

## HEALTHCARE AS A SERVICE SUPPLY CHAIN: THE NEXUS OF HEALTH INFORMATION TECHNOLOGY AND MANAGEMENT CAPABILITY WITH MEDIATING ROLE OF OPERATIONAL FLEXIBILITY

**Muhammad Saeed Hashmi**

Ex-Director of Agriculture (Economics & Marketing) Punjab, Pakistan

**Leena Anum**

Corresponding Author, Associate Professor, Lahore Business School, University of Lahore, Lahore, Pakistan,  
[leena.anum@ibs.uol.pk](mailto:leena.anum@ibs.uol.pk)

**Dr. Alveena Malik**

Institute of Business Management and Administrative Sciences, The Islamia University of Bahawalpur, Punjab, Pakistan, [alveenamalik589@gmail.com](mailto:alveenamalik589@gmail.com)

### Abstract

*This research has been undertaken with an inclination to study the systematic interplay between operations, information technology and management capability, while keeping healthcare as a supply chain. The aim of this research is to examine how operational flexibility influences the relationship between managerial competency and the quality of health information technology. A representative sample of 350 medical staff members (physicians, nurses, and healthcare technicians) from public hospitals in Lahore served as the basis for the cross-sectional study. To validate the proposed relationships, structural equation modeling was applied. The findings reveal that management skills and operational flexibility are significantly impacted by the quality of health IT, and subsequently has an impact over the service delivery in the healthcare sector. Management competence was also significantly impacted by operational flexibility, a partly mediating variable. According to the results of the study, improving the quality of health IT will boost managerial capacity and operational adaptability in healthcare institutions and enhance employee loyalty as a means of prompting sentiments associated to the workplace. Therefore, this research addresses the gap in the Pakistani healthcare supply chain literature, as there are relatively few studies that have looked at how operational flexibility affects the quality of health IT and staff management skills. The findings emphasize over the need to enhance the technology driven flexibility in service supply chains such as the healthcare sector, as it has a potential to improve both, service delivery and resource management.*

**Keywords:** service supply chain, health information technology, operational flexibility, management capability.

### INTRODUCTION

With the ever-growing global population, both, optimum utilization and conservation of resources has become way more critical. This has also led to the evolution of global healthcare needs, thus leading to intensified significance toward healthcare supply chains and the quality of healthcare services (Jia, et al. 2025). However, there are several obstacles that preventive healthcare (PHS) must overcome in order to offer the community with quality oriented and effective healthcare services. This cannot be accomplished unless the entire value chain is recognized and synchronized to offer best possible service delivery from the point of origin to the point of consumption.

Inadequate finance is one of the major obstacles. Compared to other developing nations, Pakistan spends a very small amount on healthcare—about 38 US dollars (USD) per capita. India, Ghana, and the Philippines spend 57, 85 and 165 USD per capita on healthcare, respectively, in comparison to Pakistan (World Bank, 2024). In terms of GDP percentage, Pakistan's expenditure on the public health sector increased by 1.2% in 2023–24 compared to 1.1 in 2019–2020, which is not a substantial rise (Dawn 2024). The shortage of medical equipment, medications, health infrastructure, and skilled healthcare workers is another issue brought on by the PHS's inadequate funding. Even while human resources increased between 2014 and 2024, this expansion is insufficient to meet the demands of a population that is expanding by 1.7% annually (GOP, 2024). About 32,879 doctors graduate from Pakistan each year, and 40% of them leave the country in search of better prospects, citing inequality, long work hours, and low pay as the primary causes. The Pakistan's healthcare system is under excessive strain as a result of this brain drain, which leaves people without enough access to healthcare services (Asif et al., 2024).

There is an urgent need to offer patients' excellent medical treatment at all levels as a consequence of the development of the medical profession, procedures and offerings of the healthcare system, and the ongoing need for health services. As a result, public hospitals in Pakistan work hard to offer outpatient clinics that suit patients' demands and provide quality medical care. As a result, people's and healthcare institutions' attention has been drawn to the significance of offering high-quality medical services. The idea of quality health information management, operational flexibility, and management capability, as well as the influence of quality health information management on management capability and operational flexibility, are also important aspects of this study.

## LITERATURE REVIEW

Healthcare management and the healthcare sector began implementing health information technology and flexibility ideas because, like other businesses, the healthcare sector aims to improve service results while delivering better performance. But there are a number of reasons why the healthcare sector is different from other sectors. The quality of health information technology, operational flexibility, and managerial competency are the three main factors that this study identified as being crucial to improving healthcare productivity. Today, a lot of healthcare businesses are concentrating on operational flexibility and the quality of health IT infrastructure as means of fostering sustainability and process improvement.

