

# Patient Satisfaction of Dental and Oral Health Service Facility Based on Digital Patient Experience Driven Innovation

**Pri Agung Danarahmanto**

Academy of Medical Records and Health Informatics Bandung (APIKES Bandung)  
Bandung, West Java 40122, Indonesia  
[priagung@apikesbandung.ac.id](mailto:priagung@apikesbandung.ac.id)

**Julia Famor Pratami**

Academy of Medical Records and Health Informatics Bandung (APIKES Bandung)  
Bandung, West Java 40122, Indonesia  
[drgjuliafamor@apikesbandung.ac.id](mailto:drgjuliafamor@apikesbandung.ac.id)

**M. Dana Prihadi**

Academy of Medical Records and Health Informatics Bandung (APIKES Bandung)  
Bandung, West Java 40122, Indonesia  
[danaprihadi@apikesbandung.ac.id](mailto:danaprihadi@apikesbandung.ac.id)

## Abstract

The expansion of Indonesia's healthcare business is currently overshadowed by its low resilience. To explore more about the topic, this study aims at examining the relationship between digital patient experience, innovation, and patient satisfaction with dental health care facilities in West Java, Indonesia. A survey of 100 patients from all around West Java was conducted to collect relevant data. Next, path analysis and regression approaches were used to examine the data. The results found an indirect relationship between digital patient experience and patient satisfaction through innovation. On the other hand, it was also found that digital patient experience does not directly influence patient satisfaction. Patient satisfaction can be increased using digital patient experience-based innovations as digital technology can help patients to receive health services easier. The novelty of the study is obtained by analyzing the relationship between innovation, digital patient experience, patient satisfaction in one model. Furthermore, the implementation of health service facilities in West Java as the unit of analysis also increases the novelty of this study.

## Keywords

digital customer experience, innovation, patient satisfaction, dental and oral health service, healthcare

## 1. Introduction

Health is a vital aspect of life and society's primary necessity, including for the people of Indonesia. Accordingly, the healthcare industry in Indonesia continues to expand at a rapid pace. Based on the data from the Central Statistics Agency or *Badan Pusat Statistik* (2020), the health industry is expected to develop at a pace of 15.3%, the highest among all sectors. This data demonstrates that the health sector can grow.

The healthcare industry has issues in maintaining its sustainability amid continuous growth. This is concerning because according to data from the U.S Bureau of Labor Statistics (2016), from 2004 to 2015, numerous economic actors in the health sector were unable to survive and the health industry's resilience continued to deteriorate. Customer satisfaction is one factor that can contribute to a low level of resilience (Cuevas-Vargas et al., 2019; Otto et al., 2020). The patient is one of the customers in the healthcare industry who receives services from healthcare institutions and rates their satisfaction.

Patient satisfaction issues can be seen all across the world, including Indonesia. According to a study conducted in 32 countries, patient satisfaction in these countries is still relatively low, at 34% (Statista, 2020). While in Indonesia, patient satisfaction ranges from 34% to 43% (Mahendradata et al., 2017). This issue is exacerbated by the imbalance in the ratio of health personnel. Based on data from the Ministry of Health of the Republic of Indonesia, the ratio of general practitioners to the Indonesian population is 1:2500, whereas the ratio of dentists is only 1:17000 (Badan Penelitian dan Pengembangan Kesehatan, 2018). It is concerning because according to WHO guidelines, the recommended ratio of general practitioners is 1:1000 while the ratio of dentists is 1:2000. The ratio of availability of health personnel, particularly dentists, shows a significant disparity. As a result, the scarcity of dentists in special dental and oral health services can reduce patient satisfaction.

Dental and oral health services have made a variety of initiatives to improve patient satisfaction, one of which is innovation. According to Snide and Nailon (2013), innovation can be encouraged to increase patient satisfaction. Although numerous innovations have been facilitated in the health industry, their impact on the companies' success is yet to be achieved despite the fact that they have invested billions of dollars (Herzlinger, 2006). Alarmingly, according to Forbes (2021), large corporations such as Amazon, Apple, and Walmart are unable to improve the health sector through their innovations.

