# The Effect of AI Implementation on Customer's Loyalty in Online Healthcare Service: Application of Grounded Theory


## Abstract

This paper aims to provide a comprehensive review of the adoption of artificial intelligence (AI) in healthcare services and the implications for customer loyalty, particularly in online services. To achieve this aim, grounded theory method was used as well as confirmatory factor analysis (CFA) and structural equation modeling (SEM). It is performed by carrying out two phases of research: first phase involved 19 in-depth interviews with snowball sampling to cover theoretical saturation with experts from health sector while second phase was conducted through survey employing convenience sampling consisting of 213 customers who have utilized internet-based healthcare services.

Findings from the study revealed different dimensions of AI that impact on customer loyalty such as AI-Enhanced Customer Experience, Increased Trust and Reliability, Data Privacy and Security, Personalization and Customization, Service Efficiency, Technical Support and Accessibility. These dimensions are also further strengthened by considering Healthcare Market Competition, Economic Conditions, Cultural Attitudes Towards Technology, Healthcare Infrastructure and Accessibility, Internet and Technology Penetration as well as Customer Demographics. Thus, AI improves service quality and enhances customer trust so augmenting customer loyalty but its efficacy is constrained by these contextual factors that need strategic intervention for maximum advantages from AI in healthcare.

The study concludes by providing policy recommendations that are specifically made within each context for promoting consumer loyalty through intelligent strategic implementation. Policymakers and practitioners can apply AI to increase patient satisfaction, trustworthiness, or loyalty for improved telemedicine outcomes once all these concerns are understood and addressed appropriately within the framework of the research design used for this study.



**Keywords:** Artificial Intelligence, Customer's Loyalty, Online Services, Healthcare Services, Grounded Theory


## 1. Introduction

Digital solutions have seen a boom in growth due to advancements in digitization, artificial intelligence (AI), and information and communication technology (ICT). This development has created the belief that humanity is entering into a new era of development called the fourth industrial revolution. According to Chatterjee et al. (2019), this revolution is predicted to result

in a shift in decision-making from humans to machines. Information technology has historically aided in the processing of data, improving and assisting human decision-making in the process. Numerous algorithms exist today that have the ability to interpret data, learn from that data, and utilize that data to make extremely well-informed judgments. It uses more data than humans could ever hope to sort through themselves, which makes the tasks easier and faster. The whole process of this is based on robots' ability to mimic human intelligent behavior including problem solving as well as information gathering (Syam & Sharma, 2018).

Businesses that use AI in their operations may automate repetitive tasks, particularly in the sales department. However, the most intriguing feature is that these businesses can increase effectiveness and boost sales through personalization, customization, and better service quality (Paschen et al., 2019). This capability includes the application of AI as an advanced analytics tool to do a variety of tasks, such as creating customized offers for clients based on their requirements, offering virtual agents to have online conversations with them, and proactively offering solutions to potential problems that the clients may encounter (Miklosik et al., 2019). Marketing professionals need to take use of AI's many potentials as it presents them with endless opportunities in the dynamic and more complicated sales environment (Anzén & Ekberg, 2020). The purchasing habits of customers have changed significantly during the past several decades (Steward et al., 2019). This implies that consumers can now research independently and set preferred criteria for making purchases (Ifekanandu et al., 2023). The rapid expansion of AI over the past few years has disrupted many businesses completely.

The utilization of AI-powered technologies in digital marketing has gained momentum due to its ability to offer customized and effective consumer experiences. Businesses need to recognize the mediating role chatbots play in the relationship between AI and customer loyalty if they want to improve customer satisfaction and connections (Khan et al., 2023). These chatbots powered by AI improve customer satisfaction and loyalty (Balan, 2023). According to Mear (2023), chatbots offer proactive interaction with customers on a personalized basis thereby increasing their loyalty. Khan et al. (2023) argue that businesses need to understand how AI-driven technologies impact customer loyalty given that latest studies show that consumers prefer self-service options such as chatbots for fast and smooth assistance.

For computers to make instantaneous decisions like selecting promotions or calculating consumer satisfaction, they have to represent, learn, store, and enhance knowledge step by step from previous experiences up to current state information (Wirth, 2018). Machines train by comparing answers with these forms of truth in situations where there are no clear-cut solutions. Robots can respond and adapt themselves while applying experienced knowledge

into the ever-changing business environment unlike traditional systems which work on predetermined sets of unyielding instructions. With time marketing environments and channels have changed due to introduction of AI. Gone are those days when we used old methods such as telemarketing or printing catalogs; instead we use modern ways like social media or chatbots? Conventional marketing strategies usually focus on firm-level achievements such as identification of competitive advantages and increasing monetary returns. The potential of conventional marketing to improve customer relationships is particularly intriguing. Traditional marketing often focuses on the purchase point alone, missing every single detail and touch point of each and every unique consumer, even if developing deeper knowledge, connections, and services to individual customers is crucial. Put otherwise, conventional marketing is not scalable and cannot account for every situation in which a client comes into contact with the company or its products. Most significantly, traditional marketing has shown to be ineffective in improving customer relationships because to the comprehensiveness of customer relationships, which encompasses consumer trust, contentment, commitment, engagement, and loyalty. As a result, artificial intelligence is required to close this gap (Yau et al, 2021).

In order to generate knowledge, artificial intelligence marketing, or AIM, employs AI to automate the curation of enormous volumes of data and information about the marketing mix. The information is then used by AIM to carry out and automate marketing tasks, such producing market intelligence (Verma et al., 2021). With this power, AIM may go above and beyond to provide customization (Kumar et al., 2019) so that each consumer can understand his or her requirements and preferences, making things that were previously unthinkable now feasible. For example, traditional marketing often focuses on the company level and acquisition/purchase activity only, but AIM may drill down to the individual customer level across numerous actions (e.g., acquisition, consumption, and disposal) connected to a product or service (Yau et al, 2021).

This has attracted significant attention in the healthcare sector due to rapid technological developments, capital requirements, and inability to store digitally information on the impact of service capacity on encounters (Wang et al, 2013). Previously conducted studies have found that information technology (IT) enhances operational performance as well as providing comparative advantages which are fundamental in a world increasingly becoming digital (Aabo & Moller, 2016; Lee et al., 2016).

According to Larivière et al. (2017), during a service contact, technology may act as an "enabler, innovator, coordinator, and differentiator" for both consumers and staff. When their

interactions are examined, technology-based service encounters are found to be important success factors. There is a variety of potential challenges currently brought about by rapidly expanding technology-based facilities in the service sectors. As an example, customers can interact and work directly with tech-based facilities thanks to AI and digital technologies or equipment including smartphones and modern robots (Yoon & Lee, 2019). IT managers should consider the role of IT and its implications for improving customer experience during interactions since it radically changes services (Yoon & Lee, 2019).

