



# Driving Hospital Performance through Hospital Collaboration in the context of Interdisciplinary with Open Innovation and Patient Centred Care an Empirical Investigation

Johanes Ronalddy Polla <sup>1\*</sup>, Harjanto Prabowo <sup>2</sup>, Sutoto <sup>3</sup>, Sri Bramantoro Abdinagoro <sup>4</sup>

<sup>1,2,4</sup> Binus Business School, Doctor of Research Management, Binus University

<sup>3</sup> KARS

(Received: 07 October 2023

Revised: 12 November

Accepted: 06 December)

## KEYWORDS

Hospital  
Performance,  
Open Innovation,  
Hospital  
Collaboration,  
Case managers,  
Healthcare

## Abstract

In an era characterized by complex healthcare challenges and rapid technological advancements, hospitals are increasingly seeking collaborative approaches to innovate and improve their operational outcomes while also focusing on their patients' needs. This empirical study employs a multifaceted research design to examine the relationship between patient-centered care, hospital collaboration, open innovation practices, and various dimensions of hospital performance in Indonesian hospitals by implementing interdisciplinary approaches within the organization. By collecting and analyzing data from a diverse array of hospitals across national contexts, this research investigates the extent to which collaborative engagements with external entities foster open innovation initiatives within hospital settings. The empirical analysis delves into critical performance indicators encompassing patient care quality, operational efficiency, financial sustainability, and innovation adoption. Utilizing advanced statistical methods, the study dissects the correlations and effects of hospital collaboration with open innovation on these performance dimensions, offering a comprehensive understanding of the potential benefits and challenges associated with such endeavors. With a total of 306 respondents, including case managers from hospitals around Indonesia, the outcomes of this investigation offer valuable insights for both academic research and hospital management strategies. This paper not only advances scholarly discussions on the symbiotic relationship between collaboration and open innovation but also provides hospital administrators, policymakers, and healthcare practitioners with actionable insights into cultivating a collaborative ecosystem that drives performance advancements while also focusing on the patient. Additionally, this research investigates an interdisciplinary perspective in Indonesian hospitals by emphasizing the importance of fostering partnerships, knowledge sharing, and external engagement. This study underscores the pivotal role of hospital collaboration in leveraging open innovation to propel hospitals toward elevated performance trajectories within the dynamic healthcare landscape.

## 1. INTRODUCTION

Indonesian healthcare faces a significant access-quality gap, impacting public hospital care. In the era of globalization and pandemics like COVID-19, national and international inter-agency coordination holds the potential to enhance hospital medical services. Collaboration between Indonesia and international hospitals can contribute to strengthening community health services. The Asia Medical Week-Indonesian Outreach, "The 1st International Hospital Capacity Building Forum," aims to bring Indonesian and international hospitals together to identify challenges and build capacity. Dr. Rukmono Siswihanto, M.Kes.,

Sp.OG(K), emphasized that this cooperation focuses on three main aspects: human resources, infrastructure, and technology. The event occurred on Friday and Saturday, November 22–23, 2019, at Hotel Tentrem Yogyakarta.

Addressing the healthcare system requires expertise in innovative business tactics, leveraging uncertainty for a strategic advantage over competitors. Implementing entrepreneurship-based healthcare ideas, especially in hospitals, remains unclear. Some healthcare stakeholders, including physicians, may reject innovations (Herzlinger et al., 2023). However, recognizing the need for entrepreneurialism in the healthcare system, perceived as a



competitive failure, and implementing policy reforms for an industry in transition are crucial (Christensen et al., 2009). An example is the Indonesia Health Insurance (JKN) program initiated in 2014 by the Indonesian government. The program aims to ensure comprehensive health coverage for the entire Indonesian population. Hospitals participating in the JKN program are required to engage in collaborative efforts to provide services and cover healthcare expenses. This involves fostering cooperation among enterprises, academic institutions, and governmental entities to advance technology and products. The government allocates resources for infrastructure development, supports start-ups and small enterprises, encourages digital platforms for collaboration, and seeks international investment to enhance innovation ecosystems. The government's initiatives are expected to enhance the economic growth and competitiveness of Indonesian hospitals through innovation and collaboration.

"Patient-centered care" is an approach that prioritizes the patient in care delivery, focusing on patient preferences, values, and needs in decision-making. While patient-centered care has been studied for decades, it has gained increased attention as a means to improve healthcare quality and patient outcomes. The concept emerged in the 1950s and 1960s when psychologists and social scientists explored the effects of patient-centered communication on outcomes. Patients' satisfaction and health outcomes improved when healthcare providers listened, acknowledged feelings, and involved patients in decision-making. The World Health Organization (WHO) defined patient-centered care in the 1970s as an approach that is respectful and responsive to individual patient preferences, needs, and values. This definition has been widely accepted and adopted by healthcare organizations and policymakers worldwide. Reports by the Institute of Medicine (IOM) in the 1990s called for a fundamental shift toward patient-centered care, listing it as one of the six quality care domains alongside safety, effectiveness, efficiency, timeliness, and equity.

Since then, numerous studies have shown that patient-centered care is beneficial. For instance, research has demonstrated that patient-centered care reduces healthcare costs, improves health outcomes, and enhances patient satisfaction. Additionally, lower rates of medical malpractice claims and medical errors have been linked to patient-centered care. Several organizations have developed frameworks and guidelines to encourage the delivery of patient-centered care. Examples include access to care, care

coordination and integration, information and education, emotional support, family and friend involvement, continuity and transition, and the Picker Principles of Patient-Centered Care.

Accessing care, as per Hall (Hall, 2012), involves ensuring that patients are fully educated about the risks and advantages of their treatment, a crucial step that may take time but is essential for informed decision-making. With the patient's consent, involving family members in the patient's treatment can be beneficial, providing emotional support and aiding in decision-making. Patient portals can facilitate communication between patients, family members, and healthcare professionals (O'Neill, 2022).

Another illustration is the Patient-Centered Medical Home (PCMH) model, emphasizing team-based care, patient engagement, and coordinated care across various settings and providers. Research on patient-centered care underscores the importance of involving patients in their care and tailoring healthcare to meet their specific requirements and preferences. Patient-centered care is likely to remain a major focus of quality improvement efforts as the healthcare industry continues to evolve.

The study conducted by Baughman et al. (2020), titled "Pandemic Care through Collaboration: Lessons From a COVID-19 Field Hospital," provides insights into the establishment and operation of a field hospital during the COVID-19 pandemic. The field hospital was set up as a joint effort between a prominent academic medical center and the state government to address the increased influx of COVID-19 patients. This study emphasizes the significance of fostering collaboration among diverse stakeholders, such as hospital managers, physicians, nurses, public health officials, and the community, in addressing a public health emergency. The authors elucidate how the field hospital effectively utilized the proficiency and assets of several organizations to deliver exceptional healthcare services to individuals afflicted with COVID-19. The research paper highlights significant insights, such as the necessity for effective communication and coordination among various parties, the importance of being adaptable to swiftly evolving situations, and the benefits of utilizing technology to facilitate collaboration and healthcare service provision. The authors also underscore the need to emphasize the well-being of staff members and offer services to support their physical and emotional needs. Overall, the research underscores the pivotal significance of collaboration in addressing public health emergencies, exemplified by the



COVID-19 pandemic, offering valuable insights and recommendations for effective collaboration strategies in delivering high-quality treatment within intricate and swiftly changing circumstances.

Transforming entrepreneurship and collaboration in hospital organizations require substantial empirical evidence. Jonathan Rauch's article, "Disruptive entrepreneurship is transforming U.S. health care," explores how new technologies and innovative business models are reshaping the American healthcare industry. Historically dominated by large, bureaucratic organizations like hospitals and insurance companies, the rise of disruptive entrepreneurship, characterized by small, agile start-ups, challenges this status quo. One example is the emergence of telemedicine, allowing patients to consult with doctors remotely via video conferencing, potentially increasing access to healthcare, especially in rural or underserved areas. Rauch contends that disruptive entrepreneurship is fostering innovation and competition in the healthcare industry, ultimately benefiting patients by enhancing access to care, reducing costs, and improving outcomes. However, Rauch acknowledges challenges, such as integrating new technologies into the existing healthcare system efficiently and effectively (Rauch, 2015).

"Hospital performance" measures a hospital's ability to provide high-quality care, improve patient outcomes, and manage resources. Hospital performance has been measured for decades, with a new focus on healthcare quality improvement. The 1990s saw several IOM reports on healthcare quality improvement.

Based on the previous explanation of the problems and phenomenon, one of the goals of this research is to determine if open innovation can sustain hospital performance mediated by hospital collaboration at the managerial level. Evidence gaps emerge when fresh research contradicts established conclusions. The field issue arises from observation and pre-interviews from Indonesian hospitals based on openness and collaboration to fill the gap in the healthcare industry on current issues like pandemic and management issues, looking at Indonesian hospital performance.

## 2. LITERATURE REVIEW

### 2.1 Resource Based View

A company's success depends on its resources and ability to earn. Intangible and physical resources exist. Machines, medical supplies, buildings, and land are physical resources.

Culture, awareness, and expertise are intangible. (Ferreira, Azevedo, & Ortiz, 2010).

Economists claim that improving a company's performance gives a competitive edge. The competitive advantage of a corporation stems from its fixed resources. The notion often known as the resource-based view theory (RBV) arises from the existence of these fixed resources. The resource-based view theory (RBV) is a theoretical notion that has emerged from extensive studies conducted by economists globally. This notion is often regarded as providing the necessary solution for organizations to develop a competitive advantage. According to Barney and Wright (2001), The Resource Based View (RBV) thesis, initially formulated by Wernerfelt (1984), posits that an organization's resources and capabilities play a crucial role in determining its competitiveness and performance. These resources and capabilities serve as the fundamental building blocks upon which the company's success is built. The Resource-Based View (RBV) framework serves as a valuable tool for analyzing and identifying strategic advantages by examining a company's assets, functions, and the evaluation of these functions. The underlying principle of the Resource-Based View (RBV) theory posits that an organization can enhance its competitive position vis-à-vis other firms by effectively leveraging the resources of the target company in alignment with its capacity to attain competitive advantage (Wernerfelt, 1984).

RBV can be used to analyse a company's competitiveness. RBV can add, develop, and extend items, but not all resources can offer a competitive edge. Heterogeneous and immobile resources create a competitive advantage. This RBV can identify the company's long-term competitive advantage: resources and capabilities. RBV says strategic asset ownership and control define a company's competitive edge (Madhani, 2010).

### 2.2 Open Innovation

Open innovation organizes innovation differently. Open Innovation: The New Requirement for Technology Profitability and Creation by Chesbrough was published in 2003. Open innovation assumes that a company can and must use both internal and external ideas to innovate and sell. Open innovation brings platform, architectural, and system ideas from inside and outside the business together. Business models specify these architectures and systems' requirements in open innovation. These company strategies use internal mechanisms to create value and claim a share of it.



The literature proposed two open innovation elements. Open innovation emerges from inside and outside. Outside in Open Innovation uses other people's discoveries (Chesbrough et al., 2006), is accessible, and connects with outside groups to gain scientific and technical capabilities. The procedure is covered (Chiaroni et al., 2010). Inside out Open Innovation involves commercializing organizational innovation and partnering with external companies (Chiaroni et al., 2010). (Cheng and Huizingh, 2014) demonstrated its application.

The establishment of interorganizational links with interest groups such as universities, research centers, suppliers, or customers is a fundamental element within the framework of open innovation, regardless of its specific dimensions (outside-in, inside-out, or coupled activities). Wagner (2006) conducted a study which suggests that in order to derive advantages from open innovation, enterprises should engage in collaborative efforts with suppliers and adopt an open approach towards them. As Chesbrough (2010) asserts, proposals originating from suppliers have the potential to be equal to or surpass those developed inside within an organization. Narasimhan and Narayanan (2013) believe that the incorporation of suppliers in open innovation exhibits notable distinctions as compared to closed innovation. The study indicates that the major goal of open innovation is to address problems and prioritize the selection of partners based on their suitability, irrespective of any pre-existing relationships. On the other hand, closed innovation is distinguished by its focus on internal innovation development and administration, strict control over intellectual property, and the implementation of established governance procedures. This study aims to apply the supply network concept to the open innovation paradigm, taking into consideration the differentiation between closed and open innovation approaches. Scholars commonly allude to the potential network of suppliers, encompassing suppliers of various scales, suppliers with which the company has had prior associations, and suppliers with whom it lacks any previous connection. The study aligns with the supply network framework and examines the necessity of directing attention towards the "upstream facet of open innovation" (Beck, 2022), which is alternatively referred to as vertical open innovation and partner-oriented open innovation. The present study adopts the "network-based innovation strategy" as described by Saebi (2015) to examine the organization's approach to fostering collaborative activities with its supply network.

## 2.3 Patient Centered Care

Patient-centered care (PCC) represents a break from traditional disease-centric paradigms and is grounded in the principles of holistic healthcare (Epstein, 2000). During the 1970s, patient-centered care started to experience a surge in popularity, and in recent times, it has acquired significant traction due to endorsements from medical, public, and other organizations. The importance of defining and measuring patient-centered care (PCC) outcomes is growing due to the increased interest in PCC. The concept of PCC is determined by the locations and perspectives that are depicted. A comprehensive examination of the existing literature revealed the identification of four distinct sources that provide definitions of PCC. The perspectives encompassed in this category consist of patient perspectives, therapeutic perspectives, economic perspectives, and perspectives on public policy.

The study conducted by the Picker Institute and Harvard Medical School (2019) highlights the significance of eight elements of Patient-Centered Care, which are considered to be of utmost importance to patients respect for patient's values, preferences, and expressed needs, coordination and integration of care, information and education, physical comfort, emotional support and alleviation of fear and anxiety, involvement of family and friends, continuity and transition, and access to care.

To fully comprehend patient centricity, include the patient's perspective. Patient preferences for healthcare interactions have been identified, but a patient-centered care (PCC) definition has not yet been defined. Respect, civility, capability, efficacy, patient engagement in decision-making, treatment duration, availability or accessibility, and information are patient care priorities. Patient treatment requires excellent communication and extensive inquiry (Jennings et al., 2005). A primary care preference research found that communication, partnerships, and health promotion were the most important patient demands, especially for psychological and symptomatic patients (Little et al., 2001). Jennings et al. found that patients prefer respectful and competent treatment and information. This shows the importance of a patient-centered healthcare system.

Patient-centered treatment prioritizes patient needs and preferences. This method believes that healthcare practitioners and patients should work together to achieve the greatest results and that patients should participate in their care. Management bases patient-centered care on



numerous ideas. Managers must understand their patients' needs and experiences with empathy. Managers must listen to patients and their families and communicate openly and honestly to ensure that all healthcare team members communicate well with patients and each other. This requires clear speech, avoiding medical jargon, and explaining complex medical data. Managers should urge patients to participate in their treatment. Patients often need continuous care, so respecting their preferences and values, including them in decision-making, and providing them with information and resources to assist them make informed decisions are all important. Managers should support continuity of care and smooth provider-setting transitions throughout the patient's journey. Finally, management must prioritize patient safety and quality care. This entails monitoring and improving care quality and implementing protocols and systems to reduce errors and adverse events. Prioritizing patients and providing the finest care is patient-centered care. Positive patient outcomes and improved healthcare delivery require a culture of collaboration, communication, and continual development.

## 2.4 Hospital Collaboration

Hospital collaboration refers to the practice of hospitals exchanging medical resources to foster cooperation and enhance the provision of healthcare services. The literature has documented two types of hospital partnerships. Initially, it should be noted that hospitals possess a diverse array of medical resources and expertise available for the purpose of collaborative efforts. This form of hospital collaboration has the potential to mitigate the duplication of medical resources or personnel. The monitoring center of the collaborating hospitals possesses the capability to facilitate the transfer of patients to the appropriate hospital, taking into consideration their medical state. In the second form of partnership, hospitals possess comparable medical resources, albeit varying in capacity and patient numbers, which can be attributed to the hospitals' reputation and geographical location. Renowned medical facilities tend to draw a larger patient population, thereby leading to extended waiting periods. When a hospital engages in collaboration with other hospitals, it may result in the transfer of patients from hospitals with higher patient volumes to those with lower patient volumes. The partnership between hospitals has a dual advantage: firstly, it enables hospitals to circumvent the need for costly medical resources, and secondly, it allows patients to receive fast treatment at any accessible hospital, thereby

enhancing the quality of their care. According to Chen (2017), Various forms of collaboration can be observed, encompassing partnerships, alliances, networks, and mergers. The principal aim of hospital collaboration is to optimize patient outcomes, mitigate expenses, boost operational efficiencies, and foster the exchange of resources and expertise.

Numerous theoretical frameworks have been established to elucidate the notion of hospital collaboration and to provide guidance for fostering collaborative alliances among hospitals. One of the most important theories in this field is resource dependence theory. According to resource dependence theory, companies rely on external resources, including other organizations, to effectively achieve their goals and objectives. Within the realm of hospital collaboration, the significance of inter-organizational interactions and the sharing of resources, including knowledge, skill, and technology, is underscored by resource dependence theory as a means to attain improved outcomes. The subsequent idea, known as social exchange theory, posits that the establishment of links between organizations is predicated upon the reciprocal exchange of resources and benefits. Within the realm of hospital collaboration, the social exchange theory emphasizes the significance of mutual advantages and the cultivation of trust and reciprocity in collaborative partnerships. The theoretical framework of network theory posits that organizations can be conceptualized as nodes within a network. This perspective places significant emphasis on the interconnectedness of organizations and the consequential flow of resources, information, and influence that occurs between them. Within the framework of hospital collaboration, network theory emphasizes the significance of inter-organizational networks and the functions of trust, communication, and coordination in enabling effective collaboration. According to institutional theory, organizations are impacted by societal norms, values, and expectations, and are compelled to adhere to these societal standards. Within the realm of hospital collaboration, institutional theory emphasizes the significance of ensuring that collaborative partnerships are congruent with the norms and values that govern the healthcare system.

## 2.5 Hospital Performance

In the context of hospital performance, The RBV theory emphasizes analyzing a hospital's human capital, technology, and reputation to improve performance and gain a competitive edge (Veillard, 2005). Lean management





stresses continuous improvement and waste elimination across a business. Lean management theory emphasizes minimizing waste, improving processes, and streamlining operations to improve patient outcomes, save costs, and boost hospital performance.

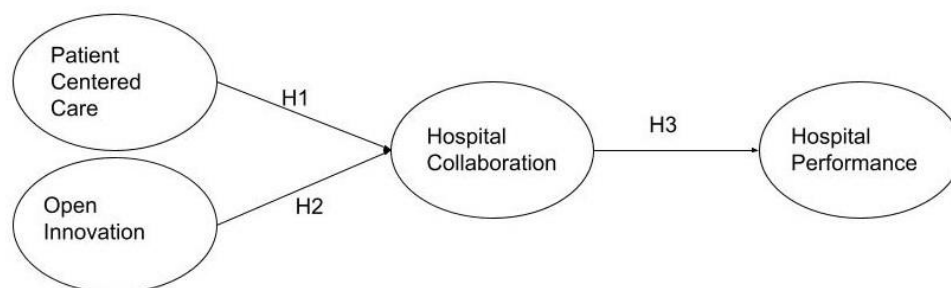
The field of strategic management theory focuses on the development and execution of key objectives and actions undertaken by a company's senior leadership in the representation of stakeholders. This process involves evaluating available resources and analyzing both the internal and external contexts in which the organization operates. Within the realm of hospital performance, strategic management theory emphasizes the need to take into account the wider context of the healthcare sector. It underscores the necessity for hospitals to formulate and execute plans that are in line with their objectives, available resources, and the broader healthcare environment. These theoretical frameworks establish a fundamental basis for comprehending the intricate and interconnected elements that impact the performance of hospitals. Moreover, they can guide the formulation of approaches aimed at assessing and enhancing hospital performance. By taking into account these theoretical frameworks, healthcare institutions can acquire a more profound comprehension of the intrinsic and extrinsic elements that influence operational efficiency, thereby enabling them to formulate and implement efficacious strategies.

## 2.6 Interdisciplinary

The delivery of care must be both efficient and effective in the current healthcare environment. In order to give patients the best treatment possible, hospitals are intricate organizations that demand a smooth integration of the skills of several healthcare experts. The act of healthcare experts from many professions collaborating is known as interdisciplinary cooperation, and it is widely acknowledged as a critical factor in hospital performance. This review of the literature looks at the amount of research that has been done on multidisciplinary teamwork in hospital settings and highlights how it affects patient outcomes. The provision of comprehensive patient care through interdisciplinary collaboration among healthcare professionals from many disciplines has received recognition as a critical component in improving hospital performance. In order to offer patients with comprehensive treatment, healthcare professionals from many

disciplines—such as doctors, nurses, pharmacists, social workers, therapists, and others—actively participate in interdisciplinary teamwork. It encourages a cooperative decision-making approach in healthcare and goes beyond conventional silos. The ability of multidisciplinary collaboration to provide a complete approach to complicated healthcare concerns is what makes it so important. It has become clear that interdisciplinary cooperation is a key factor in hospital performance. It has several advantages, including bettering staff happiness, increasing patient outcomes, and maximizing resource use. To maximize the benefits of cooperation, obstacles including reluctance to change and hierarchical systems must be overcome. Research and policy initiatives should underline the significance of multidisciplinary cooperation in attaining exceptional hospital performance as the healthcare landscape changes.

Effective collaboration across hospitals can facilitate open innovation by enabling the sharing of resources, information, and best practices with external partners and stakeholders. For example, by means of collaboration, emergency clinics can engage with academic institutions, research organizations, and healthcare technology companies to identify novel solutions and advancements that might enhance patient care. Collaboration can facilitate the sharing of resources such as patient care data and information, enhancing clinical decision-making and ultimately improving patient outcomes. The relationship between hospital performance and hospital collaboration is interconnected. Enhanced performance can be achieved through the facilitation of effective collaboration across hospitals, as it enables the sharing of valuable resources, expertise, and best practices. This phenomenon can lead to improved patient outcomes, enhanced operational efficiency, and financial savings. Collaboration can also present hospitals with the opportunity to combine their knowledge and collectively tackle intricate healthcare difficulties, resulting in enhanced performance in domains such as patient safety, clinical quality, and patient happiness. On the other hand, inadequate coordination among hospitals can give rise to isolated repositories of information and redundant endeavors, so causing a decline in performance and a fall in efficiency within the healthcare system. Thus, based on the previous literature review, the following hypothesis is proposed:



**Figure 1. Research Model**

H1: Patient Centered Care shows a significant relationship toward Hospital Collaboration

H2: Open Innovation shows a significant relationship toward Hospital Collaboration

H3: Hospital Collaboration shows a significant relationship toward Hospital Performance

### 3. METHOD

Data will be collected by administering an online survey to hospital managers in Indonesia who possess a minimal level of experience. The present study employs a questionnaire using a standardized 6-point Likert scale measurement. This measurement tool is utilized to assess the attitudes, views, and perceptions of individuals or groups toward a social phenomenon (Sugiyono, 2019).

Hair Jr. et al. (2014) propose the utilization of the Structural Equation Model (SEM) as the analytical instrument for ascertaining the sample size. According to the theory, it is necessary for the number of samples to exceed the number of indicators being evaluated. The calculation for determining the number of samples involves multiplying the number of indicators by a factor of 10. The quantity of samples is equal to ten times the number of indicators, denoted as "n". Given the presence of 29 indicators and 5 variables in this study, the algorithm stipulates that a minimum of 290 respondents should be included for analysis. The total population for this study consists of type A, B, and C hospitals in Indonesia, totalling 2421 hospitals (Millennials et al., 2020). The sample for this research comprises 290 respondents, all of whom are field managers with at least 1 year of experience. Respondents with less than one year of experience will be excluded from the sample, and the analysis will solely concentrate on those who possess such experience. The primary data was collected by handling the questionnaire via a personal

approach and distributed by the group of IMPPI (Ikatan Manager Pelayanan Pasien Indonesia).

In Indonesia, hospitals are classified into different types based on the services they provide and the level of care they offer. The following are the different types of hospitals in Indonesia:

**Class A Hospitals:** These are teaching hospitals located in major cities that offer advanced medical services and facilities. They are equipped with modern medical equipment and highly trained medical staff.

**Class B Hospitals:** These hospitals provide basic medical services and are located in district-level areas. They offer services such as emergency care, outpatient care, and inpatient care.

**Class C Hospitals:** These hospitals provide primary care services and are located in rural areas. They offer basic medical services such as outpatient care, maternal and child health services, and immunizations.

**Class D Hospitals:** These hospitals provide basic medical services and are located in remote areas. They offer services such as outpatient care, maternal and child health services, and immunizations.

In addition to the above, there are also specialist hospitals that are classified into Class A, B, and C. These hospitals provide specialized medical services such as cancer treatment, cardiovascular care, and neurology.

It is important to note that there are both public and private hospitals in Indonesia. Public hospitals are run by the government, while private hospitals are owned and operated by private organizations. Private hospitals are more likely to have modern facilities and equipment, but they can be more expensive than public hospitals. Indonesia has a range of health facility types in each district, including health posts, health centers, and hospitals. Hospitals are classified into different types based on the services they provide and the level of care they offer. It is important to choose a hospital



that meets your needs and is located near your place of work or residence. Based on these types of hospital in Indonesia, it is important to classified the hospital type on this research. The structure model found that Open Innovation (OI) construct consists of 3 indicators, Hospital Collaboration (HC) construct consists of 6 indicators, and Hospital Performance (HP) construct consists of 11 indicators

Of the 306 respondents, 63% are female, 37% are between 45 and 54 years old, and 31% are between 24 and 34 years old. In the context of a hospital or healthcare setting, "respondent by gender" refers to the gender of individuals who are responding to a survey or participating in research studies related to healthcare. This information can be useful in understanding healthcare experiences and outcomes based on gender, as there may be differences in how men and women experience and respond to healthcare. For example, if a hospital is conducting a patient satisfaction survey, they may ask patients to indicate their gender as part of the survey. This can help the hospital to understand whether there are any gender-related differences in patient satisfaction or experiences with the hospital. Similarly, if researchers are studying the effectiveness of a particular treatment or medication, they may collect data on the gender of study participants in order to analyze whether the treatment works differently for men and women. Also, 73% of the respondents are from type C hospitals and 49% of the respondents have worked less than 3 years. Respondents who have worked as MPP for a longer duration might have accumulated experience and insights about hospital collaboration. Respondents could provide valuable information about the evolution of collaborative practices, challenges faced, and successful strategies to enhance collaboration between hospitals, both within their own organization and with external partners. Respondent's perspectives might reflect the changing dynamics of collaborations over time and how these collaborations have contributed to hospital performance, patient safety, and patient-centered care.

In addition, there are 68% of the respondents have an education level of NERS. This information refers to the educational qualifications of individuals who work in a hospital and are participating in a survey or research study. This information can be useful in understanding the characteristics and experiences of hospital workers with different levels of education. In a healthcare setting, hospital workers may have different levels of education and training depending on their roles and responsibilities. For example,

doctors and nurses typically have higher levels of education and training than administrative staff or support staff. Collecting data on the level of education of hospital workers can help to identify differences in experiences and perspectives across different roles and levels of education. Collecting data on respondent level of education in a hospital setting can provide valuable insights into the characteristics and experiences of hospital workers and inform efforts to improve healthcare delivery and outcomes. Also, 98% of the respondent's hospital has BPJS facility in their hospital. Hospital collaboration refers to the cooperation and partnership between different healthcare institutions, including public and private hospitals, clinics, and other healthcare providers. In the context of BPJS, hospital collaboration involves the participation of various healthcare facilities in providing medical services to individuals covered by the BPJS healthcare program. Hospitals that collaborate with BPJS aim to ensure that eligible patients receive timely and appropriate medical care. For BPJS beneficiaries, patient-centered care involves ensuring that the medical services provided are respectful, culturally sensitive, and aligned with the patient's medical history and personal circumstances. On the other hand, open innovation could involve seeking input from patients and healthcare providers to identify ways to enhance the quality of care, streamline processes, and address challenges in the healthcare system. On this point, it is why important to know the majority is from the hospital that has access to BPJS.

According to the result, 81% of the respondents are from general hospitals, while the rest of them are from specialized hospitals. According to Permenkes No. Hospitals are divided into General Hospitals (hospitals that provide health services in all fields and diseases) and Special Hospitals (hospitals that provide primary services in one field or type of certain diseases based on disciplines, age groups, organs, diseases, or other specificities) under Act 56 of 2014. Respondents from general hospitals could include hospital administrators, department heads, and healthcare professionals involved in interdisciplinary collaboration. It would share insights into how different departments within the hospital work together, as well as any collaborative efforts with external healthcare providers where respondents from specialized hospitals could include medical specialists, surgeons, and researchers who collaborate within their specialty area. It might also





collaborate with other specialized hospitals or general hospitals to provide comprehensive care.

### 3.1 Outer Model and Inner Model Test

Convergent validity, assessed by loading factor and average variant extracted (AVE) parameter, will be used to test the

outer model. After looking at the AVE number, all variables are above 0.5. For discriminant validity, the Fornell-Larcker Criterion cross-loading parameter is normal.

**Table. 1 AVE & Cronbach's Alpha**

Latent/Observed Variable	Average Variant Extracted	Cronbach's Alpha
PCC	0.649	0.846
OI	0.667	0.888
HC	0.652	0.918
HP	0.692	0.961

Second, the composite reliability and Cronbach Alpha parameter were tested. The variable is reliable because all variables are above 0.7. All variables have Cronbach Alpha values above 0.7.

For the hypothesis testing uses path coefficient output (Mean, STDEV, T-Values). If the p-value is less than 0.05 and the table's t-statistics value is more than 1.96, the hypothesis between the existing variable is accepted. The

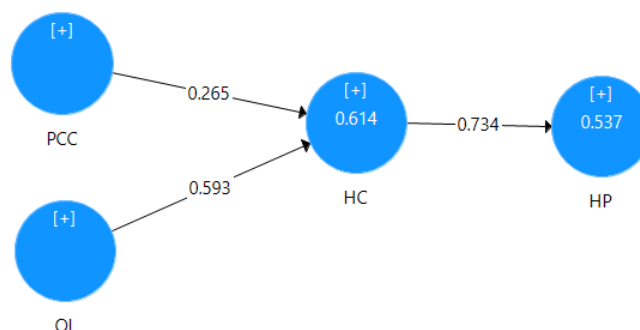
hypothesis is rejected if the p-value is more than 0.05 and the t-statistic is less than 1.96. The route coefficient value can determine each exogenous variable's impact on the endogenous variable. The scores of the Original Sample (O) of PCC-HC, OI-HC, and HC-HP are 0.265, 0.593, and 0.734 respectively. The P-value of every hypothesis is 0.000 thus all three-hypothesis considered supported.

**Table. 2 Original Sample, STDEV, T Statistic, & P Values**

	Original Sample	STDEV	T Statistic	P Values
PCC-HC	0.265	0.043	6.126	0.000
OI-HC	0.593	0.036	16.665	0.000
HC-HP	0.734	0.03	24.033	0.000

From PCC to HC and OI to HC and from HC to HP have positive relationship. The total R square from PCC to HC have 0.614 and from HC to HP have 0.537 meaning that

61.4% of HC could be explained by PCC and OI and HC could explain HP by 53.7%. The score of the NFI of the model is 0.649.



**Figure 2. Structural Model**

## 4. DISCUSSION

The value t-statistic is  $3.386 > 1.96$  and P-value is  $0.001 < 0.05$ , which means that the influence of OI on HP through

HC is significant. The coefficient value shows a positive number, namely 0.072, which means that OI has a positive effect on HP. So that the results of testing hypotheses can



be accepted because OI has a positive effect and is significant on HP. The meaning is Open Innovation influences Hospital Performance through Hospital Collaboration. This hypothesis supported by previous research by Arain et al. (2021), Jha et al. (2020), Chen et al. (2019), and Preece et al. (2018). A study by Arain et al. (2021) investigated the impact of OI on hospital performance, mediated by hospital collaboration. The results showed that OI had a positive and significant effect on hospital collaboration, which in turn had a positive and significant effect on hospital performance. On the other hand, a study by Chen et al. (2019) explored the impact of OI on hospital performance, mediated by inter-organizational collaboration. The results showed that OI had a positive and significant effect on inter-organizational collaboration, which in turn had a positive and significant effect on hospital performance.

## 5. CONCLUSION AND RECOMMENDATION

The implementation of Open Innovation has been found to have a beneficial impact on hospital performance, particularly in the context of hospitals in Indonesia. This influence is further enhanced by the presence of Hospital Collaboration, which acts as a moderating factor. This method has the potential to yield favorable effects on hospital performance through its facilitation of the integration of novel technology and practices, enhancement of healthcare outcomes, and mitigation of costs. Open innovation has the potential to exert a positive impact on hospital performance by facilitating the advancement of novel medical technology and therapies. By engaging in collaborative partnerships with other healthcare institutions, hospitals can gain access to a broader spectrum of experience, resources, and research discoveries. This enhanced access has the potential to expedite the advancement of novel treatments and technologies, or even facilitate the establishment of a system that showcases their operational excellence. This phenomenon has the potential to result in enhanced healthcare outcomes for patients and provide a competitive edge to hospitals in Indonesia. Furthermore, the exchange of knowledge, resources, and experiences among hospitals in Indonesia facilitates mutual learning and the adoption of successful best practices from different contexts. This phenomenon has the potential to result in enhanced patient outcomes, decreased healthcare expenditures, and heightened operational efficiency. The establishment of robust partnerships between hospitals and

other healthcare organizations is crucial for the achievement of fruitful open innovation endeavors. Collaborative networks facilitate the consolidation of resources, exchange of knowledge and skills, and the collective pursuit of shared objectives within the healthcare sector. Efficient collaboration can additionally serve to mitigate redundant endeavors and potentially costly medical equipment while ensuring the successful implementation of breakthroughs. The adoption of open innovation in the healthcare sector in Indonesia has the potential to yield favorable outcomes for hospital performance. This is mostly due to its ability to facilitate the advancement of novel technologies and treatments, as well as the effective implementation of best practices. The collaboration among hospitals can assume a moderating function through the facilitation of efficient knowledge sharing, resource allocