# *Investigating the barriers towards adoption and implementation of open innovation in healthcare*

Article

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**Abstract**

Open innovation, characterized by collaborative approaches and knowledge-sharing across organizational boundaries, holds great promise for transforming healthcare practices. However, the complexities of the healthcare landscape introduce unique challenges that impede the widespread adoption of open innovation initiatives and warrant an enquiry into barriers associated with one of the open innovation initiatives, i.e. digital clinic. Hence, this study investigates medical professionals' resistance toward digital clinics in emerging markets. Using innovation resistance theory (IRT) as underpinning theory, the study investigates the effects of performance barriers, value barriers, risk barriers, legal barriers, tradition barriers, and image barriers. This study also examined how the effects of barriers on inertia vary at different levels of medical professionals' personal innovativeness. The structural equation modelling and Process Macro are used to analyze the collected data. The findings indicate that value barriers, risk barriers, legal barriers, and tradition barriers play crucial roles in framing resistance intention towards digital clinics. The study uniquely enriches the emerging literature related to digital clinics by investigating the role of different barriers and inertia in digital clinic adoption. The study helps hospitals understand different barriers towards digital clinic adoption intention.

**Keywords:** *Open innovation, health, digital clinic, innovation resistance theory, personal innovativeness, inertia.*

## 1. Introduction

Due to the high risk and cost involved in research and development, organizations are sceptic towards innovation investment and are always looking to outsource open innovation to enhance their business process (Barham et al., 2020). Accordingly, open innovation received significant attention from marketers and researchers in recent years (Bogers et al., 2018; Teplov et al., 2019; Badir et al., 2020; Bagherzadeh et al., 2021; Sa et al., 2023; Saura et al., 2023; Zhang et al., 2023). Among all the open innovation, inbound open innovation received significant adoption by the organization to leverage the benefits of external sources (West and Bogers, 2014). In particular, the service industry aggressively outsources inbound open innovation to enhance its performance (Greco et al., 2018). Healthcare is among the sectors where there are huge opportunities for digital inbound open innovation for digitalization (Kapoor et al., 2020). Wearable technology, telehealth and telemedicine, mobile health, wearable health, and personalized medicine are all included in the category of digital health (Shankar et al., 2023). Digital health solutions can be categorized into three major domains: first, system efficiency-boosting solutions with no discernible improvement in patient outcomes; second, mobile digital health solutions that inform or provide basic monitoring; and third, clinical decision support and prediction models that direct treatment, provide active monitoring, and computation (Guo et al., 2020). Digitalization enhances accessibility, convenience, and service performance, and hence, the healthcare sector is the first mover in adopting innovative technology such as telemedicine, electronic health records, artificial intelligence-enabled diagnostics, video consultation, mobile health applications, surgical robots, blockchain, immersive medical training simulations, and digital clinic (Kapoor et al., 2020; Talwar et al., 2020; James et al., 2021; Prakash and Das, 2021; Secinaro et al., 2021; Schmitz et al., 2022). Among all digital health solutions, the digital clinic is one of the major innovations which attracts the attention of researchers and healthcare service providers. A digital clinic refers to a healthcare facility or service that leverages digital technologies to deliver medical care, consultations, and health-

related services remotely or in a virtual environment (Liu et al., 2021). Digital clinics contribute to expanding access to healthcare, especially in remote or underserved areas. Digital clinics offer convenience, reduce geographical barriers, and improve the overall patient experience by leveraging technology to deliver healthcare services in a modern and accessible manner (Rodriguez-Villa et al., 2020).

Under the National Digital Health Mission, the Indian government has cleared the path for the construction of an efficient and all-encompassing digital healthcare architecture by implementing a number of digital initiatives. As a result, the Indian online pharmacy market will reach 458 billion Indian rupees by 2026, with a compound annual growth rate of 44.99 percent (Statista, 2023). Further, Indian digital health market revenue reached $7373 million and is expected to reach $17120 million by 2028 with an annual growth rate of 18.35%. Further, In India, Digital clinics play a significant role in transforming healthcare delivery, addressing accessibility challenges, and improving overall health outcomes with some of the prominent challenges such as digital literacy, infrastructure limitations, and regulatory considerations which need to be addressed to maximize their impact and ensure equitable healthcare access for all segments of the population. Hence, it is crucial to understand behaviour intention towards digital clinics in India. Hence, attempts were made to investigate digitalization in Indian healthcare. The research investigating perceived barriers towards digitalization in healthcare is at nascent stage (Shankar et al., 2023) and majority of the studies investigated the consumers' behaviour towards online health (Zhang et al., 2017; Gurtner Talwar et al., 2020; Arfi et al., 2021), telemedicine (Schmitz et al., 2022), video consultations (James et al., 2021), mobile health (Duarte and Pinho, 2019). However, limited attempts were made to investigate the barriers towards digital health innovation (Mitchell and Kan, 2019; Palacholla et al., 2019), and very few studies investigate service providers' (medical professionals) resistance to the adoption of digital innovation in healthcare, i.e., digital clinic. Thus, it is necessary to

investigate factors impacting medical professionals' resistance behaviour towards digital clinics. Literature suggests inertia is crucial in resistance behaviour (Shankar and Kumari, 2019), which is defined as the individual status quo towards the existing system (Samuelson and Zeckhauser, 1988). Hence, we have examined the role of inertia in investigating the resistance behaviour towards digital clinics. Hence, using innovation resistance theory (IRT), this study attempts to investigate how different barriers play a role in framing medical professionals' inertia and resistance intention towards digital clinics. The IRT considers both functional and psychological dimensions of resistance, which allows the exploration of various aspects that contribute to resistance behaviour (Ram and Sheth, 1989). Further, the effect of barriers on resistance behaviour is not straightforward, and several intervening variables play crucial roles in framing resistance behaviour. Technology adoption literature highlighted innovativeness as a crucial boundary condition (Hwang et al., 2020; Kumar et al., 2023; Hateftabar, 2023). Innovative individuals perceived fewer functional and psychological barriers in adopting digital clinics, hence representing less inertia towards the existing system and tend to show more favourable intention towards digital clinic adoption (Shankar et al., 2023). In contrast, innovative individuals perceived several functional and psychological barriers to technology adoption, hence representing inertia towards the existing system and ultimately representing higher resistance towards digital clinics (Shankar et al., 2021). Hence, it is necessary to investigate the role of personal innovativeness. Therefore, this study aims to address the above-mentioned gaps by answering the following research questions.

- *RQ1. What are the barriers that frame medical professionals' inertia towards digital clinics?*
- *RQ2. How does inertia play a role in framing medical professionals' resistance behaviour towards digital clinics?*

- *RQ3 How effects of different barriers on resistance intention vary at different levels of innovativeness.*

To answer RQ1 and RQ2, the present study proposed a framework to investigate the role of different barriers (performance, value, risk, legal, tradition, and image) on medical professionals' inertia and how it leads to resistance intention towards digital clinics. The study also examines the moderation effects of the level of personal innovativeness on the association between barriers and medical professionals' inertia to answer RQ3.

Academically, this study makes contributions to open innovation, especially inbound open innovation literature. The study proposed a framework to investigate the effect of functional and psychological barriers on medical professionals' resistance behaviour towards digital clinics to contribute to the existing literature related to digital innovation in healthcare. Specifically, this model depicts generalizable relationships between functional and psychological barriers and medical professionals' resistance behaviour towards digital clinics using ITR as underpinning theory. Our study also demonstrates the role of inertia in the adoption behaviour towards digital clinics. Accordingly, our study significantly contributes to digital health research and ITR theory. Further, the study also investigates the moderating effects of personal innovativeness on the association between different barriers and medical professionals' inertia to provide a better understanding of the phenomenon. Practically, the study provides directions to healthcare professionals to reduce the resistance intention towards digital clinics. The study also provides suggestions on how healthcare service providers can make strategies to reduce inertia, which leads to resistance intention. The rest of the manuscript is structured as follows: Section 2 highlights the theoretical background of the study, and Section 3 highlights the research framework and hypotheses development. Section 4 highlights research methods, and Section 5 highlights the findings of the study. Discussion of the results highlighted in Section 6 Following theoretical and practical implications in Section 7 and

Section 8, respectively. The conclusion, limitations, and future research directions are highlighted in section 9.

## 2. Theoretical background

### *2.1 Open innovation*

Open innovation refers to the utilization of the inflow and outflow of knowledge for enhancing the innovation ecosystem in the organization (Chesbrough, 2006). In other words, organizations not only outsource outside innovation to enhance their process but also share their innovation with external parties to commercialize innovation spillovers (Barham et al., 2020). There are three types of innovation: inbound innovation, outbound innovation, and coupled (Greco et al., 2017; Krogh et al., 2018; Madanaguli et al., 2023). In inbound open innovation, organizations outsource innovation; in outbound innovation, organization commercialize their innovation by sharing it with external entities. Whereas in a coupled innovation system, organizations both commercialize and outsource the innovation for better utilization of available resources (Gawar et al., 2014).