As indicated AI has become an important tool in the healthcare industry, that is changing through its numerous benefits that influence customer loyalty directly. One main advantage of AI in healthcare is its ability to offer personalized patient experiences. Through the use of AI systems, large amounts of data can be analyzed to develop specific health recommendations and predict probable health issues as well as provide timely interventions. This level of individualization does not only improve overall patient experience but also establishes a deeper trust and contentment with health care professionals. More so, by utilizing AI chatbots and virtual assistants, patients can get immediate responses to their queries which enhances access and responsiveness to healthcare services. These improved interaction quality and service play a significant role in building customer loyalty since patients would prefer committing themselves to a provider who consistently meets their expectations.

Moreover, predictive analytics capabilities within artificial intelligence enhance operational efficiency among healthcare providers resulting in better resource management and reduction in waiting times for patients. In addition, this assists in creating smoother and more effective delivery of healthcare services by optimizing appointment schedules while predicting rates of patient admission coupled with streamlining patient flow. This leads to higher satisfaction levels among patients because they face less inconvenience related to long waiting time or inefficient administration work flows hence reducing the occurrence of these problems. With such a case scenario therefore, it means that most patients will have strong beliefs about particular hospitals where they feel valued as their time is respected besides being offered high quality medical care on continuous basis. However, there is little research about how AI implementation affects customer loyalty towards healthcare providers hence we intend to examine these factors using Grounded Theory approach for better understanding. By identifying and analyzing these factors, we hope to provide valuable insights that can guide healthcare providers effectively leveraging AI for enhancing customer loyalty.

## 2. Literature review

### 2.2. AI and customer relationship

According to the behavioral approach, a consumer that persistently and continuously buys from the same source is known as a loyal client. Behavioral component of loyalty refers to the number of purchases made by a customer in respect to a particular category of product over some specific time and if he has repurchased from the firm (Bove and Johnson, 2006). On the other hand, attitude-based loyalty comes about due to psychological attachment with a product or service which includes factors like commitment and favorable attitudes. The first researcher who suggested brand preference as an indicator for loyalty was Guest (1944) who asked his respondents one simple question: "Which of these brands do you prefer?" Later on, this strategy was adopted by several researchers. Loyalty was considered as state, preference and buying intent.

It is well-known that profitability and customer loyalty are directly related. Devoted clientele ensures long-term savings on marketing expenses (Mascarenhas et al., 2006). Businesses strive to create enduring bonds with their clients since these sentiments of loyalty result in increased revenue. Businesses are searching for cutting-edge instruments to keep clients happy and engaged, which leads to recurring business. Effective loyalty initiatives can shield market shares over time by assisting in the conversion of happy consumers into devoted ones (Vinod, 2011; da Silva, 2020). Within substantial research, customization and artificial intelligence have been linked. Gao and Liu (2022) examined consumers' perspective on the use of AI in interactive marketing customization. Their analysis based on Lemon & Verhoef's customer journey shows that personalized navigation, nudges, retention and profiling are examples of artificial intelligence-based personalization at each of the five stages of the customer experience. In their discussion, there were several suggestions which managers might apply to deal with any problems on their journey.

Marketing as a whole is expected to be more affected by AI in relation to customization (Paschen et al., 2019). The evaluation by Kumar et al. (2019) into how AI and personalization converge revealed that personalization is vital for acceptance and popularity of AI. Before the rise of AI, a company's ability to offer personalized services was dependent on how much consumer data it had, as well as its ability to generate and implement insights (Kumar et al., 2019). Today, however, businesses worldwide have adopted customization through AI leading to a huge expansion in this field.

As such, it became easier for firms to provide more customized services using AI-enhanced customization capabilities. This is a big change from the early years of customization, when

marketing efforts were restricted according to predetermined guidelines made by specialists (Kumar et al., 2019).

Different types of AI (from the less complicated ones to the extremely sophisticated ones) may be needed for customization for any firm, depending on its overall goals. Depending on how much customization a corporation wants to accomplish, different AI systems will require different levels of complexity. Less sophisticated intelligence would be needed for the far more basic types of personalization, such as bulk personalization, which is typical in many online applications. Huang and Rust (2018) mentioned that agents with analytical intelligence would be necessary for mass personalization while emphasizing the nature of AI complexity. However, to make it a reality, businesses will need instinctive intelligence in high-quality customized service delivery based on intuitive knowledge as a kind of knowledge (Huang & Rust, 2018).

There is no doubt that numerous areas have become more customized courtesy of AI. These include recommender systems (Zanker et al., 2019); automated generation of advertising texts (Deng et al., 2019); predicting consumer happiness (Daqar and Smoudy, 2019); customised lead generation marketing (Syam and Sharma, 2018), among many others.

While many studies address marketing management and artificial intelligence at large, few if any have only focused on customer loyalty. Chen et al. (2023) recently conducted a research study where they explored how artificial intelligence (AI) chatbots can be used to retain customers by examining the impact of AI service quality on customer loyalty. The analysis covered 459 insights provided by respondents. Consequently, the present study found out that through cognitive trust, satisfaction emotional trust and perceived value; AI chatbots exhibit positive effects on consumer loyalty alongside service quality.

Prentice et al. (2020) examined different factors affecting customer satisfaction and loyalty such as staff service quality and artificial intelligence in another research paper. It was conducted among departing visitors who had interacted with AI as well as hotel staffs' services in various Portuguese hotels surveyed. As per the results, both personnel service quality and AI were found to significantly affect customer happiness and loyalty. However, when both staff services and AI were regressed inside the same equation it was noted that influence of AI became negligible and negative too (Ifekanandu et al., 2023).

Artificial Intelligence has been implemented to improve consumer experiences from pre-transaction through post-transaction (Libai et al., 2020). AI changes the consumer journey and strengthens the customer connection by improving technology-enabled procedures. AI can help clients with bookings, trip selections, preferred locations, and hotel payment methods (Prentice

and Nguyen, 2021). Throughout the home-sharing consumer journey, AI experiences take place. During the pre-purchase phase, conversational AI technologies are used to deliver prompt replies and enhance search ranks based on visitor choices, such as geographical preferences and comparable places clicked. AI solutions have the potential to streamline the payment procedure during the purchasing process. Customers may employ AI techniques to improve security and their entertainment experience after checking in.