Frequently, dental and oral health service innovations are unable to meet the needs of their patients. According to CB Insight (2021), the primary reason for their failure is the sale of items or services that do not cater to market needs. Access to decent health services is one of the needs of patients in Indonesia. According to the official statistics, 61.8% of Indonesians have difficulties in accessing health services (Badan Penelitian dan Pengembangan Kesehatan, 2018). This finding is worrying because health services access is one of the needs that have to be met immediately.

One of the solutions is the digitization of dental and oral health services so the general public can have easier access to health services. Nowadays, people's life cannot be isolated from digital trends. Therefore, health facilities must provide a digital customer experience. Digitalization can help businesses develop and save up to 10% of their costs (McKinsey & Company, 2015).

## **1.1 Objectives**

Based on the aforementioned phenomenon, this study aims at investigating the impact of innovation as a mediator on digital customer experience and patient satisfaction at dental and oral health services in West Java, Indonesia. These three characteristics were already explored independently in earlier studies. In addition, studies on dental and oral health services in West Java were yet conducted. In the meantime, this study leads to a deeper understanding of the attempts to improve patient satisfaction through the use of digital customer experience-oriented technologies in West Java.

There are various parts to this study. The first section includes a study of relevant literature and the formulation of a theoretical framework and assumptions. The second section explains the research methods and data collection process. The third section analyzes and discusses the data. The fourth section includes the study conclusion and implications.

## **2. Literature Review (12 font)**

### **2.1 Patient Satisfaction (PP)**

Customer satisfaction is the consequence of a comparison of a company's performance or a product it delivers to customers' expectations that could result in joy or disappointment (Kotler & Keller, 2016). According to Bowen and Bowen & McCain (2015) and Lee (2013), in a service company, customer satisfaction and company performance are related. Customer satisfaction is also related to innovation like telemedicine that can improve healthcare services efficiency (Kruse et al., 2017).

Customer satisfaction can also be improved by improving efficiency, staff performance, and service quality (Chen, 2012; Kumar et al., 2013; Suh & Yi, 2006). According to Leiter et al. (1998), patient satisfaction is influenced by the quality of the nurse, doctor, and information. On the other hand, Andaleeb (2001) explains that patient satisfaction in health services can be measured by numerous factors including responsiveness, security, communication, and discipline.

## 2.2 Digital Customer Experience

Customer perceptions related to treatments they receive from the company or organization (Kavitha & Haritha, 2018). According to Schmitt (2003), customer experience is a process of managing the overall product or company's customer experience. On the other hand, Åkesson et al. (2014) argue that customer experience is the product of an organization's internal service process. Meanwhile, digital customer experience is a type of customer experience involving digital touchpoints (Betzing et al., 2018).

According to a previous study, customer experience is related to cognitive, emotional, physical, sensory, spiritual, and social elements that are either direct or indirect interactions between customers and other market actors (Frow et al., 2015). Similarly, Buttle (2019) explains that customer experience is related to customer interaction and engagement with the service providers. Customer experience relates to cognitive, emotional, physical, sensory, spiritual, and social factors which are interactions, either directly or indirectly, between customers and other market participants (De-Keyser, 2015).

Customer experience can be identified by examining moods, joys, comforts, and other different things (Bagdare & Jain, 2013). Addae et al (2021), confirm that customer experience can be described by several dimensions, such as employees, core services, added value, speed and marketing mix. On the other hand, Silalahi & Rufaidah (2018) explain that digital customer experience can be identified through digital service experience, digital image experience, and digital touchpoint experience.

