



# Mediation Effect of Service Quality on the Relationship of Healthcare Service Innovation and Outpatient Experience

Amena Haeba Ali<sup>1,2</sup>, Hazmilah Hasan<sup>2\*</sup>, Suriati Akmal<sup>2</sup>

<sup>1</sup>Kalba Hospital, UAE

<sup>2</sup>Institute of Technology Management and Entrepreneurship,  
Universiti Teknikal Malaysia Melaka (UTEM), MALAYSIA

\*Corresponding Author

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**Abstract:** Healthcare organizations play an important role in people's well-being all over the world; good healthcare facilities are extremely beneficial in combating many diseases worldwide. Innovation is one of the most important factors influencing service quality in healthcare organizations worldwide, particularly in the UAE. The pandemic, changing human needs and globalization have made organizations more aware of the importance of improving patients' experiences through improved service quality and innovative services, which has become a winning strategy and provides organizations with a comparative advantage over others through customer confidence building. This research assessed mediating effect of service quality on health services innovation and outpatient experience. The model was developed with the help of SmartPLS software package and the data was gathered through questionnaire survey. Analysis of 397 questionnaire forms were used to analyze direct relations between service quality and service innovation with out-patient experience as well as indirect effect of service innovation on out-patient experience through service quality. The developed model was confirmed through convergent validity and discriminant validity. The R-square reveals that service innovation accounted for approximately 47% of the variation in service quality. While service innovation and service quality explained approximately 80% of the change in outpatient experience. This means that a unit change in both service innovation and service quality improves the outpatient experience by 80%.

**Keywords:** Service quality, service innovation, health organization, out-patients, UAE

## 1. Introduction

One of the unavoidable facts of life is that people get sick and need to be treated. For treatments, mostly the people are connected with healthcare organisations where the highest level of quality is expected because they involve human lives (Büyükožkan, ifçi, & Güleriyüz, 2011; Sayani, n.d.). Healthcare organisations are becoming more competitive and adjusting to meet the needs and demands of their customers (patients). Patients' experiences with healthcare services have surpassed all other indicators of a healthcare organization's performance. Improved patient experience leads to increased patronage of healthcare organisations, reduced revenue loss, and increased profit (Alrubaiee & Alkaa'ida, 2015).

To provide a positive patient experience, organisations should provide services that meet or exceed customers' expectations (Jiewanto et al., 2012; Parasuraman et al., 1985; Sharma, 2017). Human needs and desires are dynamic and changing, necessitating innovative approaches to health service delivery. The emergence of COVID-19 has devastated the health sector and placed significant strain on existing facilities and manpower, necessitating the use of innovative solutions to combat the pandemic (Health, 2021). Due to that situation and the growing demand for improved service quality among healthcare organisations, innovative service practises have become an essential component of healthcare delivery. Many healthcare organisations have made it a core strategic goal to provide efficient services that improve patients' experiences by providing quality healthcare services and innovative solutions (Omachonu & Einspruch, 2010).

Besides that, the patient's experience is at the heart of patient-centered care. Recognizing it effectively aids in understanding the level of service provided to patients, especially when this concept is successfully linked with effectiveness and safety of care to ultimately afford the best healthcare quality of service and a better reputation (Al Mugeiren & Al Yaemni, 2020; Alkuwaiti et al., 2020; Avgar et al., 2011; Chen et al., 2014; Kitapci et al., 2014). Improving patient experience has taken many forms over the years, and the methods used to improve the experience have proven their effectiveness in the overall growth of the healthcare sector. Huge efforts have been made to improve the quality of the patient experience, and numerous studies have been conducted to aid in this endeavour (Avgar et al., 2011; Barwitz, 2020; de Souza et al., 2017; Ding et al., 2018; Huang et al., 2018; Price et al., 2014; Salisbury et al., 2010; Silberg et al., 2020; Wu & Hsieh, 2015; Zygourakis et al., 2014). Several studies have also described the links between patient experience and service quality and innovation levels provided by healthcare organisations (Al Mugeiren & Al Yaemni, 2020; Bao, Fan, Zou, Wang, & Xue, 2017; Bokolo, 2021; Bott et al., 2019; Varonen, 2020).

Recognizing innovation within healthcare organisations has become necessary, especially when significant scientific and technological differences exist in the industry (Lavoie-Tremblay et al., 2017). Innovation in healthcare is primarily used to improve the structure, product, or process of the healthcare sector (Varkey, Horne, & Bennet, 2008); it typically represents the creation of a creative notion, service, or good in order to improve one or more of the healthcare sector's quality measures. With so many vibrant available approaches and tactics, the term "innovative" has become a slang term in the healthcare sector (Thakur, Hsu, & Fontenot, 2012). Although current healthcare innovation primarily entails the development of new diagnostic procedures, treatments, drugs, healings, or medical devices, a greater emphasis on such concepts, particularly in healthcare as a significant sector, promises to accelerate and generate an exponential shift in significant aspects such as avoidance, more personalised attention tailored explicitly to a patient's hereditary record and requirements, higher operative and practical (e.g., patient to provisional, supplier to supplier, and patient to patient).

In healthcare, the intended benefits should be provided to the patients who are the recipients of care, but other stakeholders must be involved because they are the major contributors to the adoption, implementation, and maintenance of innovation (Nagy, Schuessler, & Dubinsky, 2016). The overall innovation process necessitates effective communication, collaboration, and appropriate social interaction during implementation. The hyper-changing requirements of various healthcare stakeholders, as well as the shift in the growth of global competition, technological developments, and inadequate service quality, are regarded as primary factors for innovation in healthcare. Innovative healthcare services are said to improve service quality and patient satisfaction (Avgar et al., 2011; Berry, 2019; Juhana, Manik, Febrinella, & Sidharta, 2015; Wu & Hsieh, 2015). The growing emphasis on service innovation and quality with the goal of improving patient experiences is a global phenomenon with a significant presence in the United Arab Emirates (UAE). On the other hand, the service quality is defined as the relationship between consumer expectations and perceived service performance. It is the overall assessment of services based on experience in comparison to the expected outcome (Hanaysha, Abdullah, & Warokka, 2011). Thus, service quality is the level of services required to satisfy the customer.

Every organization's primary goal is to maximise revenue while minimising loss. Companies are becoming more competitive. This is not an exception in the medical field. Health organisations are increasingly recognising the importance of focusing on service quality and innovation in order to gain a competitive advantage over other organisations (Berry, 2019; Juhana et al., 2015; Zhang et al., 2017). Healthcare organisations must provide high-quality, innovative services to their patients in order to improve their experience and save money that would otherwise be spent on resolving patient complaints. This is due to the significant loss of revenue caused by negative word (Alrubaiee & Alkaa'ida, 2015; Avgar et al., 2011; Aziz & Theuri, 2018). As a result, healthcare delivery is becoming increasingly patient-centered (Avgar et al., 2011; de Souza et al., 2017; Huang et al., 2018; Weng, Chen, Huang, Hung, & Hsu, 2016). However, improving service quality and providing innovative services come at a cost in the short run, as well as other barriers that some healthcare organisations are hesitant to implement and are conservative enough to change their policies and practises (Ciasullo, Cosimato, & Pellicano, 2017). According to Wallin and Fuglsang (2017), while innovations and service quality have made significant progress in many sectors, their implementation in healthcare is far more difficult. The majority of the innovations concern new drugs and medical equipment, with little focus on transformative service innovation and quality. The advent of the novel COVID-19 pandemic, which grounded

social, economic, and physical activities, has heightened the need for innovative healthcare solutions (Finell, Tiilikainen, Jasinskaja-lahti, Hasan, & Muthana, 2021; Health, 2021; Kh, 2020; Abdel-Razig et al., 2021). As a result, the purpose of this study is to assess the mediating effect of service quality on health care service innovation and outpatient experience.

## 2. Literature Review

### 2.1 Service Quality

Quality has become an emerging topic in a variety of fields. Healthcare organisations are no exception in this regard. To fulfil their patients' desires and aspirations, as well as to maintain and improve their reputation, they require facilities, staffing, and efficient and innovative services. Quality is difficult to define because it is relative and depends on one's expectations and orientation. Service quality is defined as the relationship between a consumer's expectation of a service and its actual performance. It is the overall assessment of services based on experience in comparison to the expected outcome (Afthanorhan, Awang, Rashid, Foziah, & Ghazali, 2019). Based on the founders' original submission, SERVQUAL defines service quality as a type of attitude and a long-term overall evaluation of services (Al-neyadi, Abdallah, & Malik, 2018; Arsanam & Yousapronpaiboon, 2014). Service quality assesses an institution's overall performance as well as its perceived relative strengths and weaknesses based on customer feedback (Ahmed & Masud, 2014; Alkuwaiti et al., 2020; Almuraqab, 2016; Ameen, Al-Ali, Isaac, & Mohammed, 2020; Sharma, 2017).

There is a substantial body of research on service quality in general, and specifically in health care organisations. This section examines some of these previous efforts in order to identify current issues concerning service quality in health care organisations. Meesala and Paul (2018), for example, examined the perceived strategic health care service quality in some selected hospitals in Turkey using a fuzzy Analytic hierarchy process. As service quality dimensions in hospitals, they used tangibles, dependability, assurance, responsiveness, empathy, and professionalism. The study, however, gathered information from doctors rather than end users of hospitals, who are in a better position to say whether their expectations of the hospitals are met.

When exploring service quality in health care settings by conceptually reviewing the various service quality dimension models used in the health care field, Yu et al., (2020) reputed the use of non-customer to assess service quality in hospitals. They compare the technical and functional service quality of health-care facilities. Technical quality is concerned with procedural accuracy and certainty. It is concerned with diagnosis and treatment. This cannot be effectively evaluated by the customer (patient or his relative) because they lack access to certain information that would allow them to do so. The functional quality, on the other hand, is concerned with the interaction between the service provider and the customer. This is how the customer receives the services. The customer is best placed to assess the quality of such services. They examined Parasuraman's service quality dimensions, which include dependability, responsiveness, tangibles, assurance, and empathy. In addition, Jennings et al. (2015) examined the waiting times, quality of care, satisfaction, and cost of nurse practitioner services in the emergency department.

Similarly, Kalaja et al. (2016) used SERVQUAL dimensions of reliability, assurance, tangibles, empathy, and responsiveness as quality indicators to assess the service quality of public health care hospitals in Durres, Albania. According to the study, patients were relatively satisfied with all service dimensions, as all quality gaps were positive. The five service dimensions explained approximately 71% of the variation in patient satisfaction with hospital, with all of them significantly contributing to the model, with empathy being the most significant contributor. Several studies demonstrated that the SERVQUAL dimensions were useful in examining service quality in healthcare organisations. Such studies have been carried out in a number of countries. For example, in India (Meesala & Paul, 2018; Murti et al., 2013), Iran (Mosadeghrad, 2014), the United Arab Emirates (Al-neyadi et al., 2018; Yousif, Hussain, & Mhakiluf, 2010), Saudi Arabia (Alkuwaiti et al., 2020), Tanzania (Khamis & Njau, 2014), Turkey (Abdelfattah et al., 2015).

### 2.2 Service Innovation

Innovation is a process of converting an idea, thought, or invention by creative people into wealth, service, or good that adds value to this service or good must be able to reproduce at an economical cost and cover specific needs. New ideas are generated and transformed into meaningful and useful services or products through innovation (Arundel, 2017). Innovation is defined as the successful application of new thoughts and ideas; this definition applies to all economic structures and is equally applicable to service innovation (Wallin, & Fuglsang, 2017). Today, innovation is one of the pillars of success for all businesses, as it has become an essential component of institutional strategies to gain a competitive advantage in the market. Developing innovations on a continuous basis is a challenge for organisations, especially given the constant changes in customer needs and technological advancement (Khalifa & Fawzy, 2017). In general, before introducing a creative concept or discovering a new innovative concept in a specific industry, it is critical to understand what

that industry considers to be innovation, because innovation is perceived differently in different industries. What is considered innovative in one industry may be considered familiar in another. As a result, the first step toward becoming innovative in any industry is to define innovation in accordance with the nature of that industry.

Healthcare innovation can also be defined as the presentation of new ideas, concepts, processes, services, and products with the goal of developing diagnosis, treatment, communication, education, prohibition, and research, with the primary goals of improving outcomes, safety, quality, efficiency, and cost effectiveness (Djellal & Gallouj, 2018). Furthermore, healthcare innovation can be defined as a modern method of assessing healthcare sector providers to work more cost efficiently, better, smarter, and faster while providing high-quality care (Thakur et al., 2012). The healthcare industry has seen a variety of innovations aimed at improving quality of life, promoting life expectancy, diagnostic and treatment options, as well as the cost-effectiveness and efficiency of the healthcare industry. Information technology (IT) has played a critical role in the healthcare industry's innovation. In the consideration to balance health care quality and cost inclusion, innovation in the healthcare system continues to be a source (Malik, Boyle, & Mitchell, 2017). According to Arshad et al. (2018), when healthcare practitioners rely on paper medical records, delivery of care and information sharing become difficult, if not impossible. Healthcare practitioners may lose the animated insight provided by the history of patient health if they do not have complete and secure access to patient records. The healthcare industry is on the verge of a future in which healthcare providers can instantly share test results and imaging with colleagues within the same organisation, across the country, or in other countries. Innovation has become a critical skill for everyone in the healthcare industry. Wiedner et al., (2020) proposed that new digital information, technology products, genetic engineering, and nanotechnology are storming the health care industry, proving old assumptions wrong and spawning unexpected expectations for innovation and the enhancement of current processes. In the healthcare industry, innovation typically takes the form of new ways of working, new services, and new technologies (Wiedner et al., 2020).

Information technology (IT) is regarded as a key driver of innovation in healthcare organisations (Prakash and Gupta 2008). The healthcare system has been quick to embrace penetration technology in medical systems, procedures, treatments, and diagnostics, but it has paid much less attention to innovations in communications and networking. To some extent, this situation is due to concerns about security and patient confidentiality violations. Wiedner et al., (2020) discovered that introducing innovation in healthcare organisations becomes more efficient when the organisation considers employee interactivity. To efficiently drip the innovation through, healthcare providers and practitioners should encourage and develop synergies between various departments within the organisation. Healthcare innovation entails implementing best practises that have been proven to be successful and adopting such practises while keeping patients' safety and best outcomes in mind. Such practises boost the performance of healthcare organisations (Zhiying, 2013). In other words, healthcare innovation is defined as advancements that allow healthcare practitioners to focus on the patient by allowing them to work smarter, faster, better, and more cost effectively.

The UAE has always been concerned with technology and innovation, as investment in innovations and interventions will have a positive impact on achieving the UAE government's and companies' strategies and goals, as well as increasing enterprise productivity (Mohamed et al., 2019). An economy based on innovation is dependent on effective resource allocation and the right innovation strategy. The UAE relies on innovation to maximise profits and returns while achieving economic goals (Al Hallami et al., 2013). Innovation is not limited to large corporations, but also to dynamic small and medium-sized enterprises (SMEs) that can contribute creatively and innovatively. Teece (2006) stated that unless organisations have the best integrated assets, no innovations will be created and no goals will be met. These assets influence the organization's long-term strategy. As a result, Teece's theoretical analysis clearly considers ergonomics. However, the work environment is volatile as technological progress reshapes many organisations. Technologies and databases are constantly changing in various fields, such as healthcare (Hacklin, Battistini, Von Krogh, 2013). Teece (1986) asserted that the development and success of institutions is dependent on their ability to improve economic orientation, technology, work strategy, and innovation. However, in order to implement a good innovation, the organisation must provide complementary practises such as structural changes, employee training, marketing, and strategy redesign.

According to Zineddine (2012), without the UAE government's involvement, the healthcare sector does not appear to be willing to perform proper safeguards. In the UAE, specific laws and electronic private healthcare information (ePHI) security principles do not exist. Healthcare authorities are working hard to develop and improve healthcare sector standards through the implementation of Electronic Health Record (EHR), data standards, and electronic private healthcare information (ePHI) protection; however, a detailed privacy, security, and performance mechanism is required. Bokolo (2021) investigates the need for novel approaches to providing high-quality patient care during the COVID-19 pandemic. The researchers investigated the role of tele-medicine software package and discovered that by remotely and innovatively handling patients during and after the COVID-19 virus, telemedicine and interactive apps will reduce trauma centre visits, conserve healthcare

resources, and slow the spread of COVID-19. Takagi et al. (2012) in Tsukuba, Japan, also create an innovative web-based system for allocating beds to patients through mathematical optimization.