Smart responses from artificial intelligence can boost confidence between many stakeholders (Hohenstein and Jung, 2020). Through digital services like ID verification and background checks, AI can promote trust (Chen et al., 2021). Customers are encouraged to communicate and use the sharing platform by these services. AI enables hosts to give patrons exceptional customer service, which increases patron engagement. Customers are more likely to connect with a brand on a "physical, mental, social, and emotional" level when they have a positive experience (Carù and Cova, 2003). Visitors that receive exceptional services from AI tools are typically more involved with the site. Customer involvement and loyalty can result from a positive customer experience (Chen et al., 2022).

Furthermore, it is anticipated that underdeveloped nations would be more affected by the AI revolution than developed ones. Robots and unskilled and semiskilled labor will be replaced by computers, intensifying the tendency of "reshoring" to developed nations (Ford, 2016). Not being able to afford pricey AI technologies would also put poor nations at a disadvantage, especially as these technologies will decrease the need for human labor and raise unemployment even more (Makridakis, 2017). The current study is especially interested in how these technologies are becoming more and more important in marketing. AI is changing marketing since it presents a number of advantages and difficulties. Future marketing is expected to employ artificial intelligence (AI) technology more and more. These technologies may be used to target certain market categories, predict the next steps of customers, and personalize brand offers (Li et al., 2017). Rekha et al., 2016). AI also makes the problem of client loyalty clearer. Depending on how businesses use it and how consumers view it, it may either positively or negatively impact customer loyalty (Mgiba, 2020).

**2.2. AI and Health services**

The "final stretch" problem in healthcare and the decisive factor between good and bad health outcomes is patient involvement and compliance. When a patient doesn't follow a prescribed treatment plan or take their meds as directed, they are considered non-compliant. According to Davenport and Kalakota (2019), patients who exhibit high levels of engagement in healthcare are likely to have better health outcomes in terms of healthcare usage, cost, and patient

experience. Less than 50% of patients were strongly involved in treatment plans, according to a study of healthcare professionals and executives (Davenport et al., 2018). Healthcare professionals create treatment programs to enhance patients' acute or long-term health using their clinical expertise. However, in most cases, it is inconsequential if a patient fails to make the necessary behavioral adjustments, such managing their weight, making an appointment for a follow-up, and adhering to a treatment plan (Davenport and Kalakota, 2019). These circumstances made it more important to successfully apply AI to improve patient engagement. Composite interventions and the care spectrum are increasingly being driven by ML and workflow engines (Volpp and Mohta, 2016). The promising tack of study is messaging alerts and suitable, tailored content that occasionally promote behavior (Davenport and Kalakota, 2019).

Furthermore, a research shows that using online portals and applications to let patients communicate with healthcare professionals can increase engagement rates by as much as 60%. Cloud-based health applications gather, store, and share patient data. These applications have the potential to improve a patient's health outcomes and allow users to access data whenever and wherever they desire. These are apps that employ Artificial Intelligence to offer non-emergency medical advice for patients. Furthermore, some apps can now alert users when medications are taken or follow up on patients according to prescribed drug regimens. Moreover, ChatGPT is integrated into many healthcare applications performing time-consuming activities like note-taking and report writing or summarizing that saves time hence better productivity (Al Kuwaiti et al., 2023). Al Kuwaiti et al.'s study reveals that it assists patients with managing medications appointments symptoms checks educating about the diseases they suffer from themselves as well as being able to cope with their chronic conditions better

Additionally, the authors (Snyder et al., 2016) pointed out that service innovation is a critical strategy for expanding businesses in the healthcare industry. According to the researchers, due to complications, emergency situations and technology progress, service innovation is required in medical sphere (Khanra et al., 2020). For instance, this research recommends first developing AI-CRM capabilities before thinking of innovations; they help understand consumer needs. This can allow healthcare organizations observe patient behaviors and sniff out changing demand patterns through AI-CRM systems (Mostafa & Kasamani, 2021). On the other hand, scholars argue that increasing demand for smart gadgets is generating opportunities for innovating new product lines in health care where studies on well-being can be found (Palanica & Fossat, 2020). Moreover, such an organization can use AI-facilitated platforms as

well as tools or services of CRM systems to create new healthcare services and reframe existing ones (Daugherty et al., 2019). As such they are enabled to grow their ability of reinventing services in healthcare through AI-CRM capacities. It is widely believed that innovation is critically important to achieving good health by both scholars and practitioners addressed by Skålen et al. (2015). It is expected that healthcare organizations located in developing countries should be prepared for dealing with various customer demands while tending towards flexibility at all times. The patients for example are esteemed customers who request changes many times besides appreciating them fully. Furthermore, concerning rapid adaptation due to several uncertainties like illness complexity or fluctuating clinical conditions and diagnostic requirements among others arising from corona virus pandemic outbreak also necessitate a prompt decision-making process relating to inventory management within healthcare facilities etc. Khanra et al. (2020) mention how dynamic skills based on AI-driven CRM are essential when it comes to enhancing service innovation among providers of healthcare services. Earlier studies show the existence of a relationship between CRM and organizational effectiveness (Chang et al., 2010). Despite their growing relevance in terms of understanding and capturing client needs, there is an unclear position on how AI-driven technologies support service flexibility (Ferreira et al., 2021). Not much is known about whether AI-CRM skills enhance CSF mechanisms for improving service innovation (Kumar et al., 2023a).

Despite the rising interest in the use of AI in healthcare, there is still a wide knowledge gap on how AI implementations specifically affect customer loyalty within this industry. Various studies have been conducted to examine the benefits of artificial intelligence (AI) technologies in enhancing operational efficiency, personalizing patient care and improving both overall patient outcomes and health status for example. Although these AI enhancements are known to exist, none of them has sought to establish their complicated relationship with customer loyalty as it relates to healthcare services. The current literature mostly dwells on technological advancements and operational merits of AI. This leaves an important gap in which psychological and experiential elements that foster loyalty among patients' population may be elaborated upon. Again, while several factors influencing customer loyalty have been studied in other service industries, they are yet to be explored holistically or within the context of AI integration into the health sector more specifically. An investigation into popular aspects of patient satisfaction with regards to perceived value, trust, and trust by means of which people choose service providers is thus called for as understanding such gaps would help healthcare institutions exploit Ai's potential towards better delivery systems as well as developing long term relationships that guarantee customer retention rates. These reasons underscore why our

investigation aims at answering the question "What are the various dimensions and indicators associated with AI applications that can help drive up direct/indirect impacts on increased customer loyalty in healthcare industry of Iran?" These factors include aspects like personalization, operational efficiency, data security, user experience, patient trust and satisfaction as well as overall value towards AI-driven healthcare provision. Our research looks at these components along with other key factors that will be useful when using strategic positioning techniques for improved customer satisfaction because by doing so we shall have arrived at a framework that guides hospitals towards enhanced long-term user adoptability based upon preference mapping through massive datasets like those employed by AI.