Costly technology infrastructure, an aging population, and severe financial stresses are only a few of the frequent issues that arise from the rising demand for healthcare services and the restricted resources (land, labor, capital and/or time) (McIntosh et al., 2014; Raja & Iqbal, 2019). Nonetheless, in order to satisfy the demands of the modern world, the healthcare industry aims to offer high standards of service quality together with acceptable degrees of operational flexibility (Anees & Yan, 2019; Rehman & Malik, 2020). Today, a variety of strategies are employed to support the organizational goals of healthcare. The health management concept may also be successfully supported by installing cutting-edge technologies and enhancing managerial capabilities.

### Health Information Management

One of the six fundamental aspects of health systems across the globe, according to the World Health Organization, is health information systems. The others being: *service delivery, health workforce, access to essential medicines and technologies, health system financing and, leadership and governance*. The evolution of health systems worldwide is significantly influenced by health information systems (WHO, 2007, 2010). Health information systems are crucial for decision-making within each of the other five building blocks, which in turn serve as the foundation for health systems, even though each of the six building blocks is necessary (Nutley, 2012; William, 2021; Monferdini, et al. 2024). Information that feeds health information systems must come from a variety of sources, including vital registration, epidemiological surveillance, household surveys, health assessment data, and health service delivery centers.

According to Chan et al. (2010), health information systems require information from a variety of sources, including critical registration, epidemiological surveillance, household surveys, health assessment data, and health care delivery centers. However, employees in the health industry understand how crucial health information systems are to enhancing the effectiveness and productivity of their informational systems. Sometimes, a lack of awareness, knowledge, or training regarding health information technology results in a poor comprehension of valid methods to implement this system effectively. This confusion causes shortages and system failure (Meri et al., 2019; Modibbo & Inuwa, 2020). A health information system is essential to the success of any e-health plan in South Africa, and over 15 million rupees have been invested in health IT projects recently. It appears that the lack of an integrated management plan, inadequate procurement from consultants, high staff turnover, need-based training, and a poor business model are the main reasons why no health IT project can be implemented (Campione et al., 2019). In this study, three main dimensions: interface, functions, and performance will be observed and explored to measure the quality of health IT (Ribi  re et al., 1999).

### User-Interface

Human-computer interface design, contemporary technologies, and the usability of contemporary technological systems have all attracted a lot of attention recently (Eldahamshah et al., 2021; Adeel, 2019; Audi & Roussel, 2024; Tariq et al., 2022;). Nevertheless, the intended methods are frequently insufficient to accomplish the intended outcomes (Eason, 2001). The efficacy of computer and medical systems depends on consistency and a

combination of societal and scientific acceptability (Abdellatif, et al. 2020). The system's features must be capable of satisfying all the demands and specifications of health sector executives and users. The following are some examples of these qualities, in addition to the practical capacity to accept and compatibility with any new system: compatibility with current systems, cost, dependability, support, etc (Nielsen 1993). In order to guarantee the appropriateness, design, acceptability, and usability of health systems, manpower is a crucial component. In order to improve the efficiency of technological systems and the quality of information, as well as to benefit from the components of electronic systems and data and prevent redundant data, a system analyst is a technical expert who can evaluate user requirements, analyze the course of work, document information sources, support the quality of work, and facilitate methods of use (Khan, 2020; Alshawabkeh et al., 2022; Russo, 2022; Mehmood et al., 2022). Furthermore, the development of user-friendly data interfaces for the health quality information system requires human resources. As a consequence, the user can import or export data to electronic sources to fill the health quality information system data warehouse, or simply browse between the system's components and interfaces information and data entry screens (Malik, et al. 2023) (Niland et al., 2006).

### **System Capabilities and Functionalities**

Rapid change is a defining feature of healthcare systems. Additionally, the skill and functional competence to carry out fundamental executive management tasks are necessary for health information management (Kloss, 2016). All the necessary conditions are met by the information input function to enable processing of the data file (e.g., accept, select, enter, scan, read, and receive). Conversely, storage functions indicate the tasks necessary to maintain provide them with the data system in a permanent manner (read, transform, copy, create, update). The methods by which data can be processed to yield information with additional value are specified by processing functions. According to Niland et al. (2006), output functions retransmit those steps to generate reports and summaries of data from the system. Additionally, functional reflection refers to the health information system's capacity to provide users with the ability to fix and reverse errors (incorrect information) as well as enable the system to locate and fix errors quickly, easily, and accurately. a reliable and secure tracking system that detects errors, whether they originate from entry, processing, import, or storage, and raises the system's quality functioning.