### 2.3 Outpatients' Experience

Hurlburt and Schwitzgebel (2007) defined experience as "anything that happens, combines, and becomes a phenomenon or was experienced out of inner and outer stimuli that impinge on people in an instant." User experience includes attributes such as thoughts, feelings, and cognition that arise from contact with a thing. The term "patient experience" refers to all aspects of contact between patients and health-care organisations. The physical and nonphysical elements of the healthcare organisation can be used to assess patients' experiences with healthcare. The nature of experience is shaped by who interacts with what, when, and how. Because it measures who interacts with the health organisation, how, when, and where, quantifying experience is inevitably difficult. Every experience is more than just keeping patients and health organisations together; it is a unity of these two sides that can be examined but cannot be reduced to a simple relationship between them. Because it is free of subjectivity, the real world is a world of experience. Everything is real as long as it is not mistaken for something else. Experience appears to have peculiar content and significant form, as each experience appears to contain a specific reference to reality.

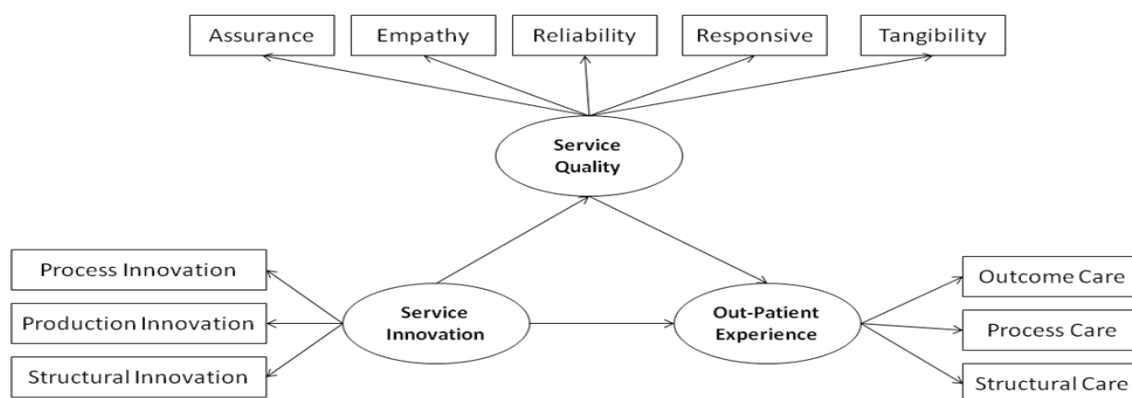
John Locke (1690-1975) distinguished between two types of experience: those that arise from sensation and those that arise from reflection. Experience is also classified according to the results of sensory organs, which include smell, taste, sight, touch, and hearing (Hurlburt & Schwitzgebel, 2007). As a result, immediate experience is unqualified by inference and free of reflection, whereas mediated experience is qualified and modified by prior knowledge that the person already possessed. Patients' experiences with health care services have grown in importance, attracting increasing interest from stakeholders and being reported publicly, allowing patients to choose between different healthcare providers and guiding, inspiring, and monitoring improvements in the quality of patients' experiences (Browne, Roseman, Shaller, & Edgman-Levitan, 2010). Patient care experience indicators are becoming more common in public reporting and pay-for-performance schemes. The Patient Protection and Affordable Care Act of 2010 mandated that the Centers for Medicare & Medicaid Services (CMS) establish a number of public monitoring and payment programmes based on data from the Consumer Assessments of Healthcare Providers and Systems (CAHPS) surveys (Price et al., 2014).

The increasing use of patient experience surveys has increased the focus on the relationship between the patient's experience and the other components of healthcare services. Patients' experiences have been argued to be an integral part of healthcare quality not only in terms of clinical outcomes and processes (de Silva & Valentine, 2000), but end users of surveys are becoming increasingly interested in understanding how patient experiences are related to measures of structures, processes, and outcomes. Such information could assist providers in improving the efficiency and effectiveness of healthcare (Price et al., 2014).

## 3. Research Framework

Previous section presented extensive literature on patients' experiences with healthcare services, service quality in healthcare organisations, and service innovation in healthcare organisations. The review connected the individual constructs to create a framework for improving patients' experiences in healthcare organisations. The study hypothesises that service quality and service innovation in health care organisations influence patients' experiences. Service quality is viewed as a predictor of customer experience. Previous research discovered a direct relationship between service quality and patient experience. Avgar et al. (2011), for example, demonstrated that improved service quality improves patients' experiences with healthcare services. (Juhana et al., 2015) also demonstrated that improved service quality leads to increased patient satisfaction. Giovanis et al. (2018) found empirical support for service quality as a predictor of patients' satisfaction with health care services, which supports this.

Similarly, the study viewed service innovation as a precursor to patient experience. Improved service innovation will result in a more positive patient experience with healthcare services. This conceptualization is derived from previous research findings. Wu and Hsieh (2015), for example, discovered a strong relationship between service innovation and patient experience. This is also consistent with the findings of Ding et al. (2018), who discovered improved patient experiences with innovative healthcare services. Figure 1 depicts the conceptual framework of the research.



**Fig. 1 - Conceptual framework**

Figure 1 above depicts the conceptual framework. The framework combines service quality and service innovation to improve the UAE health organization's outpatient experience. Patient experience is one of the objective methods of determining health organisation performance from the perspective of users. The use of patients' experiences rather than patient satisfaction is motivated by the fact that satisfaction measures are relatively subjective and thus insufficient in capturing patients' objective situation in relation to healthcare services received. According to Ishiyaku (2016), experience measures are better predictors of performance than satisfaction measures. Because most organisations want to meet their customers' needs, information from users motivates them to improve their services. As a result, this study believes those patients' ratings of service quality and service innovations have a significant impact on outpatients' experiences with services provided by UAE health organisations. The variables service quality, service innovation and out-patient experience were measured based on indicators identified from literature as reported in Table 1.

