (Gronroos, 1984). Furthermore, there are two categories of service quality: first, "how" the service is delivered, and second, "what" the final perception of the customer is (Brady & Cronin, 2001; Kang, 2006). Also, Zameer et al. (2015) define a corporate image as "the perception about the organization that the customer holds in their memories." Venetis and Ghauri (2004), currently, operating service businesses consider service quality to be a significant success element; in general, two main mechanisms explain the influence of service quality on profitability: first, service quality is considered a way for service differentiation and competitive advantage to attract new customers and increase market share, and second, service quality is becoming a way for customer retention. Also, Ravichandran et al. (2001) indicated that several techniques were devised to keep customers, but the crux was to improve service quality. Moreover, Sigit Parawansa (2015) stated that customer retention has four main stages, known as "the four-stage model of loyalty power," such as cognitive loyalty, affective loyalty, conative loyalty, and action loyalty. Service quality is remarkably relevant for the banking industry, as customers typically look for the service they perceive. Successful bank firms prioritize offering higher-quality service than their competitors. Likewise, quality of service is the principal determinant by which

banks can invite new customers and helps to retain existing customers (Ahmed, 2017). Service quality has become a critical determinant for every business's survival and competitiveness (Hu et al., 2009). Therefore, service companies should plan, organize, implement, and control the quality system to meet or exceed customer expectations and increase customer satisfaction (Ramdhani et al., 2011). As a further significant causal aspect of company competitiveness, service quality is seen to have a direct bearing on firm costs and profits (Gounaris et al., 2003; Gupta et al., 2018).

## **2.2 Customer Satisfaction**

Customer satisfaction has been a popular subject in marketing and academic research. (Cengiz, 2010; Chiguvu et al., 2017; Kombo, 2015; Murugiah & Akgam, 2015; Narteh & Kuada, 2014; Ozatac et al., 2016); and others are examples. Subsequently, Gunasekare (2016) states that "customer satisfaction is a set of feelings or outcomes attached to a customer's experience with any product or service." But nowadays, consumer happiness is a significant precursor to client retention and returning business (Syed, 2019). Also, Hanif et al. (2010) explained that in the telecommunications service sector, if a company wants to be profitable in the long run, it must satisfy its customers by crediting fair tariffs and high customer service, thereby dominating the market. On the other hand, Vásquez et al. (2017) explained that measuring customer service satisfaction is a method that should be chronic in any company so that they can control the processes and activities executed to enhance their performance. Furthermore, a hospital is a significant healthcare provider and must acknowledge the value of patients' choices; patients call the hospital seeking relevant, high-quality medical care, a safe environment, and moderately sufficient facilities (Singh, 2012). Meanwhile, Manzoor et al. (2019) stated that patient satisfaction is noted as a touchstone to assess the potency of health services given in the hospital. Furthermore, the hotel is a primary hospitality industry and provides customer-confined service. In line with this, the hospitality industry's service sectors must put the customer need first to remain competitive and establish a name for themselves in the market (Pazir & Amin, 2015). Likewise, Luturlean and Anggadwita (2015) highlighted how businesses could use the customer experience management approach to keep customers and increase the intention to revisit. Nevertheless, in the banking service sector, the main component of customer satisfaction is the correlation between the customer, the service provider, and the service they perceive (Saghier & Nathan, 2013). Besides, Bena (2010) discovered two key issues: the criteria for assessing client happiness must be defined first, according to the field of business and the firm's requirements, and second, clients prefer to declare they are pleased or select an indecisive response. Therefore,

to compete in the global market, any organization must put customer satisfaction before company profits and other operations. Similarly, customer satisfaction is critical for the continued success of any business (Mekonen et al., 2019). Customer satisfaction is a significant concern for all companies to enhance customer loyalty and design more reliable business performance (Grønholdt et al., 2000). Further, Munusamy et al. (2010) define customer satisfaction as "global issues that affect all organizations, regardless of their size, whether profit or non-profit, local or multinational." As, Lenka et al. (2009) explained, customer satisfaction is a synergy of their cognitive and affective responses to the service encounter.

## **2.3 Quality Measurement Tools for Customer-Oriented Approaches**

Giannikas et al. (2019) assert that "customer orientation concerns the degree to which an organization focuses on the customer, recognizes their desires and places meeting their needs as a foremost priority." According to previous study findings, the impact of customer orientation, including value-based customer orientation, may be described in terms of two factors connected directly to customer satisfaction Wang et al. (2012) and action-based customer orientation (He & Li, 2011). Also, value-based concerns meet customer demand by being aware of the customer's expectations for service quality, which can determine customer satisfaction (Blocke et al., 2011). While action-based approaches emphasize utilizing customer feedback and accommodating it when making organizational choices (He et al., 2011). Accordingly, Dragolea & Ungureanu (2008) explain how an organization's success depends on its capacity to control customer expectations while promoting investment and loyalty. Consequently, to keep its current customers, every organization needs to be customer-centric and open to hearing what they have to say.

### **2.3.1 SERVQUAL Model**

Several research publications cover the theoretical and practical use of SERVQUAL in a wide range of industrial, business, and non-profit organizations. For example, in the healthcare sector (Anbari et al., 2014; Umath et al., 2015), higher education (Galeeva, 2016; Ulewicz, 2014), tourism service (Home, 2006), restaurant (Lee & Hing, 1995; Yu-qiang & Jun-jia, 2011), bank (Ilyas et al., 2013; Lau et al., 2013), telecommunication (Alnsour et al., 2014), apparel retail (Bhaskar & Shekha, 2011), public service (Bryslant & Curry, 2001), local government (Donnelly et al., 1995), electronic commerce B2C (Alzola & Robaina, 2005), business – to – business service (Mehta & Durvasula, 1998), technical and vocational colleges (Akhlaghi et al., 2012) and more. Further, SERVQUAL has a variety of potential applications; it can assist service and retail firms in assessing customer expectations and

perceptions of service quality, as SERVQUAL has five universal dimensions (Parasuraman et al., 1988).

**Table 1.** Essential dimensions of service quality

SERVQUAL dimensions	Definitions	Source
Tangible	Physical facilities, equipment, and appearance of personnel.	Parasuraman et al., (1988)
Reliability	Ability to perform the promised service dependably and accurately.	
Responsiveness	Willing to help customers and provide prompt service.	
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence.	
Empathy	Carrying, individualized attention the firm provides its customer.	

SERVQUAL reports respondent responses on their expectations and perceptions of service quality (Prakasha & Mohanty, 2012). Moreover, SERVQUAL contains 22 items (Likert-type) with five dimensions (table 1), so each item in the SERVQUAL tool is of two classes: one to measure expectations and, thereby, firms overall within a business, and the second to measure perceptions about the particular company (Adil et al., 2013). Accordingly, Robinson (1999) claims that the difference between the two findings provides a gauge for the discrepancy between expectations and perceived service quality, which is performance minus expectations. Following that, for the particular respondent, the service quality for each dimension is determined as follows:

$$SQ_j = \sum_{j=1}^{n_j} \frac{P_{ij} - E_{ij}}{n_j} \quad (1)$$

Where

$SQ_j$  = service quality of dimensions

$E_{ij}$  = expectations of the firms for item  $i$  in dimension  $j$

$P_{ij}$  = perceived performance of the form on item  $i$  in dimension  $j$

$n_j$  = number of items in dimension  $j$ .

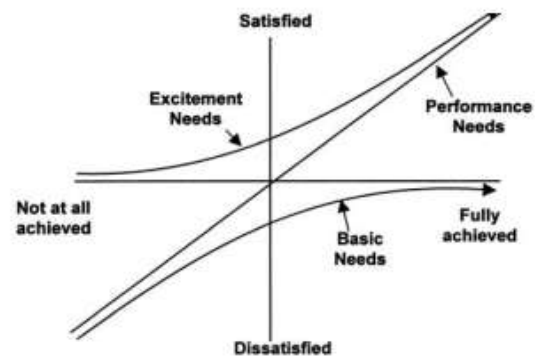
However, despite its widespread usage and popularity, SERVQUAL has received several philosophical and practical objections. See, for example: (Babakus & Boller, 1992; Bolton & Drew, 1991; Boulding et al., 1993; Cronin & Taylor, 1992; Genestre & Herbig, 1996; Teas, 1993) As a result, Buttle (1996) categorizes the critiques into two parts: one theoretical (paradigmatic objections, gaps model, process orientation, and

dimensionality) and one operational (expectations, item composition, a moment of truth (MOT), polarity, scale points, too much administrative work, and variance extracted).

### 2.3.2 Kano's Model

Doctor Noriaki Kano, a Tokyo professor, created the Kano model in 1984 to define service quality based on customer satisfaction (Seyedi et al., 2012) (Figure 1). In the meantime, customer satisfaction is a one-dimensional operation, implying that the higher the perceived service quality, the higher the customer satisfaction (Kazemi et al., 2013). Perhaps, fulfilling the customer's request does not result in a higher degree of satisfaction from the customer (Mostafa et al., 2013). Based on the Kano model, customer needs were categorized into three phases: basic, performance, and excitement needs (Bhattacharyya & Rahman, 2004).

Similarly, Five kinds of customer satisfaction with a quality attribute exist, such as "must be," "one – dimensional," "attractive," "indifferent," and "reverse" Kurt and Atrek (2012), Lin et al. (2017), and the quality attribute is defined as shown in table 2.



**Figure 1.** Kano's model.

Source: Bhattacharyya & Rahman (2004)

**Table 2.** Categories Kano's model of quality attributes

Quality attribute	Definitions	Source
Must – be	“Sufficient quality attributes <i>do not</i> lead to customer satisfaction but insufficient quality attributes lead to customer dissatisfaction.”	(Kurt & Atrek, 2012; Lin et al., 2017)
One – dimensional	“Sufficient quality attributes lead to customer satisfaction but insufficient quality attributes <i>do not</i> lead to customer dissatisfaction.”	
Attractive	“Sufficient quality attribute leads to customer satisfaction but insufficient quality attributes <i>do not</i> lead to customer dissatisfaction.”	
Indifferent	“Sufficient quality attributes <i>do not</i> lead to customer satisfaction and insufficient	

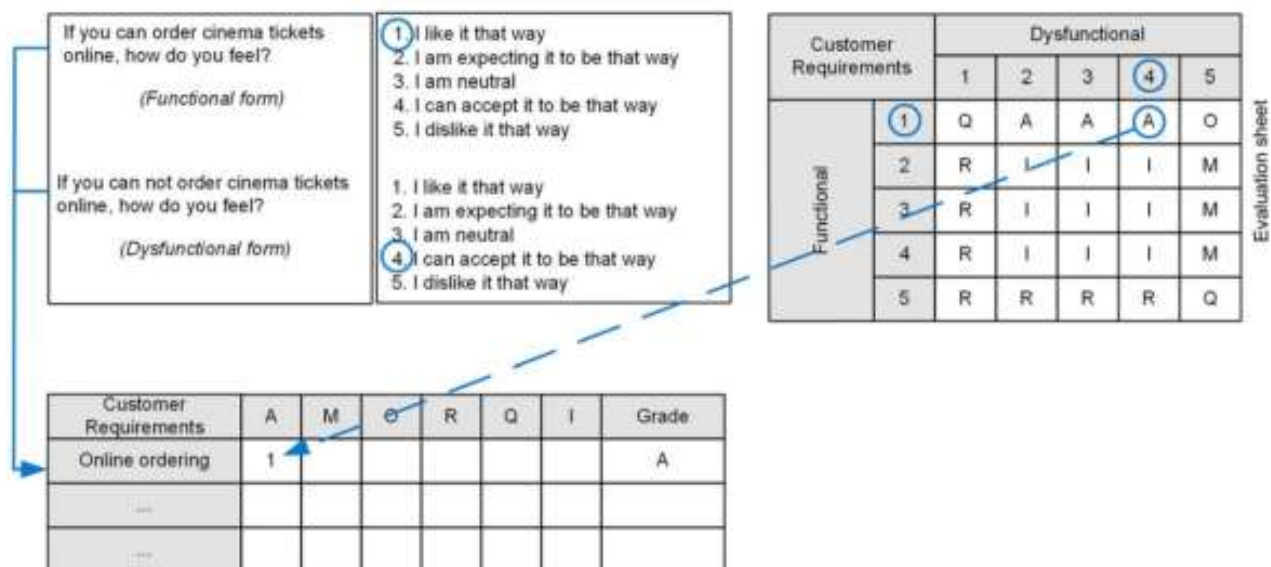
	quality attributes <i>do not</i> lead to customer dissatisfaction.”
Reverse	“Sufficient quality attributes lead to customer dissatisfaction and insufficient quality attributes lead to customer dissatisfaction.”