### *2.2 Inbound Open Innovation*

Inbound innovation provides organizations an opportunity to outsource innovations from external entities (Barham et al., 2020). Organizations opt for inbound innovation to save their cost, efforts, and time in developing innovation and, hence, opt for readymade available innovation to enhance the process of the organization (West et al., 2015; Barjak and Heimsch, 2023). Non-availability or limited availability of in-house research development teams also motivates the organization to use inbound open innovation (Krogh et al., 2018). Inbound open innovation also helps organizations mitigate the risks associated with new product development (Greco et al., 2017). Furthermore, inbound innovations help organizations in sharing performance liability as external entities also carry liabilities related to performance

(Bagherzadeh et al., 2021). The majority of organizations opt for inbound technological innovations if they are dealing with non-technological products and services. As they are not experts in developing technological solutions for enhancing the organization's performance, they opt for inbound innovation. Banking, insurance, fast-moving consumer goods, petroleum, healthcare, education, and consultancy are the major industries which opt for inbound open innovations. In healthcare, the digital clinic is one of the inbound open technological innovations which helps clinics make their process automatic (Prakash and Das, 2021). Although digital clinic provides several benefits, medical professionals have inertia towards it, and the adoption rate is not motivating. Hence, in this study, we attempt to investigate barriers towards digital clinic adoption.

### *2.3 Resistance behaviour towards the digital clinic*

The resistance behaviour of users is one of the crucial reasons for technological innovations' failure. Hence, previous studies explored individuals' resistance intention towards new technology (Laukkanen, 2016; Kaur et al., 2020; Leong et al., 2020; Talwar et al., 2020). However, scant efforts were made to examine why organizations are resisting inbound open innovation (Shankar and Nigam, 2021; Prakash and Das, 2021). Hence, it is necessary to investigate why organizations resist technological advancement. In the existing literature studies, resistance behaviour is determined as a lack of willingness to adopt innovation (Seth et al., 2020). Studies identified that the consumer status quo is one of the major reasons for resistance (Kumari and Kumar, 2023). Markus (1983) found that intra-organizational power spreading is the major cause of organizational resistance towards new technology adoption. Seth et al. (2020) argued that individuals' inertia plays a crucial role in framing individual resisting behaviour towards new technology. In the existing literature, status quo bias (SQB) (Shankar and Kumari, 2019) and innovation resistance theory (IRT) (Kaur et al., 2020; Shankar et al., 2023; Kumar and Kumari, 2023) were used to investigate individuals' resistance

behaviour towards innovation. In this study, we have used IRT to investigate medical professionals' resistance towards digital clinics.

### *2.4. Innovation resistance theory (IRT)*

Ram and Sheth (1989) proposed an Innovation resistance theory (IRT) framework to investigate individuals' resistance behaviour. They defined resistance behaviour as individuals' negative perception towards the adoption and usage of innovation due to their status quo bias towards existing systems and perceived barriers towards new technology. The IRT provides a holistic perspective that takes into account various aspects influencing individuals' reluctance to adopt innovations. Individuals represent two types of resistance: active and passive resistance towards innovation (Heidenreich and Handrich, 2015). In IRT, active resistance is conceptualized by functional barriers, and passive resistance is resistance conceptualized by psychological barriers (Sadiq et al., 2021; Shankar et al., 2023). Literature suggested performance barriers, value barriers, risk barriers, and legal barriers as function barriers in technology adoption (Kumar and Kumari, 2023; Kumar et al., 2023) and image barriers and tradition barriers as major psychological barriers (Kaur et al., 2020; Khalil et al., 2022). The comprehensive nature of IRT allows researchers to explore a broad range of factors that contribute to resistance behaviour (Kaur et al., 2020), offering a nuanced understanding of the complexities involved. IRT has been applied in various domains, including mobile payment (Kaur et al., 2020), online community (Kumar et al., 2023), healthcare (Chen et al., 2020), bookkeeping application (Kumar and Kumari, 2023), telehealth (Tsai et al., 2019) and online food delivery services (Khalil et al., 2022). Its adaptability makes it versatile and applicable to different contexts. Hence, IRT is most suitable theory to investigate resistance behaviour towards digital clinics.

## 3. Research framework and hypotheses

### *3.1 Performance barriers*

Performance barriers refer to the negative impact on the current performance due to the adoption of innovation for completing service operations (Prakash and Das, 2021). Due to the status quo, individuals are uncertain about the performance of new technology; hence, they tend to represent negative intentions towards alternative technology (Kumar et al., 2023). Prior studies suggested that uncertainty in the performance and risk associated with expected outcomes enhances the anxiety of the individual (Kummer et al., 2017); hence, they represent unfavourable intentions towards new technology adoption and usage. If an individual is not sure about the use of specific technology, they tend to represent resistance (Eriksson et al., 2021). Therefore, due to uncertainty regarding the performance of digital clinics. Thus, to reduce the future performance risks associated with the digitalization of clinics, medical professionals represent inertia towards the existing system. Thus, we propose that.