## 3. Methodology

This research adopts a comprehensive two-step methodology to examine the dimensions and indicators associated with AI applications which can lead to direct and indirect effects on increased customer loyalty in Iran's online healthcare industry. The qualitative method employed is grounded theory while validation through customer feedback was done by employing structural equation modeling (SEM).

### Step 1: Qualitative Phase - Grounded Theory Approach

#### Participants

The participants of this phase were 19 experts drawn from Iran's health care industry. Experts that participated were selected after considering their extensive knowledge about health care issues in relation to AI. With regards to selection of the experts, it was based on snowball sampling technique where initial participants referred other potential respondents creating a rich pool of insights.

#### Sampling

Snowball sampling was utilized to recruit the participants. This method is particularly effective in reaching a network of professionals with specialized knowledge. In this process, we began by identifying a few key experts within the healthcare industry who then referred other potential interviewees ensuring diverse perspectives and broad topic coverage.

#### Data Collection

Semi-structured interviews were held with these selected respondents. The guide had open-ended questions aimed at looking into various dimensions and indicators related to AI applications impact on customer loyalty in healthcare. This format allowed for in-depth exploration while providing the flexibility to probe deeper into specific areas as needed.

**Steps of Grounded Theory**

Open Coding: Open coding was used to identify and label key concepts or categories emerging from transcripts obtained out of interviews conducted.

Axial Coding: During this phase, relationships among open codes were identified whereby they were grouped into more abstract categories or subcategories so as understand interconnections between different concepts.

Selective Coding: The core categories are identified, the relationship between them refined or integrated forming a cohesive framework focusing on dimensions and indicators that influence AI application towards customer loyalty.

Theoretical Saturation: We continued sampling and coding until no new themes or insights emerged indicating that theoretical saturation had been achieved.

**Step 2: Quantitative Phase - Structural Equation Modeling (SEM)**

**Participants**

This phase of the study involved 213 customers who used online health care services in Iran. To select these participants, we used convenience sampling to focus on individuals with recent experience in using online healthcare services and AI-based interactions.

**Sampling**

Convenience sampling was used in recruiting customers. Using this method enabled us to gather information from a wide range of customer bases which have interacted with online healthcare systems driven by artificial intelligence.

**Data Collection**

A structured questionnaire was developed based on evidence from the qualitative phase. The contents of the questionnaire were on key dimensions and indicators identified from expert interviews that covered aspects such as service quality, satisfaction, trust, personalization and overall customer loyalty related to AI.

**Steps of SEM**

Model Specification: A theoretical model was developed based upon qualitative findings which outlined hypothesized relationships among dimensions of AI applications and indicators of customer loyalty.

Questionnaire Development: To measure the constructs identified in the model, a questionnaire was developed. It encompassed Likert-scale items assessing perceptions and experiences of participants with respect to AI application in online healthcare services.

Data Collection: The sample population consisted 213 customers obtaining medical services via online means ensuring that there is adequate representation within this target population through questionnaires.

Analysis of the Data: The obtained data through questionnaires were analyzed with SEM using PLS. This allowed simultaneous testing of many interrelationships, thus providing a comprehensive analysis for model.

Assessment of the Model: Several fit indices (e.g., CFI, TLI, RMSEA) were used to evaluate the model in order to determine its adequacy and goodness-of-fit. Path coefficients were analyzed to ascertain the strength and significance of relationships among constructs.

Revising the Model: After evaluating it initially, the model was altered as necessary to improve fit and better represent data that underlies it.

This two-pronged approach which combines grounded theory and SEM ensures a deep understanding of factors influencing customer loyalty towards online health care industry in Iran. Through this study AI applications for attaining stronger customer loyalty in an evolving sector is provided by combining on expert knowledge with consumer feedback.

## 4. Results

### Open Coding

At first, we engaged in open coding as the initial step of our analysis which involved thoroughly scrutinizing the interview transcripts to identify different concepts and categories concerning AI implementation and customer loyalty in the online healthcare service sector. During this process, every line of the transcript was scanned for important phrases, ideas or words that may have relevance to our study. These concepts were then labeled with descriptive codes to help us divide up the data into manageable segments. This exercise resulted in a rich set of preliminary codes like “personalized health recommendations”, “AI-driven customer support systems”, “data privacy concerns” and “service reliability”. At the end of open coding, numerous initial codes had been identified which represented various aspects of AI applications as well as their perceived effects on customer loyalty.

### Axial Coding

After open coding, we moved on to axial coding where we connected the dots between initial codes that were found during open coding stage. Here, we took these codes and classified them so that they could be put under relevant headings as part of one coherent structure. For example, under the larger category of AI-Enhanced Customer Experience are such initial codes as personalized health recommendations; real-time support; user-friendly AI interfaces among

others. Also, some other related codes were grouped together to form Increased Trust and Reliability; accurate diagnostics, consistency in service and 24/7 availability among others. As such, this phase enabled us to understand more deeply how AI impacts customer loyalty amongst online healthcare services by refining relationships across different code groups.

**Selective Coding**

The last phase termed selective coding involved identifying core categories then linking them into a unified theoretical framework. We focused on core categories arising from axial coding which were related to key phenomena of our research project. The core categories included Enhanced Customer Experience through AI-Driven Personalization and Increased Trust and Reliability in Online Healthcare Services. Then causal conditions; intervening conditions; strategies; contextual factors; consequences were segregated for these core categories. This holistic approach enabled us to come up with grounded theory that explains the intricate implications of AI on customer loyalty. By concentrating on these main themes, we were able to develop a detailed and strong theoretical model that emphasizes the pivotal dimensions and indicators of AI implementation in developing customer loyalty among Iranian healthcare sector.

According to the results of the interviews, several factors for each dimension were confirmed, as shown below, based on the dimensions of grounded theory.

**Core Phenomena**

Core phenomena are the main ideas that emerge from the data and become the focus of the study.

- **Customer Experience through AI-based Customization**

On-line health care services powered by AI personalize the customer experience using data analytics and machine learning algorithms to individualize health recommendations, notifications, and educations. This customization enhances consumer experience and makes the services more relevant and engaging, thus enhancing customer loyalty.

- **Trustworthiness and Reliability in Online Healthcare Services**

By being able to give accurate diagnosis, consistent support as well as reliable information AI raises trust levels on online healthcare service. It is this ability of AI to reduce human mistakes while providing 24/7 help that fosters belief in a long-term relationship essential for creating loyal customers.

**Causal Conditions**

They are underlying causes/conditions that bring about the core phenomena

- **AI-Driven Service Quality**

In healthcare services, integration of artificial intelligence technologies such as natural language processing and predictive analytics enables accurate diagnosis of specific illnesses, efficient booking of medical appointments and personalized treatment schedules. Such qualities inform the high-quality nature of the service that meets customers' expectations thereby fostering loyalty.