Likewise, to categorize requirements or quality attributes, it is necessary to use Kano's questionnaires, which are sorted into two types, i.e., functional and

dysfunctional forms of questions. See, for example, the figure 2 (Madzík et al., 2019: pp. 3).

Numerous research papers consolidate the application of Kano's model in an assortment of industrial, profit, and non-profit firms (table 3).

But, regardless of the numerous benefits of Kano's model, it may have been criticized for a case in which, Some authors (Gregory & Parsa, 2013, p. 40). include lengthy questionnaires that exclude the quantitative or qualitative performance of the specific attributes.



**Figure 2.** Categorization of a requirement using the Kano approach

*Source: Madzík et al., (2019): p. 3*

**Table 3.** Analysis of the application of Kano's model

Author & year	Description	Kano's quality element	Model type
Madzík et al., (2019)	Understanding customer requirements in higher education	Kano method	CR
HSU et al., (2007)	Capturing passenger's voice in the airline industry	Kano method	CS
Chiang et al., (2021)	Classifying technological innovation attributes for hotel service	Use synergies of the Kano method, self-importance questioners, and factor analysis	CS
Gregory and Parsa (2013)	Hospitality and Tourism industry	Kano method	CS
Llinares and Page (2011)	Kansie Engineering to evaluate subjective real estate consumer preference	Use synergies of the Kano method, self-importance questioners, and factor analysis	CR
Ma et al., (2019)	Differentiate between future vehicle-driving services	Use synergies of the Kano method, self-importance questioners, and factor analysis	CS
Rozaq et al., (2019)	Assessing customer satisfaction with hospital service quality	Kano method	CS
Velikova et al., (2016)	Identification of wine festival satisfaction drivers	Penalty – Reward Contrast Analysis (PRCA)	CS

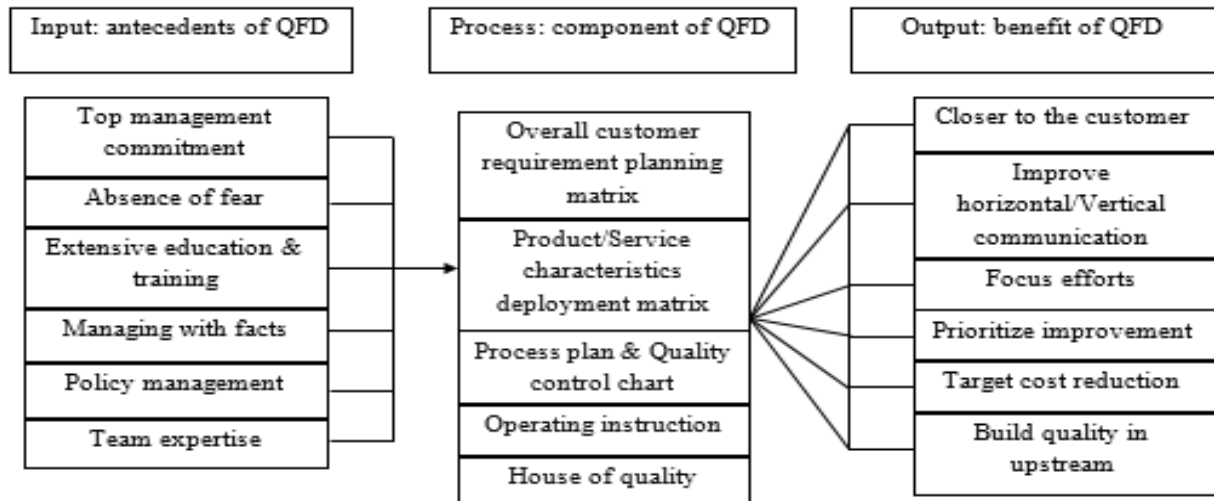
### 2.3.3 Quality Function Deployment (QFD)

Bouchereau & Rowlands (2000) define QFD as “a visual connective process that helps teams focus on the needs of the customer throughout the total development cycle.” Quality function deployment (QFD) is supported by a matrix approach to design and function the essentials (commencing with customer requirement)

upon the way of attaining them (Jagdev et al., 1997) (Figure 3). As a result, a set of charts originated to show the connection between client expectations for service attributes and service planning. Likewise, “Quality Function Deployment (QFD) is a service planning and development support method, which provides a structured way for service providers to assure quality and customer satisfaction while maintaining a

sustainable competitive advantage” (Andronikidis et al., 2009: pp-320). The indicated usage of the QFD approach in many service areas demonstrates its universal applicability. Such as bank service (Purba et al., 2018), hospitality (hotel service) (Paryani et al., 2010), healthcare service (Dijkstra & Bij, 2002; Gremyr & Raharjo, 2013), utility service (Jahanzaib et al., 2016), design/build project (Pheng & Yeap, 2001),

software product development (Haag et al., 1996; Thackeray & Van Treeck, 1990) and more. In light of this, numerous circumstances or significant aspects described in the illustration below are necessary to put into practice and advance QFD (Kathawala & Motwani, 1994).



**Figure 3.** The Three Components of QFD: A System Model. Source: Kathawala & Motwani (1994) Modified

Despite its popularity and widespread acceptance, quality function deployment is subject to numerous criticisms; see, for example, Wolniak (2018), who argue that it is not flexible, time-consuming, labor-intensive, only allows for qualitative data, and creates difficulties for collaboration within multidisciplinary teams; and Andronikidis et al. (2009), who assume linear association within customer requirements and service attributes, impose a Poel (2007) critiques quality function deployment from a methodological aspect, which includes that "customer demands are product/service dependent, customer demand can not always be represented by a linear additive value function, individual customer preference cannot be translated into a collective customer preference ordering without violating a number of very reasonable conditions, the correlation between customer demand and engineering characteristics is not always non-negative and constant, the relative importance of customer demand can not be uniformly translated into a relative importance of the engineering characteristics, and the meaning of tragedy values is unclear or disputable."

#### 2.4. Multi-Criteria Decision-Making Tools

Multi-criteria decision-making analysis (MCDA) was introduced as a subsection of operations research intended to assist in solving problems (Jato-Espino et al., 2014). Since then, numerous multi-criteria decision-making techniques have been introduced to use them for

different service and manufacturing sectors (Kiker et al., 2005; Lahdelma et al., 2000; Løken, 2007; Słowiński, 1986; Tonietto & Carbonneau, 2004).

##### 2.4.1 Analytic Network Process (ANP)

The analytic network process consists of similar attributes to the analytic hierarchy process, which includes simplicity, flexibility, and coincident implementation of qualitative and quantitative measures and can add ebullience to the judicial process. In addition, the analytic network process deals with every event, i.e., a network of criteria, sub-criteria, and alternatives; moreover, in the analytic network process, every component in the network can interplay with each other by any means (Kheybari et al., 2020). Likewise, Kheybari et al. (2020) recapitulate the analytic network process in four main steps, such as:

**Step 1.** Building a model and converting a problem into a topic network structure.

**Step 2.** Formulating a pairwise comparison matrix and determining priority vectors.

**Step 3.** Generating a supermatrix and converting it to a weighted supermatrix.

**Step 4.** Selecting the best option.

Numerous research papers discuss the use of analytic network processing (ANP) in a variety of industrial, profit, and non-profit organizations (table 4).

**Table 4.** Analysis of the Application area of the Analytic Network Process (ANP)

Author & year	Description	Area
Galankashi et al. (2015)	Prioritizing green supplier selection criteria	Green supply chain
Çelebi et al. (2010)	Logistics management	Small electronic appliance manufacturer
Simwanda et al. (2020)	Modeling the drivers of urban land-use change	Urban development
Abdi (2012)	Product family formation & selection for configurability	Manufacturing system
Gheshlaghi et al. (2019)	GIS-based forest fire risk mapping	Environmental planning
Bayazit (2006)	Vendor selection decisions	Supply chain
Boateng et al. (2015)	Risk prioritization in mega projects	Project management
Author & year	Description	Area
Cheng and Li (2004)	Contractor selection	Project management
Cheng and Li (2005)	Project selection	Construction management
Cooper et al. (2012)	Selection of a third-party logistics provider	Pharmaceutical company
Dabestani et al. (2017)	Evaluation and prioritization of service quality dimension	4 – star hotel
Farman et al. (2017)	Optimum cluster head selection	Wireless sensor network
Genevois et al. (2015)	Automatic teller machine deployment problem	Bank service sector
Godse et al. (2008)	Web service selection	Web service industry
Hasanzadeh et al. (2013)	Coastal oil jetties site selection	Oil production industry
Chen et al. (2004)	Enterprise partner selection	Vocational education
Jharkharia and Shankar (2007)	Selection of logistics service provider	Logistics
Meade and Presley (2002)	R&D project selection	Research & Development program
Mulebeke and Zheng (2006)	Software selection in product development	Manufacturing industry
Wu et al. (2012)	Porter's Five Force analysis	Strategic management
Zhu et al. (2010)	A portfolio-based analysis for green supplier management	Supply chain management
Zare et al. (2018)	Prioritizing shift work disorder	Hospital service

Despite its reputation and widespread use, ANP has been subjected to several theoretical and practical criticisms. For instance, the method's complexity, the length of the implementation, and the uncertainty in giving judgment, especially at the cluster level (Kadoić et al., 2017).

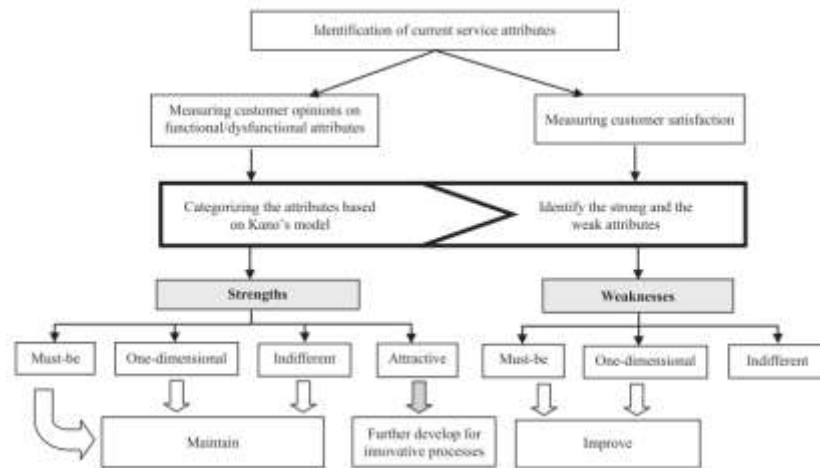
## 2.5 Integration of Customer-Oriented Tools for Improving Service Quality

In the current worldwide competitive market, it is not adequate for firms to depend exclusively on continuous improvement to sustain and advance their competitive advantage. The introduction of integrated customer-oriented tools for increasing service quality, similar to the synergy of changed processes, has been widely applied in many service and industrial businesses. See, for example, a fuzzy QFD approach using SERVQUAL and Kano models (in the case of hotel service) (Beheshtinia & Farzaneh Azad, 2017), integration of SERVQUAL and Kano models (in the case of airline service) (Basfirinci & Mitra, 2015), application of integration of Kano model, AHP technique and QFD

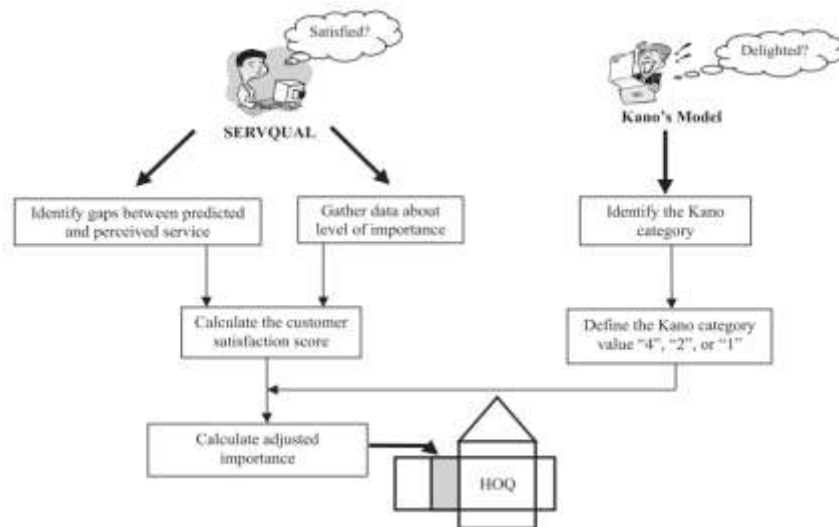
matrix (case of banking service) (Pakizehkar et al., 2016); integration of Kano model and AHP (case of banking service) (Kazemi et al., 2013), application of integrating SERVQUAL and Kano model into QFD (case of logistics service) (Baki et al., 2009), integrating SERVQUAL and Kano model into QFD (case of simulation – based training on project management) (Rahmana et al., 2014), integrating SERVQUAL and Kano model into QFD (case of hotel industry) (Gupta & Srivastava, 2012), a hybrid of Kano model and QFD (case of banking service) (Pourhasomi et al., 2013), integrating fuzzy SERVQUAL into refined Kano model (case of restaurant service) (Hsieh et al., 2015), combination of the Kano model and QFD (designing new product) (Tontini, 2007), integrating SERVQUAL and Kano model and QFD (case of PT POS Indonesia) (Singgih & Ardhiyanti, 2010) and more. Accordingly, Tan and Pawitra (2001) mentioned and clarified the fundamentals of the procedure involving the collaboration of SERVQUAL, the Kano model, and QFD to evaluate customer satisfaction to develop service excellence and innovation for business organizations.

**Table 5.** The Major Point for Integrating SERVQUAL and Kano's Model into QFD

SERVQUAL	Kano's model	QFD
Assumes a linear relationship between customer satisfaction & service attributes performance.	Helps SERVQUAL to prioritize the improvement of an organization's weakness based on the category of needs that can lead to the highest customer satisfaction.	
As a continuous improvement & innovation tool.	It Helps SERVQUAL to address innovation issues, attractive attributes are a source of customer delight so it is one area where effort for improvement should be targeted.	Generally serves as the planning process for translating customer needs into an appropriate organizational requirement.
Provides important information on the gap between predicate service and perceived service, however, it is not able to address how the gaps can be closed.	Helps SERVQUAL to prioritize which service gap to focus on and to make effort on.	



**Figure 4.** A framework of integrated Kano's model into SERVQUAL.  
**Source:** Tan & Pawitra (2001)



**Figure 5.** A framework of integrated SERVQUAL and Kano's model into QFD.  
**Source:** Tan and Pawitra (2001)

The key arguments or problems for incorporating SERVQUAL and the Kano model into QFD are then briefly reviewed (Figure 4 and Figure 5, Table 5). Andronikidis et al. (2009) assessed and stated that when working with quantitative methods related to QFD, various issues arise at different stages of QFD execution, as follows: "QFD methodology imposes the need to deal with large amounts of data gathered from customers, competitors, and cross-functional, time-consuming, requiring input and analyzing a large amount of subjective data, bias may be easily inserted into any stage of the QFD, etc." The employment of quantitative approaches like the analytic hierarchy process (AHP) is thus necessary to build a new strategy for enhancing QFD's efficacy to resolve those problems. A better service delivery that meets or surpasses client expectations is made possible by the analytic network process (ANP) and Markov chains, increasing sales and customer satisfaction.

### 3. MATERIAL AND METHODS

#### 3.1 Fuzzy SERVQUAL Model

The main steps incorporated in the appraisal of bank service quality are discussed as follows: the questionnaires' design; distributing survey questionnaires and gathering survey data; analyzing customer expectations and perceptions of service quality; and finally, the interpretation of fuzzy SERVQUAL analysis.

##### Step 1. Questionnaire Design

This article adapts questionnaires from previous literature. The SERVQUAL model questionnaires addressing customer perceptions and expectations are weighted using the linguistic variables scale. For instance, the linguistic variables include "strongly disagree," "disagree," "neutral," "agree," and "strongly agree" (Table 6).



**Table 6.** A linguistic variable of perceptions & expectations.

Likert scale	Linguistic variables	Fuzzy membership function
1	Strongly disagree	(1, 1, 3)
2	Disagree	(1, 3, 5)
3	Neutral	(3, 5, 7)
4	Agree	(5, 7, 9)
5	Strongly agree	(7, 9, 9)

### Step 2. Distribution of Survey Questionnaires and Collection of Survey Data

A simple random sampling technique was used for the SERVQUAL model questionnaire's respondents. In line with this, the basic formula for calculating the sampling error for a sample estimate of a population parameter is as follows (Bozorgi, 2007).

Sample error =

$$\frac{\text{Variability of the measurement (Values among the sampling units)}}{\sqrt{\text{Size of the sample}}} \quad (2)$$

Also, this article describes a pilot test and the standard variation in factors of service quality measurement in the Grönroos model. Likewise, table 7 summarizes the standard deviation of service quality variables (Grönroos, 2000).

**Table 7.** Mean standard variation of services quality measurement. Source: Grönroos (2000)

Items	Mean standard variation
Tangibles	0.708
Reliability	0.301
Responsiveness	0.521
Assurance	0.263
Empathy	0.755
Technical factor	0.605
Image	0.603

Therefore, for this purpose, this article considers using a 5% sample error to be adequate for academic research. Accordingly, to get an accurate sample size, we should select the maximum value of the mean variation of a factor, so the sample size is calculated as follows:

$$0.05 = \frac{(0.755)}{\sqrt{\text{Size of the sample}}} = 240.24 \approx 240$$

### Step 3. Analysis of Customer Expectations and Perceptions

The main mathematical operations on fuzzy number Previous literature has discussed the mathematical operations of the fuzzy number (Adamo, 1980; Campos & Verdegay, 1989; Dubois & Prade, 1978; Nahmias, 1978).

The primary mathematical operations on fuzzy numbers include the ones listed below: Triangular fuzzy numbers  $A_1 = (c_1, a_1, b_1)$  and  $A_2 = (c_2, a_2, b_2)$  should be used as examples.

1. The triangular fuzzy number  $Y = (c, a, b)$  is a special case of a generalized trapezoidal fuzzy number.

The ranked average integration representation of the triangular fuzzy number  $Y$  will be.

$$P(Y) = \frac{1}{6}(c + 4a + b) \quad (3)$$

2. Addition operation of  $A_1$  and  $A_2$

$$A_1 + A_2 = (c_1 + c_2, a_1 + a_2, b_1 + b_2) \quad (4)$$

Where:  $c_1, c_2, a_1, a_2, b_1, b_2$  are real numbers

3. Subtraction operation of  $A_1$  and  $A_2$

$$A_1 - A_2 = (c_1 - b_2, a_1 - a_2, b_1 - c_2) \quad (5)$$

Where:  $c_1, c_2, a_1, a_2, b_1, b_2$  are real numbers

4. Division operation of  $A$  and any real number  $r$

$$\frac{A}{r} = \left( \frac{c}{r}, \frac{a}{r}, \frac{b}{r} \right) \quad (6)$$

Where:  $r$  are real numbers

5. Multiplication operation

$$P(Y_1 * Y_2) = \frac{1}{6}(c_1 + 4a_1 + b_1) * \frac{1}{6}(c_2 + 4a_2 + b_2) \quad (7)$$

The analysis steps are discussed as follows:

1. Let fuzzy number  $A_{ein}$  be the service quality expectation from the  $n^{\text{th}}$  customer under service item  $i$ , let fuzzy number  $A_{pin}$  be the service quality perceptions from the  $n^{\text{th}}$  customer under service item  $i$ , and let fuzzy number  $TA_{ei}$  be the sum of service quality expectation from all customer under service item  $i$ , let fuzzy service number  $TA_{pi}$  be the sum of service quality perception from all customer under service item  $i$ .

$$TA_{ei} = \sum_{i=1}^N A_{ein} \quad (8)$$

$$TA_{pi} = \sum_{i=1}^N A_{pin} \quad (9)$$

By using equations (4) & (8) we can analyze the sum of service quality expectations from all customers under service item  $i$ , alike, by using (4) & (9) we can analyze the sum of service quality perception from all customers under service item  $i$ .

2. Let fuzzy number  $MA_{ei}$  be the average service quality expectations from all customers under service item  $i$ , and let fuzzy number  $MA_{pi}$  be the average service quality perceptions from all customers under service item  $i$ .

$$MA_{ei} = \frac{TA_{ei}}{N} \quad (10)$$

$$MA_{pi} = \frac{TA_{pi}}{N} \quad (11)$$

By using equations (6) & (10) we can analyze the average service quality expectation from all customers under service item  $i$ , alike, by using equations (6) & (11) we can analyze the average service quality perception from all customers under service item  $i$ .

3. Let fuzzy number  $Gap_i$  be the gap within the perception and expectation of service quality from all customers under service item  $i$ .

$$Gap_i = MA_{pi} - MA_{ei} \quad (12)$$

By using equations (5) & (12) we can analyze the service quality gap with the expectation and perception from all customers under service item  $i$ , likewise, by using equation (3) we can analyze the representation of a fuzzy number.

### 3.2. Fuzzy Kano's Model

Following is a discussion of the primary methods used to assess the functional and dysfunctional requirements for bank service quality: design, dissemination, and data gathering for Kano model questionnaires; Kano categorization; customer satisfaction and self-stated importance; and, lastly, customer needs and technical requirements.

#### Step 1. Kano's Model Questionnaire Design

This article adapts questionnaires from previous literature. Kano models' functional and dysfunctional interpretations were careful. In line with this, customer responses are weighted using linguistic variables. For example, the linguistic variables include "I like it," "I expect it," "I am neutral," "I can tolerate it," and "I dislike it." And the second type of Kano model questionnaire addresses customers' views on how important a given feature is to them, and their responses are weighted using the linguistic variables scale. For example, the linguistic variables include "not important," "somewhat important," "important," "very important," and "extremely important" (Table 8).

**Table 8.** Linguistic variables of Kano's model.

Self-stated importance scale	Linguistic variable	Fuzzy membership function
1	Not important	(1, 1, 5)
3	Somewhat important	(1, 5, 7)
5	Important	(5, 7, 11)
7	Very important	(7, 11, 13)
9	Extremely important	(11, 13, 13)

#### Step 2. Distribution of Kano's Model Questionnaires and Collection of Survey Data

The snowball sampling technique was used for Kano's model questionnaire respondents, and the formula for calculating the sample size is as follows:

$$n = \frac{Z^2 * \sigma^2}{e^2} = \frac{Z^2 * P(1-P)}{e^2} \quad (13)$$

$$n = \frac{1.96^2 * 0.3(1-0.3)}{0.05^2} = 322.69 \approx 323$$

#### Step 3. Determine Kano's Classification, Customer Satisfaction Coefficient, and Self-Stated Importance

The customer satisfaction coefficient indicates whether a service's ability to satisfy criteria may boost customer

satisfaction or whether doing so only keeps them from being unsatisfied. As seen below, the two equations were used to calculate how satisfied and unsatisfied people were with their lives.

$$\text{Customer satisfaction (better)} = \frac{A + O}{A + O + M + I} \quad (14)$$

$$\text{Customer dissatisfaction (worst)} = -\frac{O + M}{A + O + M + I} \quad (15)$$

### Step 4. Determine Customer Requirements and Technical Requirement

Utilizing the fuzzy SERVQUAL and fuzzy Kano models, customer needs were determined. A similar concentrated group conversation with the branch manager and customer support representative led to the discovery of the technical necessity.

### 3.3. Fuzzy Analytic Network Process

The major steps undertaken in the fuzzy analytic network process are discussed as follows.

#### Step 1. Establish Fuzzy Analytic Network Process Pairwise Comparison Matrices

Following the identification of the customer requirement from fuzzy SERVQUAL and fuzzy Kano model analysis, the next step is to construct a fuzzy pairwise comparison of customer requirements to analyze the weight of each customer requirement, respectively. On the other hand, the analytic network process is weighted using the linguistic variables scale; for instance, the linguistic variables include "equally important," "weakly important," "fairly important," "strongly important," and "absolutely important."

#### Step 2. Analyze the Local Weight of Each Technical Requirement Concerning Customer Requirement

This step entails examining the fuzzy weights associated with each technical requirement and each customer requirement for compliance (Table 9).

**Table 9.** Linguistic variables of the Analytic Network Process.

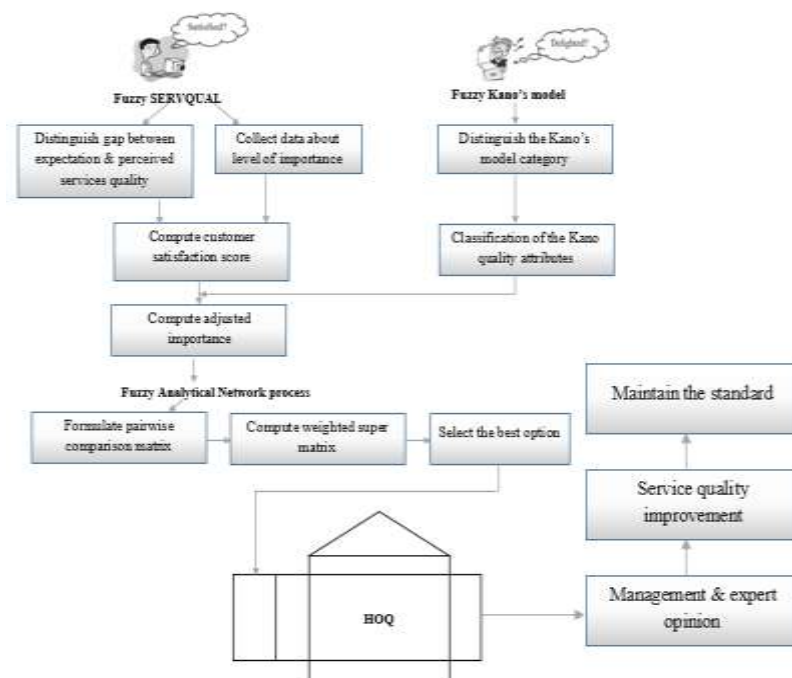
Saaty scale	Linguistic variable	Fuzzy membership function
1	Equally important	(1, 1, 1)
3	Weakly important	(2, 3, 4)
5	Fairly important	(4, 5, 6)
7	Strongly important	(6, 7, 8)
9	Absolutely important	(9, 9, 9)

### 3.4. Integrated Fuzzy SERVQUAL, Fuzzy Kano's Model, and Fuzzy ANP into QFD

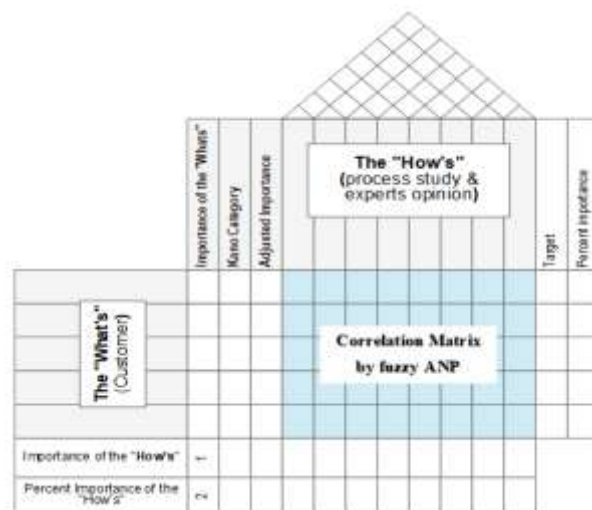
The approach incorporated in the design of an integrated HOQ is discussed as follows: Kano categories were allocated based on their fuzzy Kano model analysis, and

the importance of "what" was gathered using fuzzy SERVQUAL analysis (Figure 6 and Figure 7). The Kano categories were then multiplied with fuzzy

SERVQUAL results to determine the modified importance (importance of "what" value).



**Figure 6.** A framework of synergies of fuzzy SERVQUAL, fuzzy Kano's model, and fuzzy analytical network process into QFD.



**Figure 7.** House of Quality (HOQ) for service quality design by using fuzzy ANP for correlation matrix

Also, the adjusted importance was then multiplied with each technical requirement in the row and summed up the results of the total value to determine the (importance of the "how" value). Briefly, the application of integrated fuzzy SERVQUAL, fuzzy Kano model, and fuzzy ANP into QFD is presented in the figure 7.

#### 4. RESULTS AND DISCUSSION

Based on the statistics obtained from the table 10, we can interpret the following analysis result as follows:

These include the first variable, reliability, which contains: the bank providing the promised service within a given time frame (-4.478); the bank responding to your claim fast and delivering adequate service within the time frame (-4.324); the bank performing the service right the first time (-3.310); and whenever you face a problem, the bank always shows a sincere interest in solving it (-3.216). understanding your specific needs of you (-3.010).

**Table 10.** The analysis of expectations and perceptions

Dimension	Expectation	Perception	Gap	Rank
<b>Reliability</b>	<b>7.726</b>	<b>4.089</b>	<b>-3.637</b>	<b>-3.637<sup>[1]</sup></b>
Item 1	8.154	3.676	-4.478	-4.478 <sup>[1]</sup>
Item 2	7.762	4.546	-3.216	-3.216 <sup>[8]</sup>
Item 3	7.762	4.905	-2.857	-2.857 <sup>[12]</sup>
Item 4	7.065	3.755	-3.310	-3.310 <sup>[6]</sup>
Item 5	7.886	3.562	-4.324	-4.324 <sup>[2]</sup>
<b>Assurance</b>	<b>7.580</b>	<b>5.279</b>	<b>-2.301</b>	<b>-2.301<sup>[4]</sup></b>
Item 6	7.811	5.918	-1.893	-1.893 <sup>[17]</sup>
Item 7	7.539	4.771	-2.768	-2.768 <sup>[13]</sup>
Item 8	7.686	5.680	-2.006	-2.006 <sup>[16]</sup>
Item 9	7.284	4.748	-2.536	-2.536 <sup>[15]</sup>
<b>Tangible</b>	<b>7.597</b>	<b>6.203</b>	<b>-1.394</b>	<b>-1.394<sup>[5]</sup></b>
Item 10	7.977	7.118	-0.859	-0.859 <sup>[22]</sup>
Item 11	7.441	5.739	-1.702	-1.702 <sup>[19]</sup>
Item 12	7.536	6.016	-1.520	-1.520 <sup>[20]</sup>
Item 13	7.435	5.938	-1.497	-1.497 <sup>[21]</sup>
<b>Empathy</b>	<b>7.175</b>	<b>4.388</b>	<b>-2.787</b>	<b>-2.787<sup>[3]</sup></b>
Item 14	7.232	4.013	-3.219	-3.219 <sup>[7]</sup>
Item 15	7.399	5.520	-1.879	-1.879 <sup>[18]</sup>
Item 16	6.814	4.098	-2.716	-2.716 <sup>[14]</sup>
Item 17	7.069	3.957	-3.112	-3.112 <sup>[9]</sup>
Item 18	7.363	4.353	-3.010	-3.010 <sup>[10]</sup>
<b>Responsiveness</b>	<b>7.885</b>	<b>4.485</b>	<b>-3.400</b>	<b>-3.400<sup>[2]</sup></b>
Item 19	7.814	4.323	-3.491	-3.491 <sup>[5]</sup>
Item 20	8.030	4.425	-3.605	-3.605 <sup>[3]</sup>
Item 21	8.124	5.154	-2.970	-2.970 <sup>[11]</sup>
Item 22	7.572	4.039	-3.533	-3.533 <sup>[4]</sup>

**Table 11.** Kano classification

Customer requirement	A	O	M	I	R	Q	Total	Categories
Item 1	Response	14	53	22	10	1	101	O
	Percentage	13.86%	52.48%	21.78%	9.90%	0.99%	100%	
Item 2	Response	8	24	42	10	4	101	M
	Percentage	7.92%	23.76%	41.58%	9.90%	3.96%	100%	
Item 3	Response	21	57	13	6	2	101	O
	Percentage	20.79%	56.44%	12.87%	5.94%	1.98%	100%	
Item 4	Response	17	28	37	14	2	101	M
	Percentage	16.83%	27.72%	36.63%	13.86%	1.98%	100%	
Item 5	Response	27	38	13	18	1	101	O
	Percentage	26.73%	37.62%	12.87%	17.82%	0.99%	100%	
Item 6	Response	14	45	20	20	0	101	O
	Percentage	13.86%	44.55%	19.80%	19.80%	0.00%	100%	
Item 7	Response	25	29	22	20	1	101	O
	Percentage	24.75%	28.71%	21.78%	19.80%	0.99%	100%	
Item 8	Response	16	30	23	29	1	101	O
	Percentage	15.84%	29.70%	22.77%	28.71%	0.99%	100%	
Item 9	Response	12	34	22	28	3	101	O
	Percentage	11.88%	33.66%	21.78%	27.72%	2.97%	100%	
Item 10	Response	10	33	45	9	1	101	M
	Percentage	9.90%	32.67%	44.55%	8.91%	0.99%	100%	
Item 11	Response	22	38	13	22	1	101	O
	Percentage	21.78%	37.62%	12.87%	21.78%	0.99%	100%	
Item 12	Response	30	44	14	7	3	101	O
	Percentage	29.70%	43.56%	13.86%	6.93%	2.97%	100%	
Item 13	Response	8	42	30	14	4	101	O
	Percentage	7.92%	41.58%	29.70%	13.86%	3.96%	100%	
Item 14	Response	0	61	36	1	3	101	O
	Percentage	0.00%	60.40%	35.64%	0.99%	2.97%	100%	
Item 15	Response	13	43	17	10	14	101	O
	Percentage	12.87%	42.57%	16.83%	9.90%	13.86%	100%	

The second variable is responsiveness which contains bank employees delivering prompt service to you (3.605), bank employees never being too busy to respond to your request (-3.533), and bank employees informing you exactly when service will be performed (-3.491).

The third variable is empathy which contains the bank giving care and individual attention to you (-3.219), the bank giving you the best interest at heart (-3.112), and bank employees always The majority of client requirements, according to the Kano classification study, are characterized as one-dimensional needs; thus,

the bank should take note of aspects in the design of the service system that suggest greater customer satisfaction. Examples of one-dimensional items are item 14 (response of 61 and percentage of 60.40), item 3 (response of 57 and 56.44%), and item 1 (response of 53 and 52.48%). This analysis enables us to determine or identify customer requirements, which also helps the company understand the voice of its customers to improve service quality (Table 11).