## 2.3 Innovation

Innovation is often associated with change. Drucker (1985) defines innovation as an opportunity to transform a company so that it can develop a new product or service. Innovation is also defined as a change in an organization as a result of a changing environment (Damanpour, 1996). Innovation is described as an implementation of an idea that is different from the existing norms (Afuah, 2014). It is also defined as a change occurs not only through the introduction of new products or services, new manufacturing methods, sales, or marketing, but also through an approach, a transactional structure, or a business model (Amit & Zott, 2001).

Innovation is an effort to create opportunities to be able to continue to maintain the company's growth. According to Denicolo and Zanchettin (2016), innovation is related to growth and the creation of new things in a business. Companies are always changing and innovating to survive in competitions (Merx-Chermin & Nijhof, 2005). According to Danarahmanto (2020), innovation is a critical factor for a company's sustainability. Through innovation, companies can evolve in a variety of ways. Rademakers (2005) asserts that products, processes, organizations, and companies can be innovated. Innovation can also be done through organizational, marketing, process, and product changes (Gunday et al., 2011).

## 2.4 Relationship Between Patient Satisfaction, Digital Customer Experience, and Innovation

This study examines the implementation of digital customer experience-based innovation to improve patient satisfaction in Indonesia. According to Brown & Swartz (1989), patient satisfaction is related to their treatment experience. Many elements, including innovation and health services quality, can influence patients' experience. Kilbourne et al. (2004) explain that service quality is difficult to assess and is dependent on the patient's acceptance and their experience with medical care. On the other hand, Gilmore & Pine (2002) found that people who want to provide new experiences are viewed to be more innovative. Furthermore, it is found that innovation has a substantial impact on customer satisfaction (Su, 2011).

Customer satisfaction is influenced not only by patient experience, but also directly by innovation. Innovations made by companies have a big role in encouraging creation of customer satisfaction (Yusuf, 2012). Another study conducted by Mahmoud et al (2018), shows that service innovation and technological innovation play a role in increasing customer satisfaction. According to Chen et al (2021), patient satisfaction is related to patient experiences related to digitization and the use of technology that is used by patients to interact with service providers. This research is supported by Chauhan et al (2022), the use of technology is related to customer satisfaction, and customer loyalty, as well as the company's financial performance.

Not only by experience, customer satisfaction is also directly influenced by innovation. Omachonu & Einspruch (2010) explain that customer satisfaction can be measured against innovation in health services because it can increase

customer satisfaction. Similarly, Snide & Nailon (2013) also found that various innovations to increase patient satisfaction can be encouraged in health services. Based on the aforementioned studies, these hypotheses are proposed:

- H1: Digital customer experience significantly influences patient satisfaction of dental and oral health services in West Java.
- H2: Digital customer experience significantly influences innovation of dental and oral health services in West Java.
- H3: Innovation significantly influences patient satisfaction of dental and oral health services in West Java.
- H4: Digital customer experience significantly influences patient satisfaction through innovation of dental and oral health services in West Java.

### 3. Methods

This is an exploratory and descriptive study that employs a quantitative methodology such as path analysis and regression analysis (Malhotra, 2010). According to Jeon (2015), a path analysis requires a sample size of at least 20 times the path number. In this study, the conceptual framework shows that each variable is connected by three paths. Therefore, the minimum sample size is 60. A total of 100 patients of dental and oral health services in West Java were involved in this study. This study focuses on examining dental and oral health services due to their service gap that can be seen from the health personnel number, which is much larger than the general health services. It should be noted that West Java is Indonesia's most populous province and has the highest number of dissatisfied patients (Badan Penelitian dan Pengembangan Kesehatan, 2018).

### 4. Data Collection

In this study, the data were collected using questionnaires. The questionnaires are indicators used to test the dimensions of the research variables. The questionnaire uses a six-point Likert scale. The six-point scale has a good level of reliability (Chomeya, 2010) and can help to decrease bias in the survey results (Cummins & Gullone, 2000). Next, validity and reliability tests, correlation analysis, regression, and path analysis were used to examine the survey results. In addition, a path evaluation test was also conducted to identify the direct and indirect influences on the research model.

Table 1. Research variables, dimensions, and indicators

Variable	Dimension	Indicator
Patient satisfaction	Satisfaction	Patient satisfaction with the provided service
	Willingness to recommend	Patient willingness to recommend the service
	Willingness to return	Patient willingness to return
Innovation	Marketing innovation	Marketing technique innovation level
	Process innovation	Improving the output quality of the production process
	Product innovation	Capability to develop products to increase patient satisfaction
	Organizational innovation	Organizational management to support teamwork
Digital customer experience	Digital service experience	Patient digital service experience
	Digital image experience	Digital preview of the experience to be received
	Digital touchpoint experience	Availability of digital contacts for patients

## 5. Results and Discussion

### 5.1 Respondent Description

The majority of the respondents were female (75%) between the ages of 17 and 35 (68%). This finding indicates that females are more concerned about their dental and oral health. In addition to maintaining health, visits to dental facilities could also be aimed at improving appearance. The majority of the patients were young adults with higher education (64%). It shows that young adults are more open to digitization. As a result, they acquire more information and are more aware of the necessity of good dental hygiene.

### 5.2 Validity and Reliability

The Cronbach Alpha coefficient is used to measure the reliability. A construct can be considered to be reliable if its Cronbach Alpha value is higher than 0.60 (Gupta & Somers, 1996). The three variables of the study have Cronbach Alpha values higher than 0.60. Thus, all constructs are reliable to use. On the other hand, the Pearson Correlation value of each question is higher than the r-table (0.256). Thus, all questions are deemed to be valid (0.256).

### 5.3 Hypothesis Test

In this study, the hypothesis test was done using regression-based path analysis with IBM SPSS Statistics version 25.0. Path analysis is used to analyze the direct and indirect influence between the independent and the dependent variables (Jeon, 2015). This analysis is used to determine the direct relationship between digital customer experience and patient satisfaction, digital customer experience and innovation, innovation and patient satisfaction, and to measure the indirect relationship between digital customer experience and patient satisfaction through innovation. The results of the regression analysis and the direct relationship between variables can be seen in the following table.

Table 2. Path coefficient

Variable influence	Path Coefficient	t-count
Digital customer experience → Patient satisfaction	0.227 **	2.045
Digital customer experience → Innovation	0.840 **	15.333
Innovation → Patient satisfaction	0.604 **	5.437

Note: \*\*sig < 0.01

Based on the regression analysis results, H1 was rejected while H2 and H3 were accepted. H1 was rejected because the influence of digital customer experience on patient satisfaction is insignificant as showed by a t-count of 2.045 and a t-table of 2.627, indicating that t-count < t-table. H2 was accepted because the influence of digital customer experience on innovation is significant with as shown by t-count of 15.333 and a t-table of 2.627, indicating that t-count > t-table. H3 was accepted because the influence of innovation on patient satisfaction is significant with as shown by t-count of 5.437 and a t-table of 2.627, indicating that t-count > t-table.

H4 was measured using Sobel test to determine the mediating influence of innovation on digital customer experience and patient satisfaction. The results show t-count of 5.034 and t-table of 2.627 with a significant level of 0.01. Because the t-count is higher than the t-table, it can be concluded that H4 can be accepted because it shows the mediating influence of the health services quality (Ghozali, 2013).

Table 3. Direct and indirect influence

Direct and Indirect Influence	Direct Influence	Influence Indirect Influence
Digital customer experience → Innovation	0.840	-
Innovation → Patient satisfaction	0.604	-
Digital customer experience → Patient satisfaction	0.227	0.507

Table 3 shows the direct and indirect relationship between variables. The indirect relationship was measured by multiplying the coefficient of the path traversed. The indirect relationship between digital customer experience and patient satisfaction through health service quality is 0.507. This result was obtained by multiplying the digital customer experience coefficient to innovation (0.840) and innovation to patient satisfaction (0.604). It was also found the direct

influence of digital patient experience on patient satisfaction is 0.227. Thus, it can be found that the total influence is 0.734.

The calculation result of all the variable constructs shows a significant relationship. With a total effect of  $R^2 = 0.648$ , the relationship and influences of digital customer experience and innovation on customer satisfaction are positive. It shows that digital customer experience and innovation can explain 64.8% of consumer satisfaction while other variables not addressed in this study can explain 35.2%.

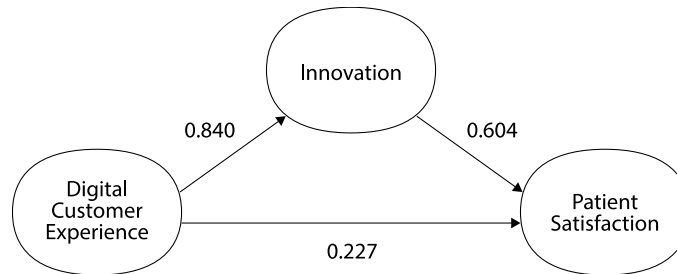


Figure 1. Result of the Study

## 5.4 Analysis

The healthcare industry's rapid expansion is also foreshadowed by a high failure rate. To further explore the issue, this study aims at gaining an understanding of the factors that influence patient satisfaction in dental and oral health services. This study explores the patient's perspective on digital customer experience and innovation to improve patient satisfaction. Dental and oral health is related to appearance. Based on this assumption, it was found that the majority of patients are female. It is assumed that women pay more attention to their appearance. In addition, this study found that most of the patients were young adults. Young adults are more open to health information, so they are more likely to be more concerned about dental and oral care.

This study also shows that innovation and digital customer experience have an important role in improving patient satisfaction. These findings support Brown & Swartz (1989) who found that customer experience influences customer satisfaction. The findings are also in line with Snide & Nailon (2013) who revealed that innovation influences customer satisfaction. Innovation is done to ensure the company's long-term survivability (Danarahmanto et al., 2020).

It was also revealed that patient satisfaction can be influenced by innovation. The information availability stimulates changes in patient demands and it also makes it easier for them to compare health facilities. As a result, dental and oral health services must develop new marketing strategies to reach a larger market and become the preferred option for patients. Product innovations made possible by digitizing services can give the general public more access to health care. In addition, process and organizational innovation are critical for resource optimization in the face of competition.

This study contradicted Wang et al. (2018) who found a positive relationship between customer experience and customer satisfaction after using a product. In this study, digital customer experience had no significant effect on patient satisfaction. It happened because dental and oral health services personnel require a direct meeting to perform their tasks such as filling decaying or damaged teeth, extracting teeth, and installing dentures. Medical personnel also have to be able to observe, assess, and treat patients directly.

On the other hand, the findings of this study suggest that there is an indirect influence of digital customer experience on patient satisfaction through innovation. Although digital customer experience does not have a direct influence on patient satisfaction, when it is utilized to encourage innovation, digital customer experience can significantly influence customer satisfaction. This study supports the hypotheses suggesting that there is a relationship between digital customer experience and innovation (Su, 2011) and the relationship between innovation and patient satisfaction (Omachonu & Einspruch, 2010; Snide & Nailon, 2013).

## 5.5 Study Implication

This study has several implications. This study can be utilized to investigate the influence of digital customer experience and innovation on patient satisfaction at dental clinics in West Java. Dental and oral health services in

West Java can utilize this study to improve patient satisfaction and help them to thrive in the current market. According to the findings, digital patient experience and innovation of dental and oral health services significantly influence patient satisfaction.

According to the findings, dental and oral health services can increase patient satisfaction by using numerous digital customer experience technologies. It should be noted that the Innovations must focus on digital services, must be able to provide an overview of digital services based on patient needs, and create digital contact points that make it easier for patients to interact with or to receive health care.