- **User-Friendly AI Interfaces**

The internet healthcare platforms have user interfaces designed for ease-of-use such as intuitive navigation, clear instructions, interactive features among others. These user-friendly interfaces ensure a seamless customer experience necessary for their retention.

- **Personalized Health Recommendations**

AI systems provide unique advice concerning personal health; medication prompts or reminders; lifestyle guides after analyzing specific health data. When customers recognize that the firm values them individually, they are more likely to perceive it with great importance which increases their loyalty.

- **24/7 Availability of AI Support**

This kind of continuous availability ensures clients can get support anytime they need it therefore increasing patient trust towards the service delivery mechanism relying upon it. AI-driven chatbots or virtual personal assistants are used round-the-clock for answering questions related to health or emergencies. This continuous availability ensures that customers can receive support whenever they need it enhancing their trust and loyalty to the service.

**Intervening Conditions**

These are contextual factors or variables that come between causal conditions and core phenomena.

- **Customer Technology Literacy**

The extent to which customers are familiar with AI technology and at ease with it determines their ability to fully enjoy AI-based healthcare. It is possible to improve user experience or satisfaction with the application of high technology literacy, while low levels may require further support and education efforts.

- **Data Privacy and Security Concerns**

The trust people have regarding artificial intelligence applications may be affected by individuals' worries concerning security and privacy dangers over the same information. A robust data protection mechanism coupled with a transparent data usage policy is necessary for gaining and retaining customer trust in dealing with AI.

- **Quality of Human-AI Interaction**

The quality of interactions between human beings and AI directly affects the satisfaction level of customers based on how well it understands them as if it were humanized consisting empathetic answers and accurate responses. High-quality interactions can lead to better experiences, thus increasing loyalty.

- **Regulatory and Ethical Standards**

Compliance with health care regulations as well as ethical standards when implementing artificial intelligence keeps this technology used responsibly and safely. Adherence to these principles increases trust in AI-powered services among customers.

**Mechanisms (Strategies)**

Strategies are approaches, techniques or interventions that can be used to address core phenomena or mitigate causal conditions or intervening ones.

- **Continuous AI System Improvement**

Due to feedback from customers, technological advancements inform regular updates that keep these AI systems relevant, up-to-date, and most importantly useful. This helps maintain customer satisfaction hence leading to loyalty.

- **Customer Education and Support Programs**

Customers' understanding plus effective use of the benefits offered by artificial intelligence might be enhanced by giving them various educational resources like tutorials as well as FAQs through customer service desks provided for in organizations. Educated customers will not only comprehend but also appreciate the benefits associated with artificial intelligence hence becoming loyal users of such services.

- **Transparent Communication of AI Benefits and Risks**

When health care organizations use transparent and open communication to discuss the benefits and potential risks of Artificial Intelligence, it helps in creating trust and acceptance among users. This will enable customers to have the right expectations whilst using such services hence building confidence in them.

**Consequences**

The consequences depict what results out of core phenomena as well as strategies put forth to address them.

- **Higher Customer Retention Rates and Loyalty**

Effective implementation of AI systems leads to increased satisfaction levels with the service which results into loyal customers who do not want to change their hospitals. Loyal clients are often reluctant in dumping a healthcare facility for another one.

- **Positive Word-of-Mouth and Referrals**

Satisfied clients' referrals can help increase awareness about AI-based healthcare services, thus raising its profile. Therefore, positive word-of-mouth is valuable in attracting new clientele as well as improving product positioning.

- **Enhanced Competitive Advantage**

By successfully incorporating AI technologies into their operations, online healthcare providers gain a head start over their rivals. The high quality of customer care as enhanced by the use of AI could make all the difference other than just making them stand out amongst competitors thereby bringing more people on board.

**Context or Contextual Factors**

These are the general circumstances surrounding a phenomenon or the external factors that affect how these strategies work.

- **Healthcare Market Competition**

AI technology's dependence on web-based business survival depends on whether or not they are needed for primary care patients. They may be an important competitive advantage where there is significant market competition for superior AI-driven services.

- **Economic Conditions**

The state of economy including the level of disposable income that consumers dispose can affect how far they would be willing go in supporting these forms of health support through artificial intelligence. In general, economical factors determine if someone can afford this kind service or if they value it at all.

- **Cultural Attitudes Towards Technology**

Customers' adoption rates and perceptions of Artificial Intelligence (AI) in health depend on sociopolitical perspectives toward innovation like this as well as general predispositions

towards tech devices. Positive cultural attitudes can facilitate adoption while skepticism can hinder it.

- **Healthcare Infrastructure and Accessibility**

The existing healthcare infrastructure and the accessibility of online healthcare services determine the effectiveness of AI applications for engaging and serving patients. This is because good infrastructure makes it easier to offer better customer services on health.

- **Internet and Technology Penetration**

Internet access availability and quality alongside technological infrastructure are indispensable when it comes to implementation and success of online healthcare service that is driven by AI. Moreover, a wide penetration is a must in order to serve customers better.

- **Customer Demographics**

Demographics including age, education levels, or present health may influence how patients perceive AI tools in medicine. Having understood these descriptors, one can then establish various ways through which AI could be tailored to meet unique needs.

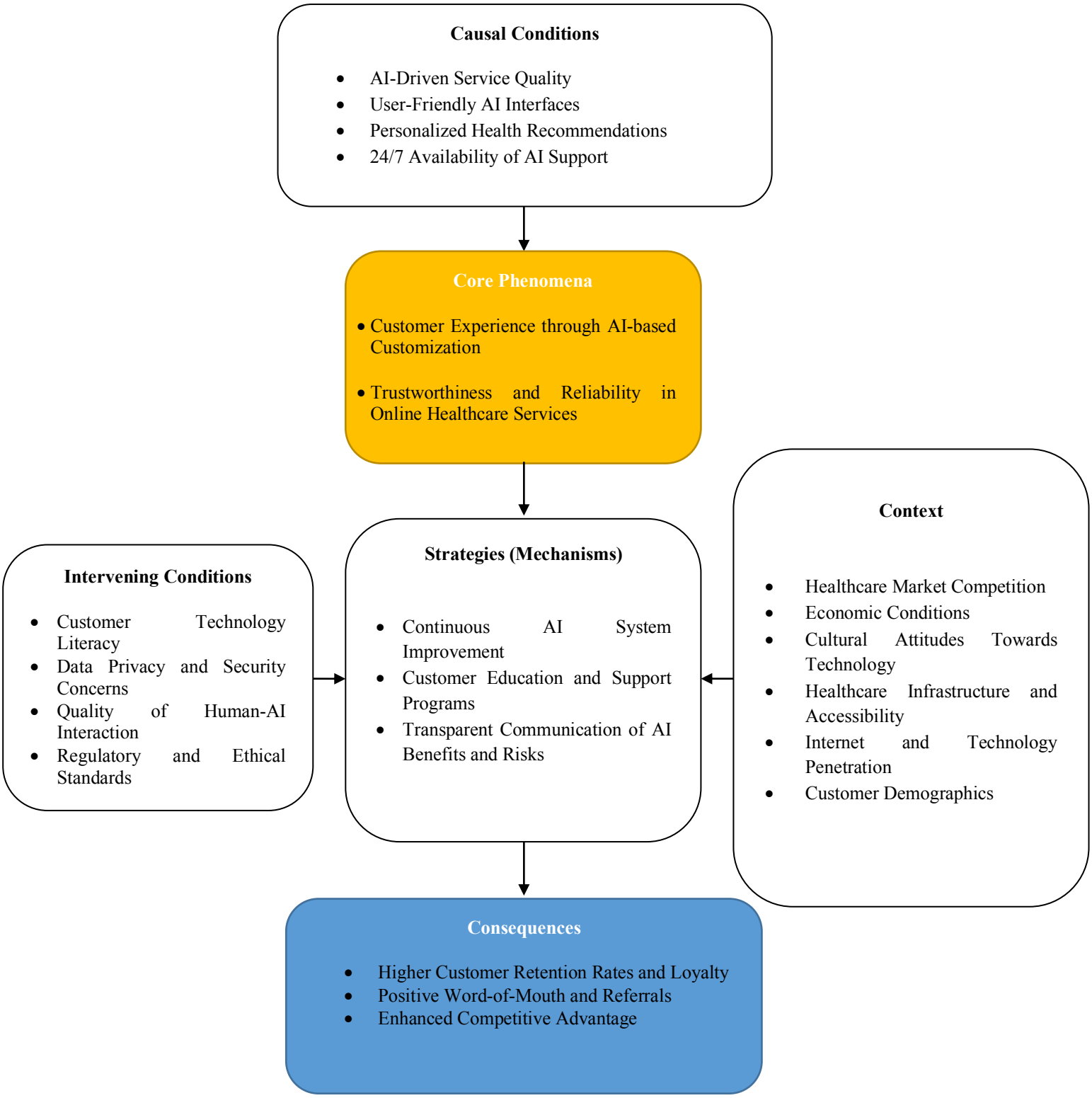


**Figure 1: Confirmed Grounded Theory Model by Experts**

We proceeded to the quantitative phase of our study after we gathered questionnaires from 213 customers of online healthcare services. The first step was to perform a Confirmatory Factor Analysis (CFA) in order to confirm the six dimensions derived from grounded theory analysis. In CFA, it is critical to check if the data fit the hypothesized measurement model with core phenomenon and all other conditions. We used indices like Chi-square test, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) in evaluating how well does the model fits.

The findings of CFA showed that our measure model fitted well, thus showing that data collected adequately supported six dimensions identified during grounded theory phase. All factor loadings for each dimension were statistically significant indicating that observed variables can reliably measure their respective latent constructs. This is essential since it provided empirical basis for constructing theoretical framework out of subjective information making sure that what we named them was statistically significant.

**Table 1: The fit indices of the dimensions**

| | CFI | NNFI | NFI | AGFI | GFI | RMSEA | $\chi^2/df$ |
|---|---|---|---|---|---|---|---|
| **Acceptable Range** | $\succ 0.9$ | $\succ 0.9$ | $\succ 0.9$ | $\succ 0.9$ | $\succ 0.9$ | $\prec 0.08$ | $\prec 3$ |
| **Causal** | 0.92 | 0.97 | 0.92 | 0.95 | 0.93 | 0.045 | 1.716 |
| **Context** | 0.95 | 0.93 | 0.96 | 0.91 | 0.92 | 0.022 | 2.228 |
| **Intervening** | 0.96 | 0.98 | 0.97 | 0.91 | 0.93 | 0.033 | 1.646 |
| **Strategies or Mechanisms** | 0.98 | 0.97 | 0.97 | 0.97 | 0.95 | 0.041 | 1.904 |
| **Consequences** | 0.95 | 0.96 | 0.96 | 0.95 | 0.91 | 0.053 | 1.678 |
| **Core Phenomena** | 1 | 1 | 1 | 1 | 1 | 0.000 | 0.193 |

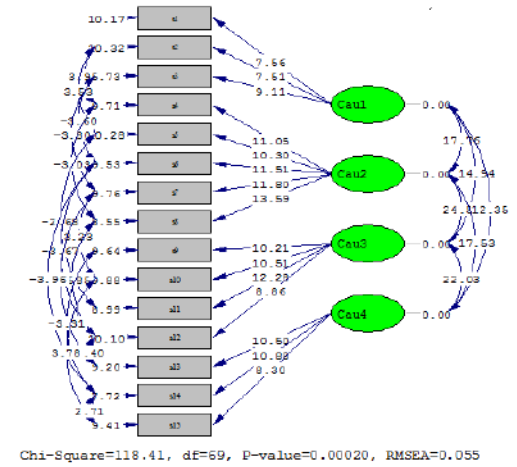


**Figure 2: t-statistics and the significance of the factor loadings of the construct of (causal factors)**

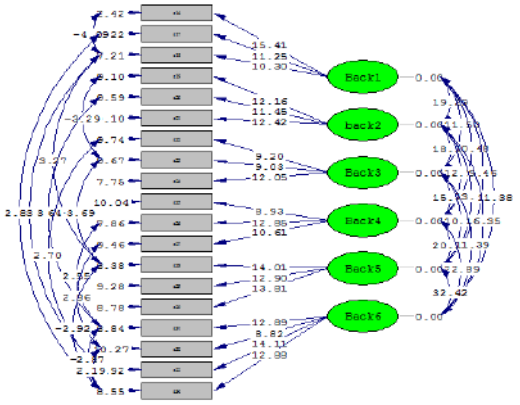


**Figure 3: t-statistics and the significance of the factor loadings of the construct of (contextual factors)**

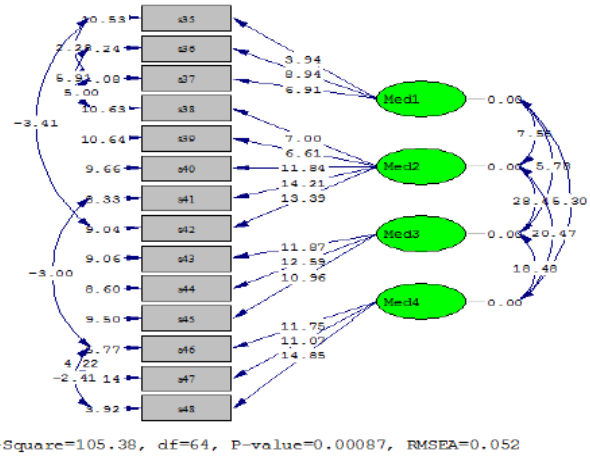


**Figure 4: t-statistics and the significance of the factor loadings of the construct of (intervening factors)**

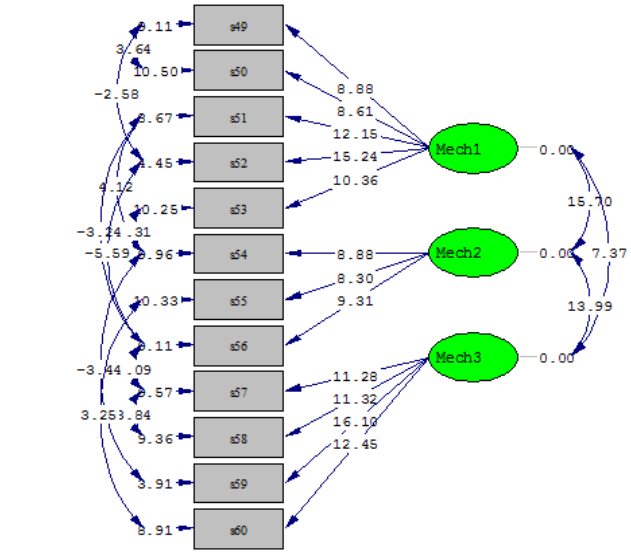


**Figure 5: t-statistics and the significance of the factor loadings of the construct of (strategy/mechanism factors)**

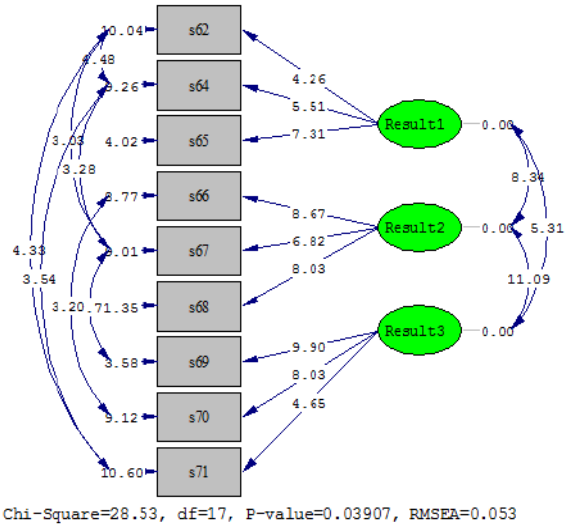


**Figure 6: t-statistics and the significance of the factor loadings of the construct of (consequences)**

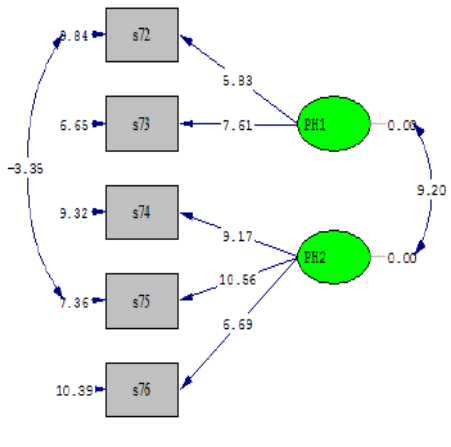


**Figure 7: t-statistics and the significance of the factor loadings of the construct of (core phenomena)**

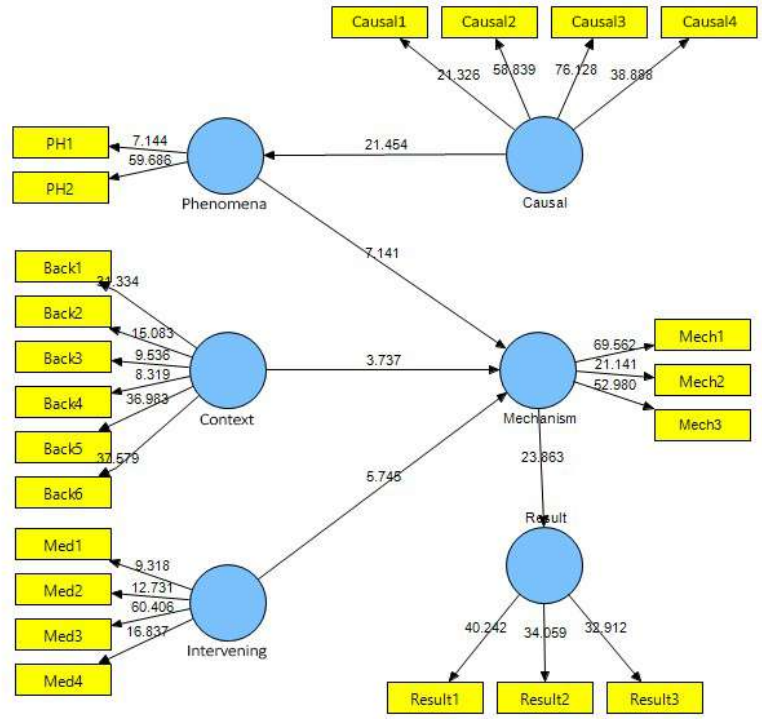


**Figure 8: Output of PLS software for measuring factor loadings of the model**

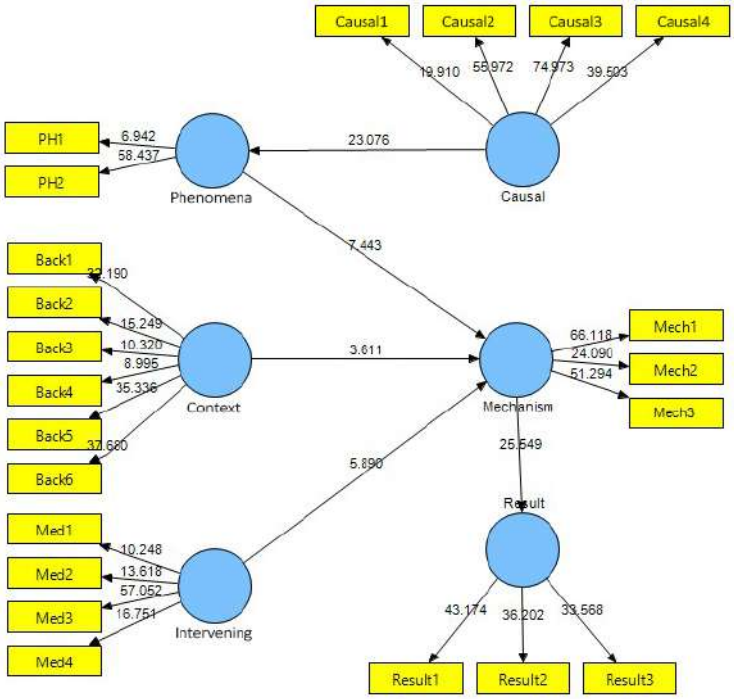


**Figure 9: Output of PLS software to measure the significance of factor loadings of the model**

After accomplishing this verification, structural equation modeling was adopted to investigate relationships between dimensions, testing hypotheses regarding AI implementation impacts on