H1: Performance barriers have a positive impact on medical professionals' inertia.

### *3.2 Value barriers*

Values refer to the trade-off between received benefits and the cost of using innovation (Shankar and Jain, 2021). If individuals perceive that they will receive fewer benefits compared to the time, effort, and money required to adopt new technology, they tend to show resistant behaviour (Morar, 2013; Verma et al., 2023). The trade-off between cost associated with using new technology and Functional attributes, such as monetary benefits/aspects and product/service attributes, influence technology usage intention (Talwar et al., 2020). In the digital clinic context, medical professionals perceive that although using digital clinics will enhance their operational efficiency, the cost involved in adopting it is much more than the benefits received. Installing a digital clinic required money, effort in learning the new system, and time to understand the functional complexity (Shankar and Nigam, 2021; Wang et al., 2023). Further, medical professionals perceive that existing systems will become obsolete if

they will start using digital clinics, and their sunk costs will increase (Shankar and Kuamri, 2019). Hence, they develop a sense of inertia towards the existing system; we propose that:

H2: Value barriers have a positive impact on medical professionals' inertia.

### *3.3 Risk barriers*

Perceived risk is one of the major elements which motivates individuals to resist innovations (Jebarajakirthy and Shankar, 2021). The acceptance of the innovation is majorly based on the level of risks and uncertainties with innovation. If individuals perceive high risks associated with new technology, they tend to represent resistance intention (Jebarajakirthy et al., 2021). There are several risks, including social risks, functional risks, privacy and security risks, physical risks, and monetary risks associated with innovation (Ram and Sheth, 1989). In the digital clinic context, medical professionals are sceptic about sharing patient personal data with third parties; hence, privacy and security risks associated with digital clinics prohibit them from adopting it (Sivathanu, 2018). Moreover, organizations perceived that they might lose control while using new technology, representing negative emotions toward it (Yang and Lee, 2016). Organizations also perceived that using new technology required time and effort (Dwivedi et al., 2023), and existing resources would not be useful. Hence, if an organization adopts a digital clinic, existing employees will be jobless, which might lead to huge human capital loss. Further, organizations are uncertain about how patients will respond to the digital clinic, hence representing inertia towards the existing system. Thus, we propose that:

H3: Risk barriers have a positive impact on medical professionals' inertia.

### *3.4 Legal barriers*

Legal risk refers to uncertainty about rules and regulations associated with innovation. Legal risk is another risk which prohibits medical professionals from adopting and using digital

clinics. The liabilities of the external entity vs medical professional in case of future unfortunate incidents are one of the major concerns in digital clinic adoption (Sullivan and Schweikart, 2019). Further, Indian legal rules and regulations are very stringent towards digital clinics, and the government recently allowed online consulting; hence, the absence of a robust legal structure is another limitation of digital clinic adoption (Chung and Zink, 2017; Yevu et al., 2023). Digital clinic technology involves the storage and transmission of sensitive patient information. Failure to adequately protect patient data can lead to breaches, compromising patient privacy and triggering legal consequences (Prakash and Das, 2021). Digital clinic technology can facilitate healthcare services across borders, leading to legal challenges related to jurisdiction, licensure, and compliance with international laws. Further, medical professionals are not sure, due to the online process, who will compensate for the loss (Prakash and Das, 2021). Hence, representing inertia towards the existing system, we propose that:

H4: Legal barriers have a positive impact on medical professionals' inertia.

### *3.5 Tradition barriers*

Tradition barriers are hindrances in the individual's existing routine and habit (Elbadrawy et al., 2012). Individuals tend to follow traditions which they receive from society and, hence, do not welcome innovation as it may change their inertia (Andrew and Klein, 2003). Any change in the traditional system leads to uncertainty and complexity (Kaur et al., 2020). Hence, organizations refuse to adopt new technology due to affection towards existing technology (Balakrishnan et al., 2021). Medical professionals love the traditional way to consult patients and are fearful that if they use digital clinics, they need to learn new technology (Prakash and Das, 2021). Further, they are also uncertain about how the patient will respond to this change. Medical professionals do not want to change their working style, daily routine, and habits, hence showing inertia towards the existing system. Thus, we propose that:

H5: Tradition barriers have a positive impact on medical professionals' inertia.