### **Healthcare Service Performance**

Public health programs may suffer from a lack of understanding of the key performance factors that could impact the quality of health information systems, such as data collection, the effectiveness of data-based monitoring, and performance evaluation mechanisms (Al-Nawafah et al., 2022; Akbar & Hayat, 2020; Al-khawaldah et al., 2022; Davis and Burgess, 2017). Three of the most popular quality criteria used in numerous studies to evaluate the effectiveness of health IT systems are timeliness, accuracy, and completeness (Alhalalmeh et al., 2022; Alhalalmeh et al., 2020; Chen et al., 2020; Ali & Senturk, 2019).

Training is essential for conveying information and skills from the teacher to the learner, enabling them to acquire the abilities necessary to perform better and continuously carry out work-related tasks (Al-Abbadi et al., 2021). In this context, it is necessary that top management conduct seminars and workshops on a regular basis. Senior management and higher authorities must commission it. All managers, frontline healthcare workers, and employees of health information management systems should have access to ongoing education and training programs. Additionally, training need to concentrate on health service delivery protocols and be quantifiable (Kaposhi et al., 2015).

### **Operational Flexibility**

Healthcare administrators might make decisions about technology, staffing, and whether to expand or remove services from their businesses while still fitting organizational frameworks. The duties of the healthcare manager encompass more than just overseeing the institution's internal operations, such as managing personnel and health services; they also include comprehending, adjusting, and taking advantage of opportunities presented by external policies and activities that invariably affect the institution and its methods of operation. As a result, the institution as a whole is impacted by the manager's actions and choices. Companies must create strategies to deal with ambiguity in a dynamic business climate. One tool that may help a business manage insecurity as much as feasible is flexibility (Al-Hawary et al., 2017). One of the fundamental forms of flexibility, operational flexibility, is now required to react swiftly and efficiently to changing circumstances, enhancing performance (Yousuf et al., 2019). Metternich et al. (2013) define flexibility as the capacity to quickly adjust to changing circumstances with little

loss of time, money, effort, or performance. The capacity to adapt either proactively or reactively to ambiguities in a corporate setting is known as operational flexibility. There are several dimensions to this talent, and their relative importance may vary. Concern over the concept of flexibility and how it relates to operations management is growing. In a competitive sector that is marked by intense competition, short product life cycles, quickly shifting customer preferences, increased technological innovation, and other factors, flexibility has long been acknowledged as a critical component. According to Sawhney (2006) and Tiwari, Tiwari, & Samuel (2015), flexibility is often defined as a company's capacity to cope with or adapt to environmental unpredictability, hence offering opportunities for long-term competitive advantage.

According to Butler and Leong (2000), hospital flexibility is a fundamental and inherent component of providing healthcare, enabling healthcare organizations to effectively respond to shifting political and economic environments as well as unpredictable patient demands. Recently, Ward et al. (2015) noted that hospitals' adaptability with regard to flexible lists and physical sources may enhance their responsiveness to patients by attending to their changing healthcare needs by offering them space, staff, and physical sources (such as beds). However, the biggest obstacle for hospitals continues to be how to integrate a high degree of flexibility to adapt to changing expectations and needs (Dias and Escoval, 2014; (Dixit, Routroy and Dubey 2019). In the meanwhile, operational flexibility takes unit-based value costs and patient clinical outcomes into account. Incorporating flexibility into the medical and non-medical sectors might result in significant improvements and maintain health outcomes, particularly in periods of increased demand and uncertainty. The three aspects of flexibility—input, process, and outcome—will be examined in this study in relation to the idea of operational flexibility in the healthcare industry (Chahal, Gupta, & Lonial, 2018).

#### **Input Flexibility**

The inputs of an internal system can be used to gauge how well-established it is. The system can handle both anticipated and unforeseen changes with great efficiency when it has solid inputs. Customers may be refunded in the event of a mistake thanks to input operational flexibility, and the company can create an operating system that is both adaptable and efficient by using qualified input flexibility (Kumar & Singh 2019).