Furthermore, it is found that innovation has a greater influence on patient satisfaction than digital customer experience. It can be assumed that patients are more satisfied when dental and oral health services that offer real innovations, such as appealing promotions and service improvement regularly. The personnel also have to be skilled who can work well together. These innovations will increase patient satisfaction rather than simply gaining experience and numerous conveniences of services through digital media. Those who require it will receive direct treatment from skilled personnel, which is not only from digital media services. Dental and oral treatment requires direct treatment from skilled personnel. Therefore, patients will not be satisfied if they only receive digital services.

This study also found a significant and indirect relationship between digital customer experience and patient satisfaction through innovation. This means that innovations made by dental and oral health services must be digital-based. Patients can more easily obtain health services due to digitization. In addition, digitization can help improve the effectiveness and efficiency of patient services. Thus, innovations are based on patient needs, particularly young adult patients who want to be served promptly and conveniently using digital technology.

This study can also be used to supplement the existing research, particularly in the areas of digital customer experience, innovation, and patient satisfaction. There has been no research in Indonesia, particularly in West Java, involving these three variables related to dental and oral health services. As a result, this study will give fresh theoretical insights into the combination of digital consumer experience and innovation in West Java.

## 5.6 Limitation

It should be noted that this study has several limitations. First, this study only focuses on healthcare services located in West Java. Thus, discrepancies of interpretation may be found for the services located outside of the province, which may require additional study. Second, this study does not discuss the relationship between indicators and dimensions in great detail. Third, because the study only examined dental and oral health services exclusively, the results for other health care facilities may differ.

The quality of health services is one factor that influences patient satisfaction, which is important for the institutions' long-term survivability. Shabbir et al. (2016) found that there is a positive relationship between health services quality and patient satisfaction. Thus, it is suggested that further study should examine the relationship between quality of health services and patient satisfaction.

## 6. Conclusion (12 font)

Previous studies have shown that there is a relationship between digital customer experience and innovation in increasing patient satisfaction partially. To fill the gap, this study presents a fresh perspective and found that innovation can be used as an intervening variable. In other words, through innovation, digital customer experience can increase patient satisfaction. Taking the finding into account, dental and oral health services are suggested to provide excellent health services supported by digital customer experience-based innovation. As a complement to digital customer experience and innovation that could increase enhance patient satisfaction, further research on health care quality is required.

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## Biographies

**Pri Agung Danarahmanto** is an Indonesian academician and business practitioner. He received his doctorate in business and management from Padjadjaran University by studied innovation, business models, sustainability in entrepreneurship, focusing on digital business. He holds a Master of Arts degree from the Jakarta Arts Institute in the field of creative media by researching the business models of digital philanthropic companies. Currently he is active as a lecturer, researcher, and entrepreneur in various business fields, such as healthcare, hospitality, and digital business. He actively teaching at the Akademi Perekam Medis dan Inforatika Kesehatan Bandung (APIKES Bandung) and Padjadjaran University Bandung.

**Julia Famor Pratami** is an Indonesian dentist. She hold bachelor degree at the Faculty of Dentistry from Padjadjaran University Bandung and a master degree at the Islamic University of Bandung majoring in hospital management. She is currently studying for a doctorate degree at the Indonesian Education University majoring in doctoral management science. Currently active as a lecturer at Apikes Bandung and as the manager of several dental care branches in Indonesia.

**M. Dana Prihadi** is an Indonesian academician. He hold bachelor degree at the Faculty of Economics from Sekolah Tinggi Ilmu Ekonomi YKPN Yogyakarta and a Master of Administration at the Sekolah Tinggi Ilmu Administrasi Bandung. He is currently studying for a doctorate degree at the Indonesian Education University majoring in doctoral management science. Currently active as a lecturer at Apikes Bandung.