#### Customer Satisfaction Coefficient and Self-Statement Importance

Based on the statistics obtained from the table 12, we can interpret the following analysis result as follows: the

**Table 12.** Customer satisfaction coefficient and self- stated importance

Service requirement	$Better = \frac{A + O}{A + O + M + I}$	$Worst = -\frac{O + M}{A + O + M + I}$	Self-stated importance
Item 1	0.68	-0.76	10.845
Item 2	0.38	-0.79	10.093
Item 3	0.80	-0.72	11.082
Item 4	0.47	-0.68	10.231
Item 5	0.68	-0.53	9.212
Item 6	0.60	-0.66	9.954
Item 7	0.56	-0.53	9.895
Item 8	0.47	-0.54	9.548
Item 9	0.48	-0.58	9.845
Item 10	0.44	-0.80	10.092
Item 11	0.63	-0.54	9.806
Item 12	0.78	-0.61	9.726
Item 13	0.53	-0.77	10.796
Item 14	0.62	-0.99	10.944
Item 15	0.67	-0.72	10.944

#### Determine Customer Requirements and Technical Requirement

Customer requirements were identified by using fuzzy SERVQUAL and fuzzy Kano's model. One of the main reasons for identifying the main customer requirement is to determine which service attributes have a significant effect on customer service perception (Table 13).

**Table 13.** List of customer requirements

No.	Customer requirement
1	The bank should provide the promised service within a given time frame
2	The bank should respond to customer clam fast and deliver adequate service within the time frame
3	An employee should deliver prompt service to the customer
4	The employee should never be too busy to respond to customer request
5	The employee should inform the customer exactly when service will be performed

Table 14 summarize the main technical requirements based on focused group discussions with the branch

self-stated importance analysis indicates that having the promised service within a given time frame (10.845), getting a fast claim response and getting adequate service within the time frame (11.082), having the employee inform you exactly when the service will be performed (10.796), and having the employee deliver prompt service (10.944) are all significant. This analysis result is critical to distinguish features from each other and helps to know which are most relevant to the customer; therefore, in the next step, we can determine customer requirements from fuzzy SERVQUAL and fuzzy Kano's model analysis results.

manager and customer support representative led to the discovery of the technical requirements.

**Table 14.** List of technical requirements

No.	Technical requirement
1	Collect customer feedback on a continuous basis
2	Identify dissatisfied customers & frequent service failure issues
3	Update service standards & guidelines
4	Conduct adequate training, performance evaluation & rewards
5	Improve internal service quality by concentrating on employee issues and concerns
6	Establish experience-sharing conducts

#### Analyze the Local Weight of each Technical Requirement Concerning Customer Requirement

Following this, the next step is to determine the fuzzy weight of each customer requirement correspondingly and evaluate each technological requirement's fuzzy weight by considering customer requirements as a factor (Table 15).

**Table 15.** Fuzzy weight of customer requirement

Fuzzy weight					Weight
CR <sub>1</sub>	0.329042	0.397976	0.472305	0.399774	0.4788824
CR <sub>2</sub>	0.078474	0.085344	0.092577	0.085465	0.10237726
CR <sub>3</sub>	0.056147	0.066162	0.078717	0.067009	0.08026851
CR <sub>4</sub>	0.166245	0.213171	0.264957	0.214791	0.25729409
CR <sub>5</sub>	0.051774	0.066162	0.085367	0.067768	0.08117774
Total					1

#### Acquire the Weighted Supermatrix

In this section, the main task is to construct the weighted supermatrix; having done that, the next step is

to multiply each column of the technical requirement by a fuzzy weight (Table 16).

**Table 16.** The weighted supermatrix

	Weight	TR <sub>1</sub>	TR <sub>2</sub>	TR <sub>3</sub>	TR <sub>4</sub>	TR <sub>5</sub>	TR <sub>6</sub>
CR <sub>1</sub>	0.479	0.354697	0.068647	0.255945	0.163718	0.125744	0.031248
CR <sub>2</sub>	0.102	0.241429	0.075028	0.097211	0.097211	0.244401	0.100502
CR <sub>3</sub>	0.080	0.270366	0.046822	0.132208	0.273316	0.054156	0.223131
CR <sub>4</sub>	0.257	0.222068	0.050393	0.102766	0.270215	0.114411	0.240147
CR <sub>5</sub>	0.081	0.12392	0.18745	0.121312	0.182614	0.117983	0.266722

#### Analyze the Comprehensive Weight

When the abovementioned stage is complete, we may build the relationship matrix between customer needs

and technical requirements, which is needed for HOQ analysis (Table 17).

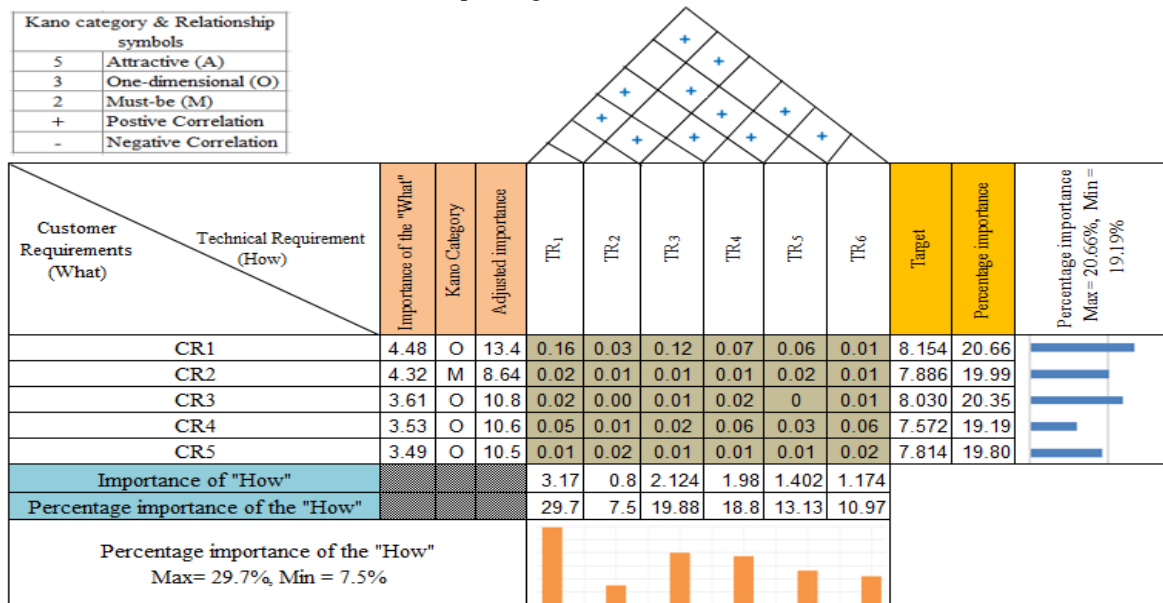
**Table 17.** Relationship matrix between customer requirement and technical requirement

	TR <sub>1</sub>	TR <sub>2</sub>	TR <sub>3</sub>	TR <sub>4</sub>	TR <sub>5</sub>	TR <sub>6</sub>
CR <sub>1</sub>	0.169858	0.0328738	0.122568	0.078402	0.060216	0.014964
CR <sub>2</sub>	0.024717	0.00768115	0.009952	0.009952	0.025021	0.010289
CR <sub>3</sub>	0.021702	0.00375836	0.010612	0.021939	0.004347	0.01791
CR <sub>4</sub>	0.057137	0.0129658	0.026441	0.069525	0.029437	0.061788
CR <sub>5</sub>	0.01006	0.01521673	0.009848	0.014824	0.009578	0.021652

#### Integrated Fuzzy SERVQUAL, Fuzzy Kano's Model, and Fuzzy ANP into QFD

From the integrated HOQ analysis, prioritize the technical requirements based on their importance, for example, collecting customer feedback continuously with a value of 29.7%, updating service standards and guidelines (19.88%), conducting adequate training, performance evaluation, and reward (18.8%), improving

internal service quality by concentrating on employee issues (13.3%), establishing experience sharing practices (10.97%), and finally identifying dissatisfied customers and frequent service failure issues (7.5%). Accordingly, the study claimed that enhancing each of those technical requirements might enhance the bank's level of customer satisfaction through higher service quality.



**Figure 8.** Integrated House of Quality

Besides, the analysis also prioritizes the customer requirements based on their importance. The bank should provide the promised service within a given time frame (20.66%), and an employee should deliver prompt service to the customer (20.35%). The bank should respond to a customer's claim fast and provide adequate service within the time frame (19.99%); the employee should inform the customer exactly when service will be performed (19.80%). And the employee should never be too busy to respond to customer requests (19.19%). Therefore, this article declares that fulfilling those customer requirements can increase customer satisfaction.

## 5. CONCLUSION

With the increasing progress in bank service in today's competitive market, people experience fast and prudent service delivery of bank service this phenomenon has enhanced customer expectations about bank service.

The finding has a practical implication for service industries to explore their drawbacks related to service quality. Likewise, increase customer satisfaction and increase their competitiveness in the current marketplace. The bank should also constantly collect customer feedback, identify the root causes of service failures that commonly leave customers dissatisfied, update service standards and guidelines, and implement proper training, performance assessments, and incentive schemes. And raise the standards of internal services by emphasizing worker issues and concerns. And finally, establish procedures for exchanging experiences.

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## References:

- Abdi, M. R. (2012). Product family formation and selection for reconfigurability using analytical network process. *International Journal of Production Research*, 50(17), 4908–4921. doi: 10.1080/00207543.2012.657976
- Adamo, J. M. (1980). Fuzzy decision trees. *Fuzzy Sets and Systems*, 4, 207–219. doi: 10.1016/0165-0114(80)90011-1
- Adil, M., Ghaswyneh, O. F. M. Al, & Albkour, A. M. (2013). SERVQUAL and SERVPERF: A Review of Measures in Services Marketing Research. *Global Journal of Management and Business Research Marketing*, 13(6), 65–76.
- Ahmed, M. (2017). Service Quality Measurement regarding Banking Sector. *International Journal of Business and Social Science*, 8(6), 50–61.
- Akhlaghi, E., Amini, S., & Akhlaghi, H. (2012). Evaluating Educational Service Quality in Technical and Vocational Colleges using SERVQUAL Model. *Procedia - Social and Behavioral Sciences*, 46, 5285–5289. doi: 10.1016/j.sbspro.2012.06.424
- Ali, Q. (2018). Service Quality from Customer Perception: Evidence from Carter Model on Bank Islam Brunei Darussalam ( BIBD ). *International Journal of Business and Management*, 13(2), 138–148. doi: 10.5539/ijbm.v13n2p138
- Alnsour, M. S., Tayeh, B. A., & Alzyadat, M. A. (2014). Using SERVQUAL to assess the quality of service provided by Jordanian telecommunications Sector. *International Journal of Commerce and Management*, 24(3), 209–218. doi: 10.1108/IJCoMA-03-2012-0021
- Alzola, L. M., & Robaina, V. P. (2005). Servqual: Its Applicability in Electronic Commerce B2C. *Quality Management Journal*, 12(4), 46–57. doi: 10.1080/10686967.2005.11919270
- Anbari, Z., Mohammadi, M., & Taheri, M. (2014). Measurement of Quality of Hospital Services via SERVQUAL Model. *Life Science Journal*, 11(6), 51–56.
- Andronikidis, A., Georgiou, A. C., Gotzamani, K., & Kamvysi, K. (2009). The application of quality function deployment in service quality management. *TQM Journal*, 21(4), 319–333. doi: 10.1108/17542730910965047
- Babakus, E., & Boller, G. W. (1992). An empirical assessment of the SERVQUAL scale. *Journal of Business Research*, 24(3), 253–268. doi: 10.1016/0148-2963(92)90022-4
- Baki, B., Basfirinci, C. S., Cilingir, Z., & AR, I. M. (2009). An application of integrating SERVQUAL and Kano's s model into QFD for logistics services A case study from Turkey. *Asia Pacific Journal of Marketing and Logistics*, 21(1), 106–126. doi: 10.1108/13555850910926272
- Basari, M. A. M. D., & Shamsudin, M. F. (2020). Does Customer Satisfaction Matters? *Journal of Undergraduate Social Science & Technology*, 2(1). 1-15, doi: 10.1108/IJBM-02-2017-0037