customer loyalty within online health care services. When using SEM, it is possible analyze complex relationship paths together providing a holistic view on how different factors interrelate in determining loyalty of clients. We established a structural model based on our theory, with paths representing the hypothesized causal relationships between the dimensions and customer loyalty.

The results underscore the significance of AI technology in shaping customer perceptions and building loyalty in online health care industry that can be used for influencing actions of practitioners seeking to benefit from artificial intelligence tools to improve client experience in health care services thus enhancing their commitment to an organization.

## 5. Discussion and Conclusions

In order to improve decision-making in complex and uncertain systems, AI has been put forward as a technology with potential for reshaping medical practices (Tekkeşin, 2019; Kumar et al, 2023b). AI adoption lags behind its use in healthcare delivery compared to other business sectors for several reasons. Early AI found its home in businesses that had plenty of structured numerical data that could be fed into the computer algorithms at the heart of AI. On this basis, one can think of discrete outcomes where a buyer looked at something and then either bought it or did not buy it. It is difficult to interpret qualitative information like clinical notes and patients' reports while multifactorial outcomes associated with clinical decision making make algorithm training challenging. Furthermore, there is difficulty in embedding AI output into an already complex clinical workflow. Additionally, from our experience, some health care organizations are situated in environment which often leads them to only focus on near-term financial results at the expense of investing in longer-term innovative forms of technology such as AI. For health care organizations prioritizing innovation "total mission value" serves as a link between investment decisions and both financial and non-financial considerations such as quality improvement, patient safety, patient experience, clinician satisfaction and increased access to care (Sahni & Carrus, 2023).

The objective of our research was to examine how customer loyalty was affected by introducing artificial intelligence within online healthcare environments by employing grounded theory approach followed by CFA and SEM. The findings show that there are different major factors contributing towards customer loyalty such as: AI-Enhanced Customer Experience; Increased Trust and Reliability; Data Privacy & Security; Personalization & Customization; Service Efficiency; Technical Support & Accessibility. Being influenced by various dimensions such as Healthcare Market Competition, Economic Conditions, Cultural

Attitudes Towards Technology, Healthcare Infrastructure and Accessibility, Internet and Technology Penetration, and Customer Demographics, these dimensions were contextualized. The findings indicate that AI plays a significant role in enhancing different aspects of customer experience within the health care industry. By streamlining operations, personalizing interactions, and delivering timely and accurate information, AI technologies collectively improve customer satisfaction and loyalty. With respect to this point, trust is a crucial mediating variable and it can be influenced by enhancement in data security as well as service reliability brought about through artificial intelligence. Hence in order for AI to effectively enhance customer loyalty it has to be implemented such that it improves on trustworthiness and reliability.

Furthermore, our research highlights that contextual factors play an important part in determining whether AI applications are effective or not. For instance, when healthcare market is highly competitive then AI could differentiate itself thereby giving early adopting competitors an advantage in terms of improving service quality with its application. Similarly, economic conditions affect the level at which investments made into advanced AI technologies by health care providers can be achieved. Cultural attitudes toward technology determine user acceptance and engagement with AI-driven services while healthcare infrastructure along with accessibility determines feasibility as well as effectiveness of AI implementation.

**Policy Recommendations**

Competitive Healthcare Market

Policy recommendation: To encourage the growth of healthy competition, healthcare providers should be given incentives to adopt AI such as subsidies, tax rebates or grants for early adopters who will use AI for service improvement.

Implementation: Establish AI innovation hubs and incubators for healthcare to facilitate exchange of knowledge and innovation. Encourage joint initiatives between public and private health care providers that will enhance sharing of best practices and speed up adoption of AI.

Economic Environment

Policy recommendation: Develop financial support programs that can help healthcare providers make investments in AI technologies. This may include low interest loans, leasing options for medical equipment or public-private partnerships to reduce financial burden on the providers.

Implementation: Setting aside a fund for healthcare technology upgrade and integration of AI with priority in areas with limited access to advanced medical services. Ensure open and efficient resource allocation with maximal impact.

Cultural Understanding of Technology

Policy Recommendation: In order to improve understanding and acceptance of Al in health care among the general population, there is need for educational campaigns aimed at countering this perception. By pointing out its benefits while debunking common misconceptions, trust on Al will be built upon thus reducing resistance to technological advancement.

Implementation: Working together with influencers from all walks of life including those in culture, professionals found in hospitals as well as community leaders could be one way through which such information could be disseminated regarding how advantageous Al can get when used within a hospital set up. Workshops, seminars and interactive sessions could therefore be organized so as to create an opportunity whereby they directly interact with the public.

Healthcare Infrastructure & Access

Policy Recommendation: Investments must therefore be made into upgrading healthcare infrastructure to enable effective integration of artificial intelligence (AI). All urban as well as rural-based health facilities must have the necessary digital support systems required for effectively integrating artificial intelligence (AI).

Implementation: The plan towards improving infrastructure should therefore take a phased approach starting with those areas that are not well served. Technology companies can develop scalable and sustainable AI solutions that work in various healthcare settings.

Internet & Technology Penetration

Policy Recommendation: Make the internet and technology available in all regions for AI-driven healthcare services to reach everyone. Focusing on boosting connectivity in rural and remote areas.

Implementation: Broadband expansion projects should be implemented across the country so as to reach out to the underserved regions by providing incentives to telecommunication companies extending their services to these places. Also, digital literacy programs should be promoted so that people become able to use online healthcare systems.

Customer demographics

Policy Recommendation: Develop AI applications with specific focus groups in mind, considering age, gender, socio-economic status, and health conditions among other things.

Implementation: Demographic specific research is important in understanding different customer segments' needs and preferences. To ensure inclusivity and accessibility it is important to develop modular Al platforms customized for different patient populations.

Such contextual factors can be addressed through targeted policies and strategic initiatives, which will enable healthcare providers to use AI for better customer retention, better health outcomes, and a more sustainable healthcare system.

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