#### **Process Flexibility**

Three stages of customer value creation determine the process's flexibility: the provider domain (creating value for the customer, with an emphasis on planning, reviewing, and adjusting positive value creation); the cooperation domain (establishing a state of positive interactions between the service provider and customers as well as between customers and the organization's vision in general); and the customer domain (essentially focusing on the additional organizational distinctive value that significantly influences customer attraction). Conversely, process flexibility addresses a wide range of contributing elements that might enhance organizational services and bolster their competitive advantages (Ojha et al., 2020).

#### **Outcome Flexibility**

This adaptability result addresses competition in a professional manner. This occurs when the company concentrates on the six fundamental competencies that boost its competitiveness: service quality, service cost, service pricing, service flexibility, delivery speed, and delivery dependability. All of these diverse skills might aid the organization's executives in making wise choices by giving them a better grasp of the competitive landscape. They will provide them the ability to select from the available options and focus on different performance evaluation criteria, which will improve the interaction between businesses and their clients in order to satisfy them. Increasing an organization's internal environment results in high levels of market competitiveness since an organization's performance is restricted by how much outcome flexibility it has extended (Alamro et al., 2018; Kumar & Singh, 2019).

#### **Management Capability**

A broad variety of abilities and knowledge are needed for management, which is a multidisciplinary field of study and a complicated process (Mohammad, 2020; Mohammad, 2019). Understanding and successfully putting into practice contemporary management concepts and strategies are essential for managers to succeed. One needs a firm grasp of the foundational ideas of management in order to become a successful manager. Gaining and preserving a competitive edge over rivals depends on a company's management's capacity to adjust to the dynamic nature of the business (Pindur et al., 1995). According to Jacobides and Winter (2012), the term "capability" is



frequently used in management textbooks to refer to an idea that is taken for granted and occasionally has a wide, all-encompassing definition.

An organization's management capacity, knowledge, and procedures that are utilized to carry out initiatives and actions that result in better performance are referred to as management capability. A company's management competencies frequently include the capacity to manage inter-organizational connections efficiently. The term "managerial capability" in business describes an organization's capacity to effectively manage its assets, knowledge, and procedures in order to produce better outcomes. Assessments of management skills also commonly incorporate inter-organizational management skills (Karabag and Berggren, 2016).

### Theoretical Rationale

This study has been theoretically grounded in the *Socio-Technical systems Theory*, wherein, it is assumed that the performance of healthcare supply chains is codependent on the interplay between both, the social and the technical aspects, where social aspects cover the notion of service delivery to the patients, and the technological aspects covers the maintenance of the healthcare data banks, availability of information from various data points and the utilization of the data by service providers to improve the state of service delivery. All these aspects are expected to be influencing the management capability (Feldman 2023).

## THEORETICAL FRAMEWORK

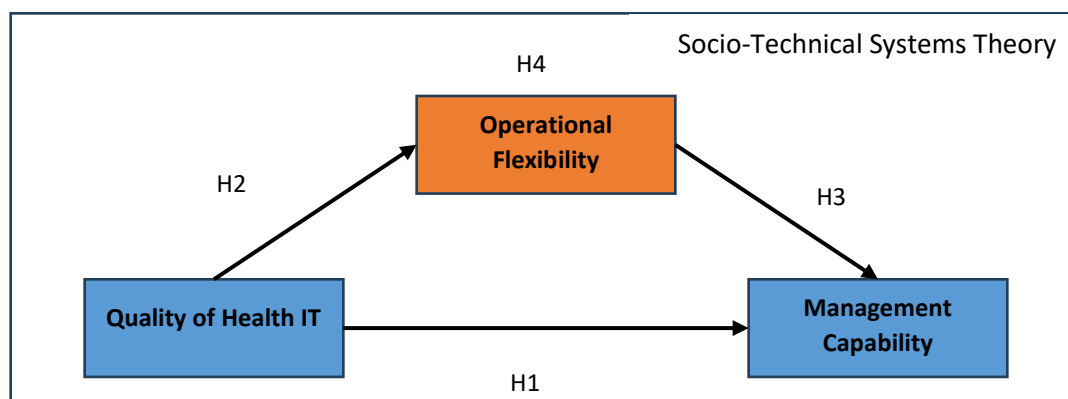


Figure 1: Proposed theoretical framework

Based on the theoretical model, which appeared in Fig. 1, the researchers have four proposed research hypotheses as follows:

**H1:** *Quality of health information technology has a significant impact on Management capability.*

Numerous studies have demonstrated that health information technology may help reduce medical mistakes and increase the efficiency of healthcare professionals. Conversely, high-quality health information systems contribute to better management practices and better health care results. These research concentrated on the ways that health information technology functions in the medical field, whether it affects patient happiness, as well as crucial it is to raise the standard of healthcare. Facts regarding the significance of the influence of health information technology use on health performance, follow-up, and improvement processes were presented in all of these research. The limitations and difficulties in health organizations are better understood as a result of this finding (Sittig et al., 2015; Whitehead et al., 2018; Darragh et al., 2018).

**H2:** *Quality of health information technology has a significant impact on Operational flexibility.*

Effective use of information technology, re-engineering of conventional procedures, increased emphasis on flexibility to react swiftly to changing demands, and performance evaluation to help senior management make better decisions are all necessary for healthcare systems (Dixit, Routroy and Dubey 2019). Administrators and leaders of health systems must imagine realistically derived models that will be beneficial to health systems. In order to effectively address such difficulties, experts must also be able to envision a complex dynamic system that offers resilience, solutions to assess "what if" situations, and the possibilities and ideas that simulation programs bring (Krakauer et al. 1998).

It is evident from the foregoing that increasing operational flexibility is crucial to raising the quality of health information systems. However, operational flexibility requires a significant source of high-quality input data, which is what health information systems' quality offers. Since this idea has never been investigated previously, particularly in the health sector, it is regarded as a significant research contribution within the researcher's area of expertise.

**H3:** *Operational flexibility has a significant impact on Management capability.*

Zhang et al. (2003) investigated how flexibility affected output capacities and performance. According to the research, operational flexibility lowers overall expenses and operating time, which helps launch new goods and enhance existing services, both of which raise consumer happiness. Al-Khalil and Darwish (2019), on the other hand, looked at the degree of flexibility adoption in the automotive sector since their research showed that putting flexibility dimensions into practice would significantly boost operational performance. The capacity to adapt either proactively or reactively to ambiguities in the organization's internal and external environments is known as operational flexibility. Based on the aforementioned, the researchers suggested that operational flexibility is crucial and influences enhancing managerial effectiveness.

**H4:** *Operational flexibility mediates the relationship between Quality of health information technology and Management capability.*

According to the fourth hypothesis, operational flexibility acts as a mediator between managerial capability and the caliber of health IT, as seen in Fig. 1. According to management theories and research, operational flexibility is necessary for quality in health IT, and it has a direct effect on performance, particularly in managerial capabilities. This study is more valuable because of its operational flexibility, and one of its most significant contributions is the examination of its mediating role.

## RESEARCH METHODOLOGY

### Sample Demographics

The study's participants included physicians, nurses, and medical technologists working at four public hospitals in Lahore city Punjab, Pakistan. At the time of the study, it was estimated that there were around 1975 medical staff leaders and physicians working at public teaching hospitals. A crucial component of research design, sample size has a big impact on the reliability and importance of the study's findings. To ensure sample size adequacy and prevent Type II errors, the sample size must be calculated. The study's purposive sample was limited to 380 physicians and medical personnel. An interviewer gave the respondents the questionnaires and directions on how to complete them. Participants were asked to rate their opinions felt about a variety of items from diverse structure. They used a seven-point Likert scale for information technology quality assessments, a seven-point Likert scale rating from "Completely disagree" (1) to "Completely agree" (7) for operational flexibility assessments, and a seven-point Likert scale rating from "Strongly disagree" (1) to "Strongly agree" (7) for management capability assessments. The completed questionnaires were collected and examined by the interviewer. A 73% response rate was obtained from the 495 completed questionnaires that were given to sample participants; 350 completed questionnaires were returned.

**Table 1: Sample Demographics**

Hospital participation			Professions		
Name of the hospital	Frequency	Percent (%)	Professions	Frequency	Percent
Public hospital number 1	122	34.9	Practical Nurse	80	22.9
Public hospital number 2	65	18.6	Registered Nurse	101	28.9
Public hospital number 3	47	13.4	Technologist	43	12.3
University Hospital	116	33.1	General Physician	27	7.7
Total	350	100.0	Resident Doctor	75	21.4
			Specialist Doctor	24	6.9
			Total	350	100.0

Ten observations for each indicator variable is the commonly accepted sample size derived out of the item response theory (Bortolotti, et al. 2013)(Nunnly, 1967). The researchers deliberately chose a suitable sample size

of 350 respondents for 33 observations in the study tool from Pakistan's four public hospitals in the Lahore city in order to meet the aforementioned requirements. Stratified random sampling was used to choose respondents from the observed population. As indicated in Table 2, 22.9% of the respondents were practical nurses, 28.9% were registered nurses, 12.3% were medical technologists, , 7.7% were general practitioners, 21.4% were residents, and 6.9% were specialists. The percentages of men and women among the 350 responders were 34 and 66 percent, respectively. Their ages ranged from 20 to 75.

### Research instrument

The fourteen-item quality of health information technology component, which was derived from Ribiere et al. (1999), was used to evaluate the first part of the questionnaire. The second section, which was based on 13 items, was devoted to operating flexibility (Chahal et al., 2018). The six-item scale that was derived from (DeSarbo et al. 2005) was used to test part three managerial competency.

**Table 3**  
Loadings, AVEs and CRs

Study Variables	Item	Loading	AVE	CR
Operational Flexibility	Ability to expand capacity through overtime and/or temporary hiring (Outcome flexibility 1).	0.775	0.698	0.97
	Ability to produce a wide range of service lines within the period used by the hospital minimum planning (Outcome flexibility 2).	0.845		
	Ability to introduce new and/or modifying existing services within.(Outcome flexibility 3)	0.905		
	Ability to shorten service times for procedures (Outcome flexibility 4).	0.823		
	Ability to produce varying levels of output at a profit within the minimum planning period used by the hospital (Outcome flexibility 5).	0.77		
	Ability of our employees to handle a range of tasks. (Process flexibility 1)	0.868		
	Ability of the technologies to handle a wide range of operations. (Process flexibility 2)	0.877		
	Ability of our processes to perform procedures on patients in varied sequences. (Process flexibility 3)	0.78		
	Suppliers' ability to respond to our request for changes in order mix. (Input flexibility 1)	0.788		
	Suppliers' ability to respond to our request for changes in volume. (Input flexibility 2)	0.819		
	Suppliers' ability to respond to our request for changes in delivery time. (Input flexibility 3)	0.842		
	Suppliers' ability to respond to our request for changes in new services. (Input flexibility 4)	0.884		
	Suppliers' ability to respond to our request for changes in service modifications.(Input flexibility 5)	0.859		
Management Capability	We have integrated logistics systems.	0.774	0.69	0.87
	We have cost control capabilities.	0.832		
	We have financial management skills.	0.917		
	We have human resource management capabilities.	0.911		
	We have accuracy of profitability and revenue forecasting.	0.797		
	We have marketing planning process.	0.696		
Quality of the Health Information Technology	Screen layout are well designed. (Interface 1)	0.825	0.68	0.97
	Screen colors are pleasant. (Interface 2)	0.835		
	Information is readable. (Interface 3)	0.871		
	Menus are easy. (Interface 4)	0.851		
	Volume of output per screen is suitable. (Interface 5)	0.856		
	Graphics are pertinent.(Interface 6)	0.852		
	Charts are concise. (Interface 7)	0.807		
	Screen interface is easy to customize. (Interface 8)	0.727		
	Simple (Functions 1)	0.847		
	Secure (Functions 2)	0.86		
	Fast (Functions 3)	0.76		
	Complete (Performance 1)	0.83		
	Sufficient (Performance 2)	0.924		
	Successful (Performance 3)	0.827		

Note: the AVE and CR were calculated based on the standardized loading of the sub dimension of the constructs in the second-order model.

### Statistical Analysis

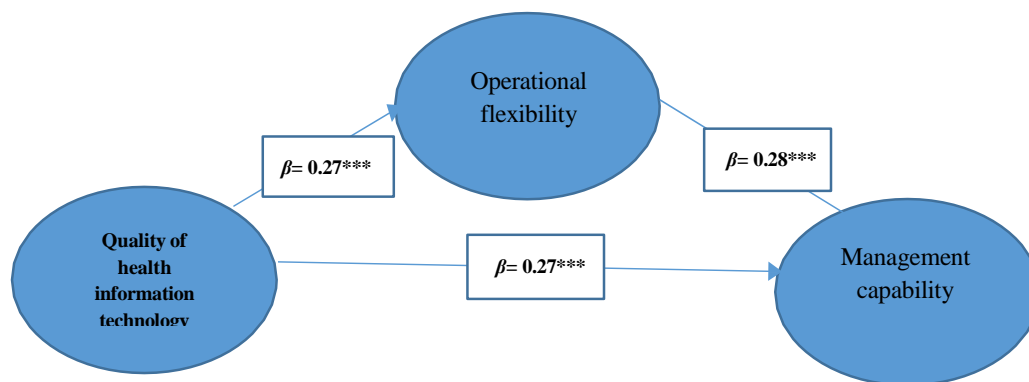
The AMOS 24 platform was utilized to conduct structural modeling research in order to compute direct and indirect effects as well as confirmatory factor analysis. Descriptive statistics were also calculated using SPSS 24.

### Confirmatory factor analysis: validity and reliability

The composite reliability (CR) and average variance extracted (AVE) values for the constructs are shown in Table 3. The AVEs were higher than 0.5, and the CRs were greater than 0.7, indicating that the constructs were convergently valid (Fornell and Larcker, 1981). The operational flexibility AVE and CR were 0.698 and 0.97, the management competency AVE and CR were 0.68 and 0.88, and the health information technology quality AVE and CR were 0.69 and 0.87. Furthermore, the CFA findings did not indicate that any of the items should be eliminated because all of their standardized loadings were sufficient. The findings of the CFA for the hypothesized model also indicate that our data match the model [chi square = 1205.590, (DF) = 479, (CFI) = 0.928, (TLI) = 0.921, (RMSEA) = 0.065, incremental fit index = 0.929, information criterion = 1369.590, and p-value = 0.000]. Despite the strong match indicated by the CFI and TLI values over 0.90, the RMSEA was below 0.08, as anticipated by Hair et al. (2016).

### RESULTS AND HYPOTHESES TESTING

SEM was constructed to incorporate operational flexibility, managerial competence, and health IT quality factors in order to assess hypotheses (see Figure 2). The SEM's fit indices (chi square = 1250, DF = 479, CFI = 0.928, TLI = 0.921, RMSEA = 0.065, and p-value = 0.000) show that the model fits well. The findings indicate that both management capability and operational flexibility are positively impacted by the quality of health IT, and that management capability is positively impacted by operational flexibility. The findings support hypotheses H1, H2, and H3. Regarding the mediating impacts of operational flexibility, the results show that operational flexibility has a large indirect impact on managerial competence due to the quality of health information technology. Our hypothesis regarding the mediating role of operational flexibility on the variables under investigation is supported by these findings. It is important to highlight that managerial capacity and the quality of health IT were somewhat mediated by operational flexibility (Troisi, et al. 2022)(Hair et al., 2016).



\*\*\* significant at 0.001

Fig. 2. Structural model – Standardized effects

### DISCUSSION

Technological advancement has paved way for the development in various organizational functions, in both, manufacturing and service driven organizations. Service sector in general and healthcare in particular has seen a major breakthrough in terms of cross-functional linkage, operational efficiency and improved management capability with the deployment of various health information systems (Dixit, Routroy and Dubey 2019) (Adeniyi, et al. 2024).

According to Kulikowski et al. (2012), informatics is the use of computerized information systems for decision-making, problem-solving, and question-answering. Without a doubt, the quality, safety, and efficacy of the healthcare services that are offered are fundamentally improved when health information technology is used



(Martin et al., 2020). A wide range of systems are implied by health information technology, from basic charting to more sophisticated decision support and connection with medical devices. Additionally, there are many ways that health information technology can improve and transform healthcare, such as reducing the rate of human error, enhancing clinical results, encouraging regularity in care, boosting practice efficacy, and monitoring data over time (Alotaibi & Federico). Physicians can use electronic devices to handle their medicine orders with computer-based data input systems (Us et al., 2001).

Therefore, it makes sense for hospitals to focus their efforts on specific factors that influence the acceptance and resistance to electronic medical records (Darby et al., 2019). As a unique managerial approach, several companies highlight the use of advanced technology and high-tech services, such as organ transplantation or robot surgery (Trinh, 2020).

The introduction of eHealth technology, including the electronic health record (EHR), has profoundly changed the way that healthcare is delivered and how physicians carry out their responsibilities. This change will thus continue as robotics and AI become more ingrained in the healthcare system (Buch et al., 2018; Arnold & Wilson, 2017; Safdari et al., 2015). A developing health system uses digital infrastructure to promote patient-centered treatment, public health, and strategic planning (Sheikh, 2020; "The Evolving Evidence Base-Methodologic and Policy Challenges," 2007).

Schön et al. (2019) define usability of health information technology as the extent to which technology may be utilized effectively, efficiently, and satisfactorily based on system design. Poor HIT usability can be linked to inadequate information entry and retrieval, as well as problems in collaboration and communication (Coiera et al., 2016). However, poorly designed systems can also result in demotivation and the undesirable burnout of skilled employees (Kroth et al., 2019). The research suggests that there are several possible definitions of flexibility. According to Gupta and Buzacott (1989), flexibility in production systems usually refers to the system's capacity to adjust to changes. According to Stevenson and Spring (2007), operational flexibility is the capacity to adjust to uncertainty either proactively or reactively. There are many aspects to this talent, and the relative importance of each may change based on the circumstances. Both the ability to prolong operations (Olsson et al., 2010) and the ability to respond to uncertainty, promote efficiency, and other traits commonly linked to operational flexibility (Yousuf et al., 2019). Interconnected capacities and flexibilities make up operational flexibility. Additionally, allowing employees to switch between workstations, for example, boosts productivity and fosters operational flexibility (Azizi & Liang, 2013).

However, technology integration is necessary for every organization to function well, and any activity that relies heavily on human contact must have a suitable technological setup to increase operational flexibility without jeopardizing the security and safety of the operators. Therefore, facilitating a range of sources and technical skills is necessary for strong operational flexibility (Berglund, 2022). Hence, aside from the provision of electronic reminders, the main way that health information technology improves adherence to protocol- or guideline-based therapy is by promoting patient care. Thus, according to research from four benchmark leaders, putting in place a multifunctional system may actually help with increased care delivery that follows guidelines (especially in the area of preventive health), better monitoring and surveillance activities, lower rates of medication errors, and lower rates of utilization for potentially unnecessary or redundant care (Care, 2006).

In opposition, high-tech foundations can be used to induce operational flexibility. For example, health information technology can effectively support the established flexibility needed for fundamental health operations in hospitals and health care organizations. Decision-makers and clinical stakeholders must focus on expanding technical and operational techniques throughout health care delivering facilities since these results have a significant connection to health sector organizations. Through carefully selected partnerships that comprise their principal network of connections, organizations are always seeking methods to increase the economic value they may offer (Doz, 1996). According to conceptual interpretation, a capacity is a state of ongoing development. Accordingly, the growth of knowledge and the real adaptation of practical tasks constitute the state of managerial competency (Jarratt, 2004). A company is more likely to succeed in reaching its goals and objectives if it can continuously adjust to changes. Operational flexibility and increased management skill are both becoming more and more important components of organizational growth. Additionally, an organization's ability to adapt to regular changes in the environment and non-environment is positively impacted by flexible organizational processes. Policymakers should thus

understand the significance of establishing networks, gaining information, and gaining a competitive edge. A company must first identify and then reveal its unique qualities.

## CONCLUSION AND IMPLICATIONS

The evolution of health care services and the quality of service delivery is heavily reliant on health information systems. Advanced documentation and follow-up systems that emphasize medical diagnosis, monitor treatment outcomes, and minimize medical mistakes are necessary for high-quality health. The key differentiator is the quality of health information technology. The goal is to achieve a level of quality in health information systems that not only meets the primary objective of patient satisfaction but also boosts productivity, lowers costs, and creates opportunities for ongoing improvement. Having health information technology in the health system is not enough. Hospital management skills are now seen as a source of quality and progress in the healthcare industry. The ability to enter and process medical and administrative data in a simple, quick, and secure way is essential for management capabilities to stand out. This is reflected in the hospital's decision-making level and serves as a foundation for hospital excellence.

An essential management concept for enabling firms to adapt to both internal and external changes is operational flexibility. Operational flexibility helps the firm achieve a strong condition that lowers possible losses while simultaneously boosting productivity and addressing any flaws or deficiencies. Operational flexibility is one of the research's strengths and acts as a mediating component. There aren't many studies that focus on improving the quality of health IT through flexible, participative methods, which is beneficial for the company. The study's findings demonstrated the mediation function of operational flexibility, which was a mediating factor between the management capacity of the hospitals under investigation and the quality of health information technology.

Looking at the interplay between various elements of the healthcare value chain, the study's findings also demonstrated the positive connection between operational flexibility and the managerial capacity of the hospitals it examined, as well as between operational flexibility and the quality of health IT. In order to improve the quality of health information technology and management capabilities in hospitals, hospital management should be encouraged to increase operational flexibility in all hospital policies and procedures. This can be achieved by strengthening the operational flexibility culture among employees, educating them on how to use it in their daily work, and increasing its visibility in hospital strategies. This boosts the hospital's competitive level, improves patient happiness and service for patients and their families, and strengthens the hospital's position in the market.

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