**Table 1 - Indicators measuring the variables**

No.	Statements	Source
<b>Service Quality Received by Covid-19 Patients</b>		
1	Efficiency of service procedures and appointment system	(Yeboah, Ansong, Appau-Yeboah, Antwi, & Yiranbon, 2014)
2	Acting with professionalism and accurate billing	
3	Quality of medical treatment and doctor visiting as scheduled	
4	Available and adequate visiting for patient family as scheduled	
5	Provision of adequate rest time for patient as they promise	
6	Level of quick medical treatment response when you need it	
7	Level employee give clear and understandable information	
8	Provision of good communication of the service right the first time	
9	Level at which nurse in give prompt response to patient request	
10	The rate at which you feel safe and at home while in the treatment ward	
11	The level of employees are politeness and friendliness in serving	
12	Friendly security staff and safe parking area	
13	Level of Doctors accurate ability to diagnose my infection	
14	Good communication among doctors, staff, and patients	
15	Level of Doctors and nurses are carefulness when treating and examining me	(Yeboah et al., 2014)
16	Level of employee dedicated attention to me and my family	
17	No social status discrimination to the patient	
18	Level of physical facilities and visually appealing medical instrument	(Yeboah et al., 2014)
19	Suitable temperature at the hospital's facilities	
20	Adequate fresh water supply at the hospital	
21	Cleanliness and adequate supplies for each ward	
22	Clean and well maintained toilet	
23	Employee neat-appearing	
24	Provision of specific need to patients including various food and beverage	
25	Sufficient and convenient parking area	
<b>Process Innovation</b>		
1	The hospital used novel elements in their operations	Deduced from (Berry, 2019; Chen, Wen, & Yang, 2014; Ciasullo,
2	The processes at the hospital are innovative and flexible	
3	The hospital adapt to my changing needs	

4	The hospital adjust their services to novel processes to ease service delivery	Cosimato, & Pellicano, 2017; Omachonu & Einspruch, 2010; Wu & Hsieh, 2015)
5	The hospital uses novel technologies to minimise physical contact to reduce the spread of the infection	
6	The hospital uses novel clinical procedures in treating me	Deduced from (Berry, 2019; Chen et al., 2014; Ciasullo et al., 2017; Omachonu & Einspruch, 2010; Wu & Hsieh, 2015)
7	The hospital use state of the art facilities in treating me	
8	Novel test kits are used to diagnose me	
9	I received innovative treatment	
10	The equipment used for Covid-19 treatment are different from the traditional equipment	
11	The hospital used innovative medium to market their services	Deduced from (Avgar, Givan, & Liu, 2011; Berry, 2019; Chen et al., 2014; Ciasullo et al., 2017; Omachonu & Einspruch, 2010; Wu & Hsieh, 2015)
12	The cost of covid-19 treatment i received is affordable	
13	The hospital embrace global best practices in handling Covid-19 cases	
14	The hospital use customer-centric approach in dealing with Covid-19 patients	
15	I received promotional packages from the hospital after my treatment	

**Structure of Care**

1	The hospital provides adequate facilities for Covid-19 patients	
2	The hospital provides adequate equipments for Covid-19 patients	(Wu & Hsieh, 2015)
3	The hospital provides adequate staffing ratios for Covid-19 patients	
4	The hospital provides adequate qualified personnel for Covid-19 patients.	
5	The doctors in the hospital are professional and competent	
6	The doctors in the hospital are honest, conscientious, and dependable	
7	The doctors in hospital are willingness to listen and answer my questions	
8	The doctors in the hospital are attentive to my health condition and discuss the treatment with me.	
9	The doctors in the hospital are prompt in service and willing to consult other doctors about my treatment.	(Wu & Hsieh, 2015)
10	The doctors in hospital are willing to listen and answer my questions	
11	The nurses are professional, skillful and acted in an organized way	
12	The nurses are conscientious, sincere and dependable	
13	The nurses regularly check on me and give me prompt personalized service.	
14	The hospital improves physical well-being and survival possibilities	
15	The hospital improves my emotional well-being and the quality of life	(Wu & Hsieh, 2015)
16	The hospital improves my satisfaction with my life.	
17	I feel confident with my life after the treatment I received	Deduced from (Omachonu & Einspruch, 2010; Price et al., 2014)
18	I feel i am totally recovered from Covid-19 infection after the treatment I received.	

**4. Data Collection Procedure**

Any research relies on data. Data is gathered from a variety of sources, resulting in primary and secondary data sources. This study relied on primary data collected directly from discharged COVID-19 patients via questionnaire. The data collected were analysed using descriptive and inferential techniques. Descriptive analysis techniques are methods of analysing data that sort, organise, and summarise it to produce meaningful results. The descriptive analysis does not show relationships between the research variables, but rather describes each one separately. The descriptive research constructs will be analysed using percentages and means in this study. Inferential analyses are techniques for demonstrating the interrelationships between research constructs. As a result, PLS-SEM (Partial Least Squares-Structural Equation Modelling) was used to assess the mediating effect of service quality on healthcare service innovation and outpatient experience. PLS-SEM is a variance-based structural equation modelling method that combines regression and factor analysis. For data analysis, the PLS-SEM approach was used, which is regarded as the graphical equivalent of a mathematical representation of the relationship between dependent and explanatory variables (Rahman et al. 2013; Memon et al. 2013). PLS-SEM is a regression causal modelling approach that aims to maximise explained variance while minimising residual endogenous construct variance (Zainun et al. 2014). PLS-SEM mitigates the shortcomings of traditional multivariate analysis techniques. It addresses the shortcomings of traditional multivariate analysis techniques that treat all variables as observable; the multicollinearity problem; non-heteroscedastic error; the assumption that variables are measured without error; and the proposal of a simple model structure. The PLS-SEM relaxes



the strict assumptions of covariance-based SEM regarding sample size and normality (Wong, 2013). The use of PLS-SEM in this study is motivated by the fact that research constructs are multidimensional and latent, making Structural Equation Modelling (SEM) the most appropriate technique in this case (Arshad, Goh, & Rasli, 2014; Bawuro, Shamsuddin, Wahab, & Usman, 2019; Sarstedt, Jr, Jun-hwa, Becker, & Ringle, 2019).

## 5. Results and Discussion

### 5.1 Data Administration

A total of 600 questionnaires were distributed, with 404 (67.33) successfully returned. Seven of the retrieved questionnaires were found to be invalid due to incomplete information after screening and vetting. As a result, 397 (98.27 percent) of the questionnaires were found to be valid and used for data analysis. For data collection, total 600 questionnaire forms were distributed while 404 questionnaires forms were received back. Among those questionnaire forms, 7 questionnaires were incomplete and were discarded. Remaining 397 questionnaire forms were used for further analysis. These respondents have obtained several expertise levels as described in Table 2.

**Table 2 - Demographic information of respondents**

Items	Frequency	Percent
<b>Gender</b>		
Male	248	62.5
Female	149	37.5
Total	397	100.0
<b>Age category</b>		
18-30 years	59	14.9
31-40 years	198	49.9
41-50 years	133	33.5
51 years & above	7	1.8
Total	397	100.0
<b>Education</b>		
Secondary certificate	26	6.5
Diploma	57	14.4
Degree	206	51.9
Master degree	103	25.9
PhD	5	1.3
Total	397	100.0
<b>Visit to hospital</b>		
Yes	397	100.0

According to the demographic information provided by the respondents, approximately 63 percent were male and approximately 38 percent were female. The age distribution of the respondents revealed that roughly half were between the ages of 31 and 40. One-third of those polled were between the ages of 41 and 50. Approximately 15% were between the ages of 18 and 30, with only about 2% being 51 and older. According to the respondents' educational status, slightly more than half (51.9 percent) had a bachelor's degree, while slightly more than a quarter (25.9 percent) had a master's degree? Only 14.4 percent of respondents had a diploma, while 6.5 percent and 1.3 percent had a secondary certificate and 1.3 percent had a PhD, respectively.

### 5.2 Model Assessment

The mediation effect of service quality in the relationship between service innovation and outpatient experience was investigated using the procedure recommended by Hair et al (2014) and Hayes and Rockwood (2016) as shown in Figure 2.



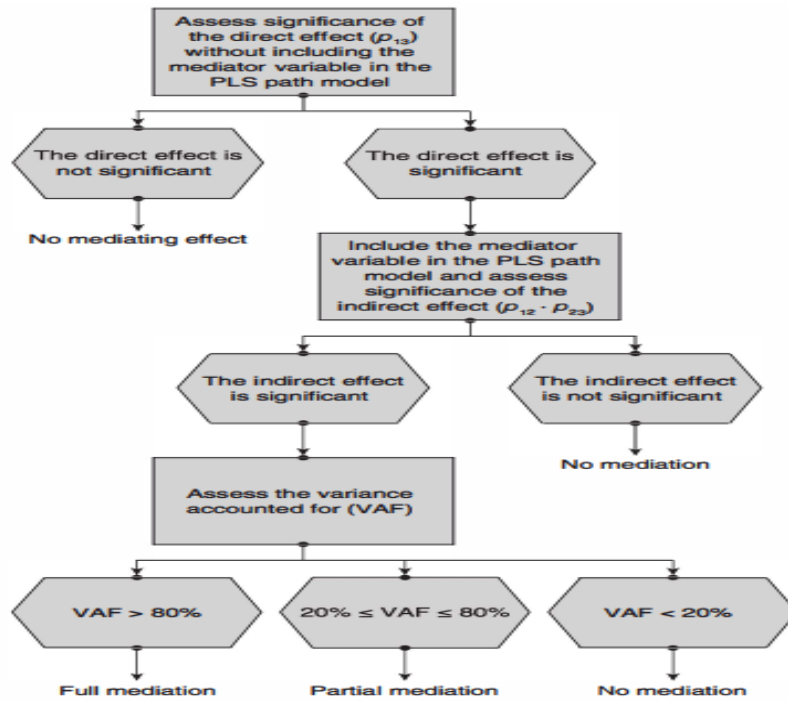


Fig. 2 - Procedure for mediation analysis in PLS-SEM (Hairs, et al, 2014)

The reliability, validity, and significance of the direct effect between service innovation and outpatient experience were first confirmed using the measurement and structural model evaluations procedure described in Figure 2. Table 3 and Figure 3 show the results of the direct effect among the variables.

Table 3 - Measurement and structural model results of direct effect

Construct/Dimensions	Outer Loadings	T-statistics	p-values	CR	AVE
Outcome care <- Out-Patient Experience	.929	124.123	.000		
Process Care <- Out-Patient Experience	.772	21.044	.000	.904	.760
Structural care <- Out-Patient Experience	.906	109.244	.000		
Process Innovation <- Service Innovation	.871	46.975	.000		
Product Innovation <- Service Innovation	.919	90.628	.000	.918	.789
Structure Innovation <- Service Innovation	.875	57.821	.000		
Path coefficient	Beta	T-Statistics	p-value	NA	NA
Service innovation → Outpatient experience	.776	37.173	.000	NA	NA

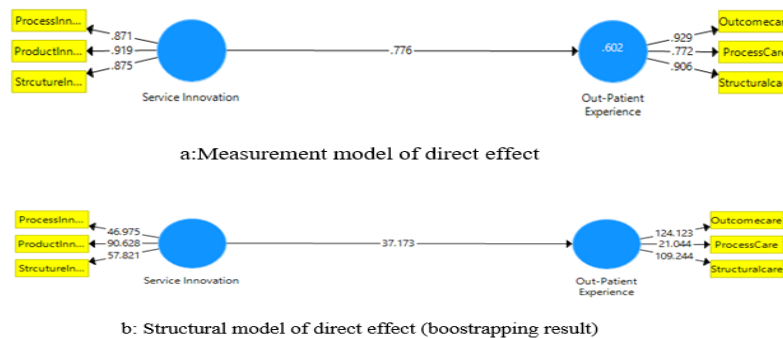


Fig. 3 - Path model of direct effect

The path model met the requirements for reliability and validity, as shown in Table 3 and Figure 3. The outer loadings of the constructs' respective indicators were all within the recommended thresholds of .70.

Similarly, the composite reliability (CR) and average variance extracted (AVE) of all constructs in the model were both within the acceptable ranges of .70 and .50 as adopted by Al Ameri et al. (2022) and Khahro et al. (2021). Based on the HTMT.90 criterion, the discriminant validity result shows that discriminant validity was achieved (HTMTinference = 0.891). In addition, the direct effect Service innovation Outpatient experience revealed a positive and significant relationship (= 0.776; t = 37.173, p.05). After determining the significance of the direct relationship between service innovation and outpatient experience, the moderator variable was added to the path model. The path model is depicted in Figure 4, which includes the independent variable (service innovation), the moderator variable (service quality), and the dependent variable (outpatient experience).

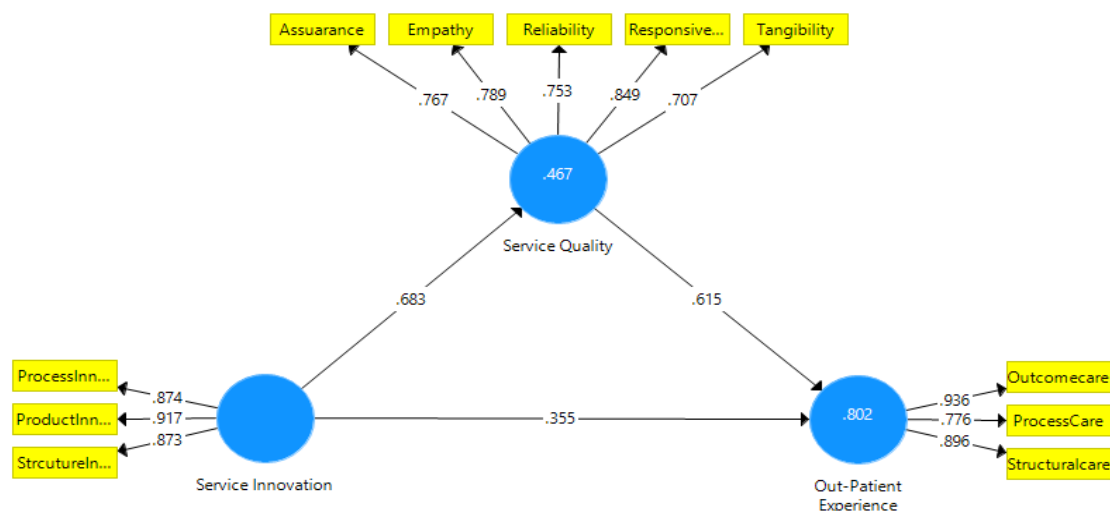


Fig. 4 - Measurement model of research path model

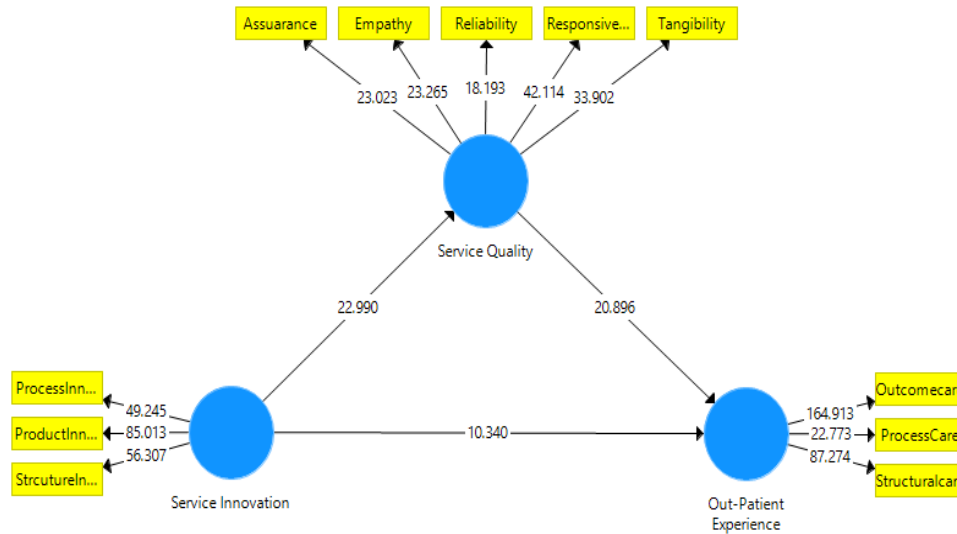
Various parameters for assessing the validity and reliability of the research path model computed with the help of SmartPLS are presented in Table 4.

Table 4 - Measurement model result of research path model

Convergent and construct validity					
Construct/Dimensions	Outer loadings	T Statistics	P-Values	CR	AVE
Assurance <- Service Quality	.767	23.023	.000	.882	.600
Empathy <- Service Quality	.789	23.265	.000		
Reliability <- Service Quality	.753	18.193	.000		
Responsiveness <- Service Quality	.849	42.114	.000		
Tangibility <- Service Quality	.707	33.902	.000		
Outcome care <- Out-Patient Experience	.936	164.913	.000	.904	.760
Process Care <- Out-Patient Experience	.776	22.773	.000		
Structural care <- Out-Patient Experience	.896	87.274	.000		
Process Innovation <- Service Innovation	.874	49.245	.000	.916	.789
Product Innovation <- Service Innovation	.917	85.013	.000		
Structure Innovation <- Service Innovation	.873	56.307	.000		
Discriminant validity					
	Outpatient Experience	Service Innovation	Service Quality		
Outpatient Experience					
Service Innovation	.891			NA	NA
Service Quality	.900	.761			

Table 4 reveals that the indicators and dimensions of the respective constructs met the requirement of reliability. This is due to the fact that all outer loadings exceed the minimum threshold of .70. Likewise, construct reliability was achieved. The composite reliability (CR) results of the respective constructs in the research path model demonstrate this. All of the CR values met the minimum threshold of .70. As shown in the table, convergent validity was also achieved. The three constructs in particular reported AVE values greater than .50, which is the minimum acceptable AVE benchmarked value. Finally, as demonstrated by the HTMT.90

criterion, discriminant validity was achieved. The HTMT inference test reveals that none of the confidence intervals contain values greater than the maximum threshold, indicating that each variable in the research path model is unique. Following the validation and reliability of the research path model's measurement model, the structural model was evaluated to determine the significance of the estimated parameters. Figure 5 depicts the structural model with the R-square and t-statistics of the paths and outerloadings.



**Fig. 5 - Structural model of research path model**

Structural model evaluation involves assessing the significance of the path coefficients, the f-square statistics, and R-square as shown in Table 5.

**Table 5 - Structural model results**

Path	Path coefficients	T Statistics	P Values	R <sup>2</sup>	f <sup>2</sup>
Service Innovation -> Service Quality (SISQ)	.683	22.990	.000	.467	.876
Service Innovation -> Out-Patient Experience (SIOPE)	.355	10.340	.000	.802	.338
Service Quality -> Out-Patient Experience (SQOPE)	.615	20.896	.000		1.015

Table 5 shows that all of the path coefficients are statistically significant. SISQ reported =.683; t = 22.990, p.05; SIOPE reported =.355; t = 10.340, p.05; and SQOPE reported =.615; t = 20.896, p.05. The R-square, which is a measure of the variance explained by independent variables on the dependent variable, reveals that service innovation accounted for approximately 47 percent of the variation in service quality. This means that every unit change in service innovation improves service quality by 47%. Similarly, service innovation and service quality explained approximately 80% of the change in outpatient experience. This means that a unit change in both service innovation and service quality improves the outpatient experience by 80%. The f-square statistic, also known as effect size, quantifies each independent variable's contribution to explaining the variation in the dependent variable. The Cohen (1992) proposed the effect size, with f-square values of 0.2, 0.15, and 0.35 are considered small, medium, and large, respectively as adopted by Almansoori et al. (2021). The effect sizes in Table 5 are all greater than 0.35, indicating that each of the independent variables has a large effect size in determining the variation in the dependent variable.

The structural evaluation of the research path model is carried out in order to evaluate the mediating role of service quality in the relationship between service innovation and outpatient experience. Although the direct effect Service innovation, Outpatient experience was still significant ( =.355; t = 10.340, p.05), it decreased when service quality was included in the model, as shown in Figure 4.5. This suggests that there is partial mediation due to service quality. This suggests that service quality may positively skew the direct relationship between service innovation and outpatient experience (Nils Roldan, Cepada, 2016). Table 6 depicts the direct impact of service innovation on outpatient experience as well as the indirect impact via service quality.

**Table 6 - Direct and indirect effects of service innovation on outpatient experience**

Total effect SI→OPE					
Path	t	BCCI			
		Lower	Upper		
.776***	37.173	.733	.815		
Direct effect SI→OPE					
Path	t	BCCI			
		Lower	Upper		
.355***	10.340	.283	.419		
Indirect effect SI→SQ→OPE					
Point estimate	t	Lower	Upper	BCCI	
				Sig	VAF
.420***	16.574	.377	.477	Yes	0.54

SI: Service Innovation; SQ: Service quality; OPE: Outpatient experience; BCCI: Biased corrected confidence interval \*\*\* p < 0.05

The Total direct effect of service innovation on outpatient experience is positive and significant, as shown in table 6 ( =.776; t = 37.173, p.05). When the moderator variable is considered, the direct effect is significantly positive (( =.355; t = 10.340, p.05). The magnitude of the path SIOPE, on the other hand, decreased significantly. This suggests that service quality moderates the relationship between service innovation and outpatient experience to some extent (Baron & Kenny, 1986). The indirect effect (the sum of the paths SISQ and SQOPE) is positive and significant ( =.420; t = 16.574, p.05).

The variance accounted for (VAF) was calculated to estimate the size of the indirect effect further (Hair, et al., 2014). The VAF represents the magnitude of the mediation effect in relation to the total effect. VAF values ranging from 20 to 80 percent indicate the presence of partial mediation, VAF values less than 20 percent indicate the absence of mediation, and VAF values greater than 80 percent indicate the presence of full mediation (Nilts Roldan, Cepada, 2016). As shown in Table 6, VAF = 54%, indicating that service quality moderates the effect of service innovation on outpatient experience.

## 6. Conclusion

As a result of the pandemic, shifting social norms, and globalization, businesses have realized the value of building customer trust and enhancing the patient experience by improving service quality and offering innovative products and services. Service quality was examined as a mediator between health service innovation and outpatient experience in this study. With the help of SmartPLS software, a questionnaire survey gathered information for the model. Direct and indirect correlations between service quality and out-patient experience were studied using 397 questionnaire forms, which were analyzed for both direct and indirect effects. Convergent and discriminant validity were used to verify the model's validity. According to R-squared, the variation in service quality can be explained by service innovation. In addition to service innovation and service quality, the outpatient experience improved by approximately 80 percent. 80 percent of the outpatient experience can be improved by a single change in both service innovation and service quality.

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