- Basfirinci, C., & Mitra, A. (2015). A cross-cultural investigation of airlines service quality through integration of Servqual and the Kano model. *Journal of Air Transport Management*, 42, 239–248. doi: 10.1016/j.jairtraman.2014.11.005
- Bayazit, O. (2006). Use of analytic network process in vendor selection decisions. *Benchmarking: An International Journal*, 13(5), 566–579. doi: 10.1108/14635770610690410
- Beheshtinia, M. A., & Farzaneh Azad, M. (2017). A fuzzy QFD approach using SERVQUAL and Kano models under budget constraint for hotel services. *Total Quality Management and Business Excellence*, 1–23. doi: 10.1080/14783363.2017.1340830
- Bena, I. (2010). Evaluating Customer Satisfaction In Banking Services. *Management & Marketing*, 5(2), 143–150.
- Berushie, M. A. (2014). Customer Satisfaction With Service Quality ( the Case of Commercial Bank of Ethiopia Addis Ababa Branch ). ST. MARY'S UNIVERSITY.
- Bhaskar, N. U., & Shekha, B. R. (2011). Impact of Service Quality on Apparel Retail Customer Satisfaction-A Study of Select Metropolitan City Hyderabad. *Journal of Management Research*, 3(2), 1–13. doi: 10.5296/jmr.v3i2.674
- Bhattacharyya, S. K., & Rahman, Z. (2004). Capturing the customer ' s voice , the centerpiece of strategy making A case study in banking. *European Business Review*, 16(2), 128–138. doi: <http://dx.doi.org/10.1108/09555340410524238>
- Blocker, C. P., Flint, D. J., Myers, M. B., & Slater, S. F. (2011). Proactive customer orientation and its role for creating customer value in global markets. *Journal of the Academy of Marketing Science*, 39(2), 216–233. doi: 10.1007/s11747-010-0202-9
- Boateng, P., Chen, Z., & Ogunlana, S. O. (2015). An Analytical Network Process model for risks prioritisation in megaprojects. *International Journal of Project Management*, 1–17. doi: 10.1016/j.ijproman.2015.08.007
- Bolton, R. N., & Drew, J. H. (1991). A Multistage Model of Customers' Assessments of Service Quality and Value. *Journal of Consumer Research*, 17(4), 375–384. doi: 10.1086/208564
- Bouchereau, V., & Rowlands, H. (2000). Methods and Techniques to help Quality Function Deployment (QFD). *Benchmarking: An International Journal*, 7(1), 8–19. doi: 10.1108/14635770010314891
- Boulding, W., Kalra, A., Staelin, R., & Zeithaml, V. A. (1993). A Dynamic Process Model of Service Quality: From Expectations to Behavioral Intentions. *Journal of Marketing*, 30(1), 7–27. doi: 10.2307/3172510
- Bozorgi, M. M. (2007). Measuring Service Quality in the Airline Using SERVQUAL Model: Case of IAA. Luleå University of Technology.
- Brady, M. K., & Cronin, J. J. (2001). Some new thoughts on conceptualizing perceived service quality: A hierarchical approach. *Journal of Marketing*, 65(3), 34–49. doi: 10.1509/jmkg.65.3.34.18334
- Bryslan, A., & Curry, A. (2001). Service improvements in public services using SERVQUAL. *Managing Service Quality: An International Journal*, 11(6), 389–401. doi: 10.1108/09604520110410601
- Buttle, F. (1996). SERVQUAL: review, critique, research agenda. *European Journal of Marketing*, 30(1), 8–32. doi: 10.1108/03090569610105762
- Campos, L., & Verdegay, J. L. (1989). Linear programming problems and ranking of fuzzy numbers. *Fuzzy Sets and Systems*, 32, 1–11. doi: 10.1016/0165-0114(89)90084-5
- Çelebi, D., Bayraktar, D., & Bingöl, L. (2010). Analytical Network Process for logistics management: A case study in a small electronic appliances manufacturer. *Computers & Industrial Engineering*, 58, 432–441. doi: 10.1016/j.cie.2009.09.002
- Cengiz, E. (2010). Measuring Customer Satisfaction: Must or Not? *Journal of Naval Science and Engineering*, 6(2), 76–88.
- Chen, S. H., Lin, H. T., & Lee, H. T. (2004). Enterprise partner selection for vocational education : analytical network process approach. *International Journal of Manpower*, 25(7), 643–655. doi: 10.1108/01437720410563980
- Cheng, E. W. L., & Li, H. (2004). Contractor selection using the analytic network process. *Construction Management and Economics*, 22(10), 1021–1032. doi: 10.1080/0144619042000202852
- Cheng, E. W. L., & Li, H. (2005). Analytic Network Process Applied to Project Selection. *Journal of Construction Engineering and Management*, 131, 459–466. doi: 10.1061/ASCE?0733-9364?2005?131:4?459? CE
- Chiang, C. F., Chen, W. Y., & Hsu, C. Y. (2021). Classifying technological innovation attributes for hotels: an application of the Kano model. In *Future of Tourism Marketing* (pp. 28-39). Routledge. 1–12. doi: 10.1080/10548408.2019.1575786



- Chiguvu, D., Muchingami, L., & Chuma, R. (2017). A Study on Customer Satisfaction in Commercial Banks in Botswana. *International Journal of Innovative Research in Science, Engineering and Technology*, 6(4), 5112–5118. doi: 10.15680/IJRSET.2017.0604002
- Cooper, O., Tadikamalla, P., & Shang, J. (2012). Selection of a third-party logistics provider: Capturing the interaction and influence of performance metrics with the analytical network process. *Journal of Multi-Criteria Decision Analysis*, 19(3-4), 115-128. doi: 10.1002/mcda.489
- Cronin, J. J., & Taylor, S. A. (1992). Measuring Service Quality: A Reexamination and Extension. *Journal of Marketing*, 56(3), 55–68. doi: 10.1177/002224299205600304
- Dabestani, R., Shahin, A., & Saljoughian, M. (2017). Evaluation and Prioritization of Service Quality Dimensions Based on Gap Analysis with Analytic Network Process. *International Journal of Quality & Reliability Management*, 34(4), 1–16. doi: 10.1108/IJQRM-04-2015-0050
- Dijkstra, L., & Bij, H. van der. (2002). Quality function deployment in healthcare. *International Journal of Quality & Reliability Management*, 19(1), 67–89. doi: <http://dx.doi.org/10.1108/02656710210413453>
- Donnelly, M., Wisniewski, M., Dalrymple, J. F., & Curry, A. C. (1995). Measuring service quality in local government: The SERVQUAL approach. *International Journal of Public Sector Management*, 8(7), 15–20. doi: 10.1108/09513559510103157
- Dragolea, L., & Dornei, V. (2008). Service quality management through customer orientation. *Annales Universitatis Apulensis Series Oeconomica*, 2(10), 1-48.
- Dubois, D., & Prade, H. (1978). Operations on fuzzy numbers. *International Journal of System Science*, 9(6), 613–626. doi: <http://dx.doi.org/10.1080/00207727808941724>
- Elmayar, A. (2011). Assessing The Perceived Service Quality Levels In The Libyan Private And Public Banking Sectors : A Customer Perspective Ashraf Elmayar A thesis submitted in partial fulfilment of the requirements of the University of Northumbria at Newcastle Upon Tyne fo (Issue March).
- Farman, H., Javed, H., Jan, B., Ahmad, J., Ali, S., Khalil, F. N., & Khan, M. (2017). Analytical network process based optimum cluster head selection in wireless sensor network. *PLoS ONE*, 12(7), 1–28. doi: 10.1371/journal.pone.0180848
- Galankashi, M. R., Chegeni, A., Soleimanyanadegany, A., Memari, A., Anjomshoe, A., Helmi, S. A., & Dargi, A. (2015). Prioritizing Green Supplier Selection Criteria using Fuzzy Analytical Network Prioritizing Green Supplier Selection Criteria using Fuzzy Analytical Network Process. *Procedia CIRP*, 26, 689–694. doi: 10.1016/j.procir.2014.07.044
- Galeeva, R. B. (2016). SERVQUAL application and adaptation for educational service quality assessments in Russian higher education. *Quality Assurance in Education*, 24(3), 329–348. doi: 10.1108/QAE-06-2015-0024
- Gebre, B. (2017). Assessment on Service Quality in Commercial Bank of Ethiopia : Emphasis on Customers ' Accounts and Transaction Service. St. Mary's University.
- Genestre, A., & Herbig, P. (1996). Service Expectations and Perceptions Revisited: Adding Product Quality to Servqual. *Journal of Marketing Theory and Practice*, 4(4), 72–82. doi: 10.1080/10696679.1996.11501740
- Genevois, M. E., Celik, D., & Ulukan, H. Z. (2015). Analytic Network Process Approach for Automatic Teller Machines Deployment Problem. Presented at the 6th IESM Conference, 1–8.
- Gera, R., Mittal, S., Batra, D. K., & Prasad, B. (2017). Evaluating the effects of service quality, customer satisfaction, and service value on behavioral intentions with life insurance customers in India. *International Journal of Service Science, Management, Engineering, and Technology*, 8(3), 1–20. doi: 10.4018/IJSSMET.2017070101
- Gheshlaghi, H. A., Feizizadeh, B., & Blaschke, T. (2019). GIS-based forest fire risk mapping using the analytical network process and fuzzy logic. *Journal of Environmental Planning and Management*, 63(3), 481-499. doi: 10.1080/09640568.2019.1594726
- Ghobadian, A., Speller, S., & Jones, M. (1994). Service Quality: Concepts and Models. *International Journal of Quality & Reliability Management*, 11(9), 43–66. doi: 10.1108/02656719410074297 Permanent
- Giannikas, V., McFarlane, D., & Strachan, J. (2019). Towards the deployment of customer orientation: A case study in third-party logistics. *Computers in Industry*, 104, 75–87. doi: 10.1016/j.compind.2018.10.005
- Godse, M., Sonar, R., & Mulik, S. (2008). Web Service Selection based on Analytical Network Process Approach. 2008 IEEE Asia-Pacific Services Computing Conference Web, 1103–1108. doi: 10.1109/APSCC.2008.218
- Goldstein, S. M., Johnston, R., Duffy, J., & Rao, J. (2002). The service concept: the missing link in service design research? *Journal of Palliative Medicine*, 20, 121–134. doi: 10.1089/jpm.2011.0527

- Gounaris, S. P., Stathakopoulos, V., & Athanassopoulos, A. D. (2003). Antecedents to perceived service quality: An exploratory study in the banking industry. *International Journal of Bank Marketing*, 21(4), 168–190. doi: 10.1108/02652320310479178
- Gregory, A. M., & Parsa, H. G. (2013). Kano's Model: An Integrative Review of Theory and Applications to the Field of Hospitality and Tourism. *Journal of Hospitality Marketing & Management*, 22(1), 25–46. doi: <http://dx.doi.org/10.1080/19368623.2011.641073>
- Gremyr, I., & Raharjo, H. (2013). Quality function deployment in healthcare: A literature review and case study. *International Journal of Health Care Quality Assurance*, 26(2), 135–146. doi: 10.1108/09526861311297343
- Grønholdt, L., Martensen, A., & Kristensen, K. (2000). The relationship between customer satisfaction and loyalty: Cross-industry differences. *Total Quality Management*, 11(4–6), 509–514. doi: 10.1080/09544120050007823
- Gronroos, C. (1984). A Service Quality Model and its Marketing Implications. *European Journal of Marketing*, 18(4), 36–44. doi: 10.1108/EUM00000000004784
- Grönroos, C. (2000). Service Management and Marketing : A Customer Relationship Management Approach, 2nd Edition. *European Journal of Marketing*, 36, 404.
- Grönroos, C. (2001). The perceived service quality concept – a mistake? *Managing Service Quality: An International Journal*, 11(3), 150–152. doi: 10.1108/09604520110393386
- Gunasekare, U. L. T. P. (2016). Human Factors of Service Quality : Study of Retail Banking in Sri Lanka. *International Journal of Business and Social Science*, 7(2), 140–145.
- Gupta, A., Singh, R. K., & Suri, P. K. (2018). Sustainable Service Quality Management by Logistics Service Providers: An Indian Perspective. *Global Business Review*, 19(3S)(3\_suppl), 130S-150S. doi: 10.1177/0972150918758098
- Gupta, P., & Srivastava, R. K. (2012). Integrating SERVQUAL and Kano Model into QFD for Customer Satisfaction of the Hotel Service Industry. *MIT International Journal of Mechanical Engineering*, 2(1), 45–54.
- Haag, S., Raja, M. K., & Schkade, L. L. (1996). Quality function deployment usage in software development. *Communications of the ACM*, 39(1), 41–49. doi: 10.1145/234173.234178
- Hamzah, A. A. bin, & Shamsudin, M. F. (2020). Why Customer Satisfaction Is Important. *Journal of Undergraduate Social Science and Technology*, 2(1).
- Hanif, M., Hafeez, S., & Riaz, A. (2010). Factors affecting customer satisfaction. *International Research Journal of Finance and Economics*, 60, 44–52.
- Harvey, L., & Green, D. (1993). Defining Quality. *Assessment & Evaluation in Higher Education*, 18(1), 9–34. doi: 10.1080/0260293930180102
- Hasanzadeh, M., Danehkar, A., & Azizi, M. (2013). The application of Analytical Network Process to environmental prioritizing criteria for coastal oil jetties site selection in Persian Gulf coasts (Iran). *Ocean and Coastal Management*, 73, 136–144. doi: 10.1016/j.ocecoaman.2012.12.004
- Hasfar, M., Militina, T., & Achmad, G. N. (2020). Effect of Customer Value and Customer Experience on Customer Satisfaction and Loyalty Pt Meratus Samarinda. *International Journal of Economics, Business and Accounting Research (IJEBAR)*, 4(01), 84–94. doi: 10.29040/ijebar.v4i01.909
- He, H., & Li, Y. (2011). CSR and Service Brand: The Mediating Effect of Brand Identification and Moderating Effect of Service Quality. *Journal of Business Ethics*, 100(4), 673–688. doi: 10.1007/s10551-010-0703-y
- He, Y., Li, W., & Keung Lai, K. (2011). Service climate, employee commitment and customer satisfaction: Evidence from the hospitality industry in China. *International Journal of Contemporary Hospitality Management*, 23(5), 592–607. doi: 10.1108/09596111111143359
- Hernon, P., & Nitecki, D. A. (2001). Service quality: A concept not fully explored. *Library Trends*, 49(4), 687–708.
- Home, R. A. (2006). A New Tune from an Old Instrument: The Application of SERVQUAL to a Tourism Service Business. *Journal of Quality Assurance in Hospitality & Tourism*, 6(3–4), 185–202. doi: DOI: 10.1300/J162v06n03\_11
- Hsieh, P., Yeh, T.-M., & Chen, J. (2015). Integrating Fuzzy SERVQUAL into Refined Kano Model to Determine the Critical Service Quality Attributes of Chain Restaurants. *Review of Integrative Business and Economics Research*, 4(4), 142–157.
- HSU, Y.-L., HSU, C.-C., & BING, P.-C. (2007). Capturing passengers' voices: the application of kano's model in the airline industry CAPTURING. 2007 International Conference on Logistics, Shipping and Port Management, 1–14.

- Hu, H. H., Kandampully, J., & Juwaheer, D. D. (2009). Relationships and impacts of service quality, perceived value, customer satisfaction, and image: An empirical study. *Service Industries Journal*, 29(2), 111–125. doi: 10.1080/02642060802292932
- Ilias, S., & Shamsudin, M. F. (2020). Customer Satisfaction and Business. *Journal of Undergraduate Social Science and Technology*, 2(2).
- Ilyas, A., Nasir, H., Malik, M. R., Mirza, U. E., Munir, S., & Sajid, A. (2013). Assessing the service quality of Bank using SERVQUAL model. *Interdisciplinary Journal Of Contemporary Research In Business*, 4(11), 390–400.
- Jagdev, H., Bradley, P., & Molloy, O. (1997). A QFD based performance measurement tool. *Computers in Industry*, 33(2–3), 357–366. doi: 10.1016/s0166-3615(97)00041-9
- Jahanzaib, M., Idrees, M., Wasim, A., Hussain, S., & Aziz, H. (2016). A Framework for Implementing Quality Function Deployment (QFD) for Utility Services. *IOSR Journal of Business and Management*, 18(4), 92–99. doi: 10.9790/487X-1804029299
- Jato-Espino, D., Castillo-Lopez, E., Rodriguez-Hernandez, J., & Canteras-Jordana, J. C. (2014). A review of application of multi-criteria decision making methods in construction. *Automation in Construction*, 45, 151–162. doi: 10.1016/j.autcon.2014.05.013
- Jharkharia, S., & Shankar, R. (2007). Selection of logistics service provider: An analytic network process (ANP) approach. *The International Journal of Management Science*, 35, 274–289. doi: 10.1016/j.omega.2005.06.005
- Kadoić, N., Divjak, B., & Ređep, N. B. (2017). Effective Strategic Decision Making on Open and Distance Education Issues. *Diversity Matters!*, 224–234.
- Kang, G. (2006). The hierarchical structure of service quality : integration of technical and functional quality, *Managing Service Quality. An International Journal*, 16(1), 37–50. doi: 10.1108/09604520610639955
- Kathawala, Y., & Motwani, J. (1994). Implementing Quality Function Deployment. *The TQM Magazine*, 6(6), 31–37. doi: 10.1108/09544789410073621
- Kazemi, M., Kariznoee, A., Moghadam, M. R. H., & Sargazi, M. T. (2013). Prioritizing Factors Affecting Bank Customers Using Kano Model and Analytical Hierarchy Process. *International Journal of Accounting and Financial Management (IJAFM)*, 6, 105–114.
- Kebede, T. S. (2017). Determinants and outcome of customer satisfaction at the commercial bank of Ethiopia: Evidence from Addis Ababa. *African Journal of Marketing Management*, 9(7), 107–119. doi: 10.5897/ajmm2016.0509
- Kheybari, S., Rezaie, F. M., & Farazmand, H. (2020). Analytic network process : An overview of applications. *Applied Mathematics and Computation*, 367, 1–35. doi: 10.1016/j.amc.2019.124780
- Kiker, G. A., Bridges, T. S., Varghese, A., Seager, P. T. P., & Linkov, I. (2005). Application of multicriteria decision analysis in environmental decision making. *Integrated Environmental Assessment and Management*, 1(2), 95–108. doi: 10.1897/IEAM\_2004a-015.1
- Kombo, F. (2015). Customer satisfaction in the Kenyan banking industry. *Journal of International Studies*, 8(2), 174–186. doi: 10.14254/2071-8330.2015/8-2/15
- Kurt, S. D., & Atrek, B. (2012). The classification and importance of E-S-Qual quality attributes: an evaluation of online shoppers. *Managing Service Quality*, 22(6), 622–637. doi: 10.1108/09604521211287589
- Lahdelma, R., Salminen, P., & Hokkanen, J. (2000). Using multicriteria methods in environmental planning and management. *Environmental Management*, 26(6), 595–605. doi: 10.1007/s002670010118
- Lau, M. M., Cheung, R., Lam, A. Y. C., & Chu, Y. T. (2013). Measuring Service Quality in the Banking Industry : A Hong Kong Based Study. *Contemporary Management Research*, 9(3), 263–282. doi: 10.7903/cmr.11060
- Lee, Y. L., & Hing, N. (1995). Measuring quality in restaurant operations : an application of the SERVQUAL instrument. *International Journal of Hospitality Management*, 14(3–4), 293–310. doi:10.1016/0278-4319(95)00037-2
- Lenka, U., Suar, D., & Mohapatra, P. K. J. (2009). Service quality, customer satisfaction, and customer loyalty in Indian commercial banks. *Journal of Entrepreneurship*, 18(1), 47–64. doi: 10.1177/097135570801800103
- Lin, F., Tsai, S., Lee, Y., Hsiao, C., Zhou, J., Wang, J., & Shang, Z. (2017). Empirical research on Kano ’ s model and customer satisfaction. *PLoS ONE*, 12(9), 1–23. doi: 10.1371/journal.pone.0183888
- Llinares, C., & Page, A. F. (2011). Kano’s model in Kansei Engineering to evaluate subjective real estate consumer preferences. *International Journal of Industrial Ergonomics*, 41, 233–246. doi: 10.1016/j.ergon.2011.01.011
- Løken, E. (2007). Use of multicriteria decision analysis methods for energy planning problems. *Renewable and Sustainable Energy Reviews*, 11, 1584–1595. doi: 10.1016/j.rser.2005.11.005

- Luturlean, B. S., & Anggadwita, G. (2015). A Framework for Conceptualizing Customer Experiences Management in the Hotel Industry. 3rd International Seminar and Conference on Learning Organization (ISCLO 2015), 1–5. doi: 10.2991/isclo-15.2016.25
- Ma, M., Chen, C., & Chang, Y. (2019). Using Kano model to differentiate between future vehicle-driving services. *International Journal of Industrial Ergonomics*, 69, 142–152. doi: 10.1016/j.ergon.2018.11.003
- Mackay, K. J., & Crompton, J. L. (1990). Measuring the Quality of Recreation Services. In *Journal of Park and Recreation Administration* (Vol. 8, Issue 3, pp. 47–56). <http://agrilibecdn.tamu.edu/cromptonrpts/files/2011/06/Full-Text104.pdf>
- Madzik, P., Budaj, P., Mikuláš, D., & Zimon, D. (2019). Application of the Kano Model for a Better Understanding of Customer Requirements in Higher Education—A Pilot Study. *Administrative Sciences*, 9(11), 1–18. doi: 10.3390/admsci9010011
- Manzoor, F., Wei, L., Hussain, A., Asif, M., & Shah, S. I. A. (2019). Patient satisfaction with health care services; an application of physician's behavior as a moderator. *International Journal of Environmental Research and Public Health*, 16(18), 1–16. doi: 10.3390/ijerph16183318
- Marković, S., Dorčić, J., & Katusić, G. (2015). Service Quality Measurement in Croatian Banking Sector : Application of SERVQUAL Model. *Management International Conference*, 209–218.
- Meade, L. M., & Presley, A. (2002). R & D Project Selection Using the Analytic Network Process. *IEEE Transactions on Engineering Management*, 49(1), 59–66.
- Mehta, S. C., & Durvasula, S. (1998). Relationships between SERVQUAL dimensions and organizational performance in the case of a business-to-business service. *Journal of Business and Industrial Marketing*, 13(1), 40–53. doi: 10.1108/08858629810206232
- Mekonen, M. A., Rong, Y., & Gebremedhin, T. (2019). Assessment Of Customer Satisfaction In Banking Services: A Comparison Between State Owned And Private Banks In Axum Town, Ethiopia. *European Journal of Business and Management Research*, 4(6), 1–10. doi: 10.24018/ejbmr.2019.4.6.169
- Mostafa, K., Batool, R., Parvaneh, P., & Alireza, A. (2013). Identify and Ranking Factors Affecting Bank Maskan Service Quality using Kano Model. *Research Journal of Recent Sciences*, 2(4), 1–8.
- Mulebeke, J. A. W., & Zheng, L. (2006). Analytical network process for software selection in product development : A case study. *Journal of Engineering and Technology Management*, 23, 337–352. doi: 10.1016/j.jengtecman.2006.08.004
- Munusamy, J., Chelliah, S., & Mun, H. W. (2010). Service quality delivery and its impact on customer satisfaction in the banking sector in Malaysia. *International journal of innovation, management and technology*, 1(4), 398–404.
- Murugiah, L., & Akgam, H. A. (2015). Study of Customer Satisfaction in the Banking Sector in Libya. *Journal of Economics, Business and Management*, 3(7), 674–677. doi: 10.7763/joebm.2015.v3.264
- Nahmias, S. (1978). Fuzzy variables. *Fuzzy Sets and Systems*, 1(2), 97–110. doi: 10.1016/0165-0114(78)90011-8
- Narteh, B., & Kuada, J. (2014). Customer Satisfaction with Retail Banking Services in Ghana. *Thunderbird International Business Review*, 56(4), 353–371. doi: 10.1002/tie.21626
- Ozatac, N., Saner, T., & Sen, Z. S. (2016). Customer Satisfaction in the Banking Sector: The Case of North Cyprus. *Procedia Economics and Finance*, 39, 870–878. doi: 10.1016/s2212-5671(16)30247-7
- Pakizehkar, H., Sadrabadi, M. M., Mehrjardi, R. Z., & Eshaghieh, A. E. (2016). The Application of Integration of Kano's Model, AHP Technique and QFD Matrix in Prioritizing the Bank's Substructions. *Procedia - Social and Behavioral Sciences*, 230, 159–166. doi: 10.1016/j.sbspro.2016.09.020
- Parasuraman, A., Zeithaml, V. A., & L. Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12–40. doi: 10.1016/S0148-2963(99)00084-3
- Paryani, K., Masoudi, A., & Cudney, E. A. (2010). QFD Application in the Hospitality Industry: A Hotel Case Study. *Quality Management Journal*, 17(1), 7–28. doi: 10.1080/10686967.2010.11918258
- Pazir, D., & Amin, I. (2015). A Study Of Customer Satisfaction Towards Hotel Industry In Kashmir Valley. *International Journal of Management Research & Review*, 5(12), 1117–1123.
- Pheng, L. S., & Yeap, L. (2001). Quality function deployment in design/build projects. *Journal of Architectural Engineering*, 7(2), 30–39. doi: 10.1061/(asce)1076-0431(2001)7:2(30)
- Poel, I. van de. (2007). Methodological problems in QFD and directions for future development. *Res Eng Design*, 18, 21–36. doi: 10.1007/s00163-007-0029-7

- Pourhasomi, M. H., Khamseh, A. A., & Ghorbanzad, Y. (2013). A hybrid of Kano and QFD for ranking customers' preferences: A case study of bank Melli Iran. *Management Science Letters*, 3, 845–860. doi: 10.5267/j.msl.2013.02.001
- Pourmohammad, H., Zandieh, M., & Farsijani, H. (2016). Ranking factors affecting the quality of banking services using analytic. *Decision Science Letters*, 5, 461–468. doi: 10.5267/j.dsl.2016.6.001
- Prakasha, A., & Mohanty, R. P. (2012). Understanding service quality. *Production Planning & Control: The Management of Operations*, 1–16. doi: 10.1080/09537287.2011.643929
- Purba, H. H., Parid, M., Prasetyo, R. D., & Jinan, R. (2018). Service Development Strategy with Quality Function Deployment ( QFD ) Approach : A Case Study in Banking Service in Indonesia. *International Journal of Advances in Scientific Research and Engineering (Ijasre)*, 4(1), 38–47. doi: 10.7324/IJASRE.2018.32579
- Rahmana, A., Kamil, M., Soemantri, E., & Olim, A. (2014). Integration of SERVQUAL and KANO Model Into QFD To Improve Quality of Simulation-Based Training on Project Management. *International Journal of Basic and Applied Science*, 02(03), 59–72.
- Ramdhani, M. A., Ramdhani, A., & Kurniati, D. M. (2011). The influence of service quality toward customer satisfaction of Islamic sharia bank. *Australian Journal of Basic and Applied Sciences*, 5(9), 1099–1104.
- Ramya, N., Kowsalya, A., & Dharanipriya, K. (2019). Services quality and its dimensions. *EPRA International Journal of Research and Development (IJRD)*, 4(2), 38–41.
- Ravichandran, K., Mani, B. T., Kumar, S. A., & Prabhakaran, S. (2001). Influence of Service Quality on Customer Satisfaction Application of Servqual Model. *International Journal of Business and Management*, 5(4), 117–124. doi: 10.1007/s001060050722
- Robinson, S. (1999). Measuring service quality: Current thinking and future requirements. *Marketing Intelligence & Planning*, 17(1), 21–32. doi: 10.1108/02634509910253777
- Rozaq, R., Larasati, D. M., Tampubolon, D. H., Ramadhani, R., & Ulkhaq, M. M. (2019). An Application of the Kano Model for Assessing Customer Satisfaction of Hospital Service Quality. 2019 IEEE 6th International Conference on Industrial Engineering and Applications, 278–283.
- Saghier, N. El, & Nathan, D. (2013). Service Quality Dimensions and Customers ' Satisfactions of Banks in Egypt. Proceedings of 20th International Business Research Conference, April, 1–13. [http://www.wbiworldconpro.com/uploads/dubai-conference-2013-april/banking/1364462871\\_607-Niveen.pdf](http://www.wbiworldconpro.com/uploads/dubai-conference-2013-april/banking/1364462871_607-Niveen.pdf)
- Sawant, K. B. (2016). A comparative study of factors affecting service quality and level of customer satisfaction in Local and Foreign banks in Oman. *Saudi Journal of Business and Management Studies*, 1(3), 112–117. doi: 10.21276/sjbms.2016.1.3.6
- Seyedi, S. M., Shirazifar, M., Dalvand, M. R., & Zohdi, M. H. (2012). Optimal examination and prioritization of the factors affecting customers ' satisfaction using integrated Quality Function Deployment ( QFD ) and Kano ' s model : Case study of Shiraz ' s Refah bank. *African Journal of Business Management*, 6(35), 9762–9772. doi: 10.5897/AJBM12.113
- Shayestehfar, R., & Yazdani, B. (2019). Bank service quality: A comparison of service quality between BSI branches in Isfahan and Dubai. *The TQM journal*, 31(1), 28-51. doi: 10.1108/TQM-04-2018-0052
- Sigit Parawansa, D. A. (2015). Effect of commitment and customers' satisfaction on relationship between service quality to the customer retention in rural bank in Makassar, Indonesia. *Journal of Management Development*, 37(1), 53–64. doi: <https://doi.org/10.1108/JMD-12-2016-0303>
- Simwanda, M., Murayama, Y., & Ranagalage, M. (2020). Modeling the drivers of urban land use changes in Lusaka, Zambia using multi-criteria evaluation: An analytic network process approach. *Land Use Policy*, 92, 1–14. doi: 10.1016/j.landusepol.2019.104441
- Singgih, M. L., & Ardhiyanti, N. (2010). Integrating SERVQUAL with KANO into Quality Function Deployment (QFD) for Better Quality of Services Case Study: PT Pos Indonesia, Branch Office of Sidoarjo. *INFORMS Service Science Conference*, 419–425.
- Singh, R. G. (2012). Customers ' Satisfaction on the Hospitals Services : a Comparison. *Indian Journal of Commerce & Management Studies*, III(3), 37–43.
- Słowiński, R. (1986). A multicriteria fuzzy linear programming method for water supply system development planning. *Fuzzy Sets and Systems*, 19(3), 217–237. doi: 10.1016/0165-0114(86)90052-7
- Syed, T. (2019). A Study on Loyalty Programs In Banks. *International Journal of Scientific Research in Science, Engineering and Technology*, 6(2), 32–35. doi: 10.32628/ijrsrset196192

- Tan, K. C., & Pawitra, T. A. (2001). Integrating Servqual and Kano's model into QFD for service excellence development. *Managing Service Quality: An International Journal*, 11(6), 418–430. doi: doi:10.1108/eum0000000006520
- Teas, R. K. (1993). Expectations, Performance Evaluation, and Consumers' Perceptions of Quality. *Journal of Marketing*, 57(4), 18–34. doi: doi:10.1177/002224299305700402
- Tesfaye, B. (2015). The Impact of Service Quality on Customer Satisfaction the Case of Commercial Bank of Ethiopia. St. Mary's University.
- Thackeray, R., & Van Treeck, G. (1990). Applying quality function deployment for software product development. *Journal of Engineering Design*, 1(4), 389–410. doi: 10.1080/09544829008901666
- Tonietto, J., & Carbonneau, A. (2004). A multicriteria climatic classification system for grape-growing regions worldwide. *Agricultural and Forest Meteorology*, 124(1–2), 81–97. doi: 10.1016/j.agrformet.2003.06.001
- Tontini, G. (2007). Integrating the Kano Model and QFD for Designing New Products. *Total Quality Management*, 18(6), 599–612. doi: 10.1080/14783360701349351
- Ulewicz, R. (2014). Application Of Servqual Method For Evaluation Of Quality Of Educational Services At The University Of Higher Education. *Polish Journal Of Management Studies*, 9, 254–264.
- Umath, B., Marwah, A. K., & Soni, M. (2015). Measurement of Service Quality in Health Care Industry using Servqual Model: A Case of Select Hospitals. *International Journal of Management and Social Sciences Research (IJMSSR)*, 4(1), 52–57. www.irjournals.org
- Uppal, R. (2019). Customer Services in Banks at Crossroads: An Empirical Analysis. *Global Journal of Arts and Social Sciences*, 1(1), 1–9.
- Vásquez, A., Benjumea-Arias, M., & Valencia-Arias, A. (2017). Proposed Model for Measuring Customer Satisfaction with Telecommunications Services. *Mediterranean Journal of Social Sciences*, 8(2), 15–25. doi: 10.5901/mjss.2017.v8n2p15
- Velikova, N., Slevitch, L., & Mathe-Soulek, K. (2016). Application of Kano model to identification of wine festival satisfaction drivers. *International Journal of Contemporary Hospitality Management*, 29(10), 2708–2726. doi: doi: 10.1108/IJCHM-03-2016-0177
- Venetis, K. A., & Ghauri, P. N. (2004). Service quality and customer retention: building long-term relationships. *European Journal of Marketing*, 38(11/12), 1577–1598. doi: 10.1108/03090560410560254
- Wang, C.-H., Chen, K.-Y., & Chen, S.-C. (2012). Total quality management, market orientation and hotel performance: The moderating effects of external environmental factors. *International Journal of Hospitality Management*, 31(1), 119–129. doi: 10.1016/j.ijhm.2011.03.013
- Wolniak, R. (2018). The use of QFD method advantages and limitation. *Production Engineering Archives* ISSN, 18, 14-17. doi: 10.30657/pea.2018.18.02
- Wu, K., Tseng, M., & Chiu, A. S. F. (2012). Using the Analytical Network Process in Porter ' s Five Forces Analysis – Case Study in Philippines. *Procedia - Social and Behavioral Sciences*, 57, 1–9. doi: 10.1016/j.sbspro.2012.09.1151
- Yu-qiang, S., & Jun-jia, W. (2011). Evaluation of Service Quality of Restaurant Enterprise Based on SERVQUAL. 2011 International Conference on Management and Service Science., 1–3. doi: doi:10.1109/icmss.2011.5998727
- Zameer, H., Tara, A., Kausar, U., & Mohsin, A. (2015). Impact of service quality, corporate image and customer satisfaction towards customers' perceived value in the banking sector in Pakistan. *International Journal of Bank Marketing*, 33(4), 442–456. doi: 10.1108/IJBM-01-2014-0015 Downloaded
- Zare, S., Shirvan, H. E., Hemmatjo, R., Faridan, M., Hajghani, M., & Dehaghi, B. F. (2018). Using the Analytic Network Process Method for Prioritizing and Weighing Shift Work Disorders Among the Personnel of Hospitals of Kerman University of Medical Sciences. *Journal of Circadian Rhythms*, 16(1), 1–10. doi: 10.5334/jcr.163
- Zhu, Q., Dou, Y., & Sarkis, J. (2010). A portfolio-based analysis for green supplier management using the analytical network process. *Supply Chain Management: An International Journal*, 15(4), 306–319. doi: 10.1108/13598541011054670

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