### *3.6 Image barrier*

Individuals perceived image towards innovation is crucial to making favourable behavioural intentions towards it (Jain and Shankar, 2021). The negative image towards innovation and entities involved in providing inbound innovation, which refers to image barriers, has a significant positive effect on resistance behaviour (Lian and Yen, 2013; Sajid and Zakkariya, 2023). If medical professionals perceive that the process and usage of the digital clinic are complex, then they tend to show negative behavioural intentions towards it (Seth et al., 2020). Further, the corporate image of the entities that provide inbound innovation plays a crucial role in adoption behaviour (Jebarajakirthy et al., 2021). Socioeconomic disparities in access to technology may lead to concerns about equitable healthcare access (Shankar and Jain, 2021). If certain demographics lack access to digital clinic services, it can contribute to a negative public perception (Srivastava et al., 2023)

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As the digital clinic is a new concept in India, medical professionals are sceptic towards the brand image of the inbound innovation providers and hence show inertia towards the existing system. Thus, we propose that:

H6: Image barriers have a positive impact on medical professionals' inertia.

### *3.7 Effect of inertia on resistance intention*

Inertia refers to individuals' tendency to stick with their existing habits and actions (Samuelson and Zeckhauser, 1988). Individuals try to maintain their status quo till the time change is not mandatory (Shankar and Kumari, 2019). Literature suggests that inertia is one of the major contributors to resistance behaviour towards innovation as individuals don't want to break their inertia and adopt new technology (De Guinea and Markus, 2009). Organizations are hesitant

to switch from their current systems because they perceive new technologies as potentially problematic or challenging (Shankar & Kumari, 2019). Inertia sets in as individuals tend to misunderstand new technology, leading them to maintain their existing routines until change becomes absolutely necessary (Mikalef et al., 2021). Organizations comfortable with existing processes and technologies may exhibit inertia, as they are reluctant to invest time and effort in transitioning to new systems (Mikalef et al., 2021) and tend to resist the adoption and use of new technology. In the digital clinic, functional and psychological barriers enhance medical professionals' inertia towards an existing system, which ultimately enhances their resistance intention towards the digital clinic. Thus, we propose that:

H7: Inertia has a positive impact on medical professionals' resistance to digital clinics.

### *3.8 Moderating effect of personal innovativeness*

Personal innovativeness refers to users' tendency to try new things (Adapa et al., 2020). Personal innovativeness plays an important role in the technology adoption process (Hwang et al., 2020; Kumar et al., 2023; Hateftabar, 2023). Individuals with high levels of personal innovativeness are more likely to be early adopters of new technologies. They are eager to experiment with and embrace innovations as soon as they become available, compared to individuals with low innovativeness (Singh et al., 2020). Personal innovativeness is often associated with a higher tolerance for risk (Senali et al., 2023). Innovators and early adopters are more willing to take risks associated with trying new technologies and hence represent less resistance towards technology adoption compared to low-innovative individuals. Personal innovativeness is also linked to adaptability and openness to change (Jeon et al., 2020). Innovators are generally more willing to adapt to new changes and hence represent less inertia towards new technology adoption and usage. Hence, innovative individuals tend to show more favourite behaviour towards innovative technology (Hwang et al., 2020). Innovative medical

professionals represent favourable attitudes towards new technology and hence represent positive intent towards digital clinic adoption, whereas low innovative medical professionals are sceptic towards trying new technology and hence show resistance towards digital clinic adoption. Further, innovative medical professionals perceived fewer functional and psychological barriers in adopting digital clinics, hence representing less inertia towards existing systems and tend to show less resistance towards digital clinics. Whereas low innovative medical professionals perceived several functional and psychological barriers in digital clinic adoption, hence representing inertia towards existing systems and ultimately representing higher resistance towards digital clinics. Hence, we propose the following:

**H8:** *The effect of (a) performance barrier, (b) value barrier, (c) risk barrier, (d) legal barrier, (e) tradition barrier, and (f) image barriers on inertia is higher for medical professionals having a low level of innovativeness compared to medical professional having a high level of innovativeness.*

**<Figure 1>**

## 4. Research method

### *4.1 Sample and data collection*

To collect the data for this study, we approached Indian medical professionals. According to a Boston Consulting Group (BCG) report, the Indian healthcare market will accelerate from $2.7 billion in 2022 to approximately $37 billion by 2030. According to the World Economic Forum report, artificial intelligence investment in the Indian healthcare sector will reach $11.78 billion by 2025 and, by 2035, will contribute $1 trillion to the economy. Hence, due to the huge opportunity, India is best suitable market to investigate the behavioural intention towards digital innovation. To ensure that only medical professionals participate in our study, we asked a filter question: “Are you a medical professional?” Only those respondents qualified who answered “yes” to this screening question. An Indian data collection firm provided a list of

potential respondents along with their email information. A total of 800 medical professionals were approached from the list of 2000 medical professionals using stratified sampling 318 responses were received, and 307 (55% female) were used for data analysis. The data was collected in the months of June and July 2022.

Across age groups, respondents were spread out: 32% were aged 21-30, 28% fell between 31-40 years, 20% were in the 41-50 age, and the rest were 50 years and above. Educationally, the participants were well-educated, with 44% holding bachelor's degrees and 30% possessing master's degrees, indicating a highly educated sample. Income-wise, 32% earn USD 1001 - USD 1500 monthly, 25% between USD 1501 – USD 2000, 14% between USD 2001 - USD 2500, and the remaining earn USD 2500 or below USD1000.

### *4.2 Scale development*

The survey instrument was constructed by drawing upon items from existing literature, with careful consideration to ensure their relevance to the study's context. Specifically, the variables and their corresponding sources for item measurement were performance barriers (five items), value barriers (three items), risk barriers (four items), image barriers (two items), tradition barriers (five items) from Laukkanen (2016); legal barrier (four items) form Prakash and Das (2021); inertia (three items) and resistance intention (Three items) from Shankar and Kumari (2019). The measurement items used for this study are shown in Table 2. To ensure the survey instrument's content validity, a panel comprising two information systems professors and two subject matter experts conducted a content assessment.

## 5. Analysis and results

### *5.1 Reliability and validity of the measurement model*

The confirmatory factor analysis (CFA) was undertaken using AMOS software to ascertain the validity and reliability of the measurement items employed in our survey questionnaire, as articulated by Tanjani et al. (2016). The outcomes of the CFA, illustrated in Table 1, underline the robustness of the constructs through Chronbac's alpha scores surpassing the 0.70 benchmarks for all variables, ensuring a high level of internal consistency. Convergent and discriminant validity were evaluated in line with the principles outlined by Hair et al. (2010). The average variance extracted (AVE) and composite reliability (CR) values associated with each construct exceeded the threshold of 0.50 and 0.70, respectively, unequivocally substantiating convergent validity (Hair et al., 2010). The correlation values between constructs were lower than the square root of the AVE values for each construct, solidifying the discriminant validity of our measurements (see Table 3). Results show resulting in a favourable model fit (CMIN /DF = 2.78, TLI= 0.92, CFI = 0.91, GFI = 0.93, and RMSEA= 0.06).

**<Table 1>**

We calculated the variance inflation factors (VIF) for the study variables to assess the presence of multicollinearity in the collected data. The examination yielded VIF values below the commonly recommended threshold of 5.0 (Hair et al., 2010), signifying the absence of multicollinearity issues for all eight independent variables. More specifically, the VIF values for the study variables ranged from 1.38 to 3.46.

**<Table 2>**

### *5.2 Common method bias*

In our efforts to address the issue of common method bias, we implemented a variety of strategies. One technique involved introducing a marker variable that had no conceptual connection to other survey variables (Podsakoff et al., 2003). Additionally, we conducted Harman's one-factor test to check for the presence of CMB. The results show that items related to a single factor accounted for only 26.58% of the total variance, falling below the

recommended threshold of 50%. This outcome implies that our study is not vulnerable to common method bias.

### *5.3 Hypothesis testing*

We utilized AMOS 27 to perform the structural equation modelling, assessing the relationships outlined in the proposed framework. The model fit for the SEM model was satisfactory (CMIN /DF= 2.57, TLI= 0.93, CFI= 0.92, GFI= 0.94, and RMSEA= 0.05). Our results indicate that the value barrier ($\beta$=0.13, p<0.05), risk barrier ($\beta$=0.22, p<0.05), legal barrier ($\beta$=0.34, p<0.001), and tradition barrier ($\beta$=0.15, p<0.01) have significant positive impacts on inertia. Hence, H2, H3, H4, and H5 are supported. However, the performance barrier ($\beta$=-0.09, p>0.05) and image barrier ($\beta$=0.12, p>0.05) is not significantly associated with inertia, hence H1 and H6 are not significant. The findings also indicate the significant positive impacts of inertia on resistance intention towards digital clinics ($\beta$=0.729, p<0.001), thereby supporting H7. The demographic variables such as age, gender, and geographical location were controlled, which might affect the proposed relationship. The results suggested that demographic characteristics do not have a significant effect on inertia and resistance intention towards digital clinics.

**<Table 3>**

### 5.4 Moderation test

We run Model 1 of PROCESS macro to check moderation hypotheses (Hayes, 2013). Table 4 shows that personal innovativeness negatively and significantly moderates the relationship between the value barrier (β = -0.10, $p$ <0.05), tradition barrier (β= -0.07, $p$ <0.05), and inertia (See Figures 2 & 3) Hence, hypotheses H8b, and H8e are supported. However, the association between performance barrier (β = -0.02, $p$ >0.05), risk barrier (β = -0.07, $p$ >0.05), legal barrier (β = -0.05, $p$ >0.05), image barrier (β = -0.06, $p$ >0.05) and inertia is not moderated by medical professionals' innovativeness. Hence, H8a, H8c, H8d, and H8f stand rejected.

**<Table 4>**

**<Figure 2>**

**<Figure 3>**

## 6. Discussion

Advancements in technology and increasing usage of AI and machine learning for delivering services have transformed the process in the service industry. As a result, several inbound open innovations were introduced in this domain, and the digital clinic is one of the outbound open innovations which is getting attraction in the healthcare sector. Healthcare is among the sectors where there are huge opportunities for digital clinics to enhance the process (Kim et al., 2018). However, the adoption of digital clinics by medical professionals is not encouraging (Jussupow et al., 2022). This study uses IRT to investigate the medical professionals' resistance to digital clinics. We have examined the role of barriers in investigating medical professionals' resistance intention towards inbound innovation (digital clinic). The study also examines how the effect of different barriers varies on different levels of medical professionals' innovativeness. The results indicated that value barriers, risk barriers, legal barriers and tradition barriers are positively associated with inertia. These findings are in line with resistance intention-related studies in other contexts (Sivathanu, 2018; Kaur et al., 2020). The results indicated that value barriers have a significant positive effect on inertia towards the existing system. The infrastructure cost of establishing a digital clinic and the sunk cost of the existing system (Shankar and Kumari, 2019) reduce the perceived value of medical professionals towards digital clinics, and hence, they develop inertia towards the existing system. Further, medical professionals perceive that the time and effort required to learn technology is lesser than the

benefits received from digital clinics, hence showing inertia towards the existing system. In line with previous findings (Kaur et al., 2020), findings also suggested that risk barriers have a positive impact on medical professionals' inertia towards the existing system. Medical professionals are very sensitive towards the privacy and security of patient personal information and perceive that if they adopt digital clinics, then third parties can access and misuse the patient's personal information. Further, medical professionals are also uncertain about the functioning of the system and hence show resistance towards digital clinic adoption. Further, the findings of existing literature results indicated that legal barriers play a crucial role in framing crucial medical professionals' resistance intention (Prakash and Das, 2021). In India, the legislation, rules and regulation towards online health is strict. Hence, medical professionals represent resistance towards process digitalization. Further, the labilities of the different parties are also not clear in medical-related legislation. Hence, medical professionals do not prefer to adopt digital clinics. In line with the findings of Laukkanen (2016), the result indicated that traditional barriers have a significant positive effect on medical professionals' inertia towards the existing system. Medical professionals find digital clinic technology complex and are afraid that they will not be comfortable in consultation. They are also afraid of the complexity faced by patients during consultation and hence want to stick with the existing system. Further results indicated that performance barriers and image barriers have no significant effect on inertia, as medical professionals are somehow sure that using innovative technology will be useful in enhancing process performance. Moreover, due to advancements in information technology, medical professionals are aware of the latest innovations and, hence, do not find digital clinics complex. Finally, results indicated that innovative medical professionals show less inertia towards existing systems and tend to use new technology, whereas less innovative medical professionals show inertia towards existing systems and resist digital clinic adoption. As

innovative individuals tend to try new things, they show positive intent towards innovative digital clinics compared to low innovative medical professionals.

## 7 Academic Implications

This study has several academic implications. Firstly, although open innovation has been in existence in the literature for the last two decades (Chesbrough, 2006), the literature did not demonstrate the role of risk and barriers in the open innovation context. In other words, the literature did not demonstrate how and which barriers can drive individual inertia and how inertia drives resistance intention towards inbound open innovation. To fill this gap, we investigated the effect of barriers on inertia, and findings showed that, except for performance and image barriers, all the proposed barriers drive medical professionals' inertia and resistance intention in the digital clinic context.

Secondly, this study significantly contributes to the digital health literature. Recently, several investments were made in the healthcare sector to digitalize the process. Hence, Digital innovation in healthcare continues to evolve rapidly, contributing to improved patient care, increased efficiency in healthcare delivery, and advancements in medical research and treatment modalities. Ongoing developments in technology are likely to bring about further transformative changes in the healthcare landscape. Hence, it is crucial to investigate the digital health phenomenon. In the existing literature, the majority of the research focused on customers' responses towards digital innovation in healthcare, and scant efforts were made to investigate service providers' behavioural intentions towards digital health. This study uniquely examines medical professionals' resistance to the digital clinic.

Thirdly, in addition to presenting IRT based resistance intention model, our study, particularly our moderation analysis, shows some boundary conditions for the effect of barriers on inertia. We conducted a moderation analysis of the personal innovativeness of medical professionals

on the effect of barriers on inertia towards the existing systems. Accordingly, our study extends the current understanding regarding the barrier principles of IRT by presenting the boundary conditions of the resistance intention process. Finally, this study enriches emerging virtual clinic literature. Previous studies examined consumers' adoption/resistance intention towards digital health, but scant efforts were made to examine medical professionals' resistance intention towards digital clinics. This study fills this gap by investigating the medical professionals' intention towards digital clinics using IRT as an underpinning theory, thereby enriching emerging online health literature.

## 8. Managerial implications

Based on our study's findings, we provide several insightful recommendations to companies providing digital clinic services. Our findings show that four barriers (i.e., value, risk, legal, and tradition) drive medical professionals' inertia towards existing systems, which leads to resistance intention towards digital clinics. We recommend that companies provide digital clinic services in designing and communicating open innovation for digitalizing the clinic. Organizations should provide some discounts for establishing the digital clinic infrastructure to enhance medical professionals' perceived value towards digital clinics. Organizations should also Provide comprehensive training programs, demonstrate the benefits of digital clinics, and involve healthcare professionals in the decision-making process to address concerns and build support. To reduce risk barriers, companies should provide secure platforms to ensure that no unauthorized access will be provided. They should also ensure that patients' personal information will not be shared with third parties. Companies should also ensure zero defect services. To reduce legal barriers, companies providing digital clinic solutions should sign a simple, easy-to-understand, but detailed agreement with the medical professionals. In the agreement, the liability of both parties should be clearly mentioned to reduce the legal barriers. Regularly monitoring and updating systems to comply with relevant healthcare regulations,

obtaining necessary certifications, and staying informed about changes in legislation are crucial for mitigating regulatory risks. Organizations should also ensure that all healthcare providers using digital clinic technology are licensed and credentialed. Implementing a system for verifying credentials and regularly updating provider information helps mitigate licensing and credentialing risks.

Finally, to reduce tradition barriers, organizations should ensure effective solutions 24*7 if clients are facing some technical difficulties. Further, there must be several means to connect with the organization in case of a mishappening. Implementing comprehensive change management strategies, providing training programs, and emphasizing the benefits and improvements offered by digital clinics could be helpful in reducing tradition barriers. The results also indicated that inertia leads to resistance intention towards digital clinics. Hence, organizations should make medical professionals aware of technological advancement used in the health sector.

## 9. Conclusion, limitations, future research directions

The digital clinic is one the major innovative inbound open innovations to provide digital health solutions. Digital clinics leverage a variety of digital tools and platforms to facilitate communication between healthcare providers and patients. Hence, this study uniquely investigates the different barriers associated with digital clinic adoption from a medical professional's perspective. The study highlights the crucial functional and psychological barriers by using IRT as an underpinning theory. The study also found personal innovativeness as a crucial moderator. The study contributes to the literature related to open innovation, digital health and digital clinic adoption. The study also helps marketers to reduce medical professionals' inertia and resistance towards digital clinics.

In recognizing the implications drawn from this study, it is crucial to note its limitations. One notable constraint lies in the reliance on cross-sectional data; future investigations could greatly benefit from a longitudinal approach, delving into the digital clinic dynamics both before and after adoption. Furthermore, the study primarily delves into the factors affecting resistance behaviour, yet a holistic understanding could emerge by simultaneously examining its advantages and risks. Future research endeavours might explore this nuanced interplay, drawing upon theoretical frameworks like the dual-factor model to enrich insights. Additionally, acknowledging the potential influence of respondents' demographics opens avenues for insightful exploration. Finally, we did not measure the respondents' current engagement with digital clinics. Future studies might examine the intervening effect of length of engagement.

This study also provides several future research avenues. We investigated resistance intention towards digital clinics in future studies that can investigate the simultaneous effect of risk and benefits associated with digital clinic adoption. Future studies might Investigate how resistance to digital clinics varies across different demographic groups, including age, gender, socioeconomic status, and educational background. Understanding these variations can help tailor strategies for different populations. Future studies can also explore the impact of cultural factors on resistance intention. Compare and contrast resistance patterns in different cultural contexts. Finally, future studies might investigate how the integration of digital clinics aligns with and supports public health initiatives and assess the potential for digital clinics to contribute to broader healthcare goals and sustainable development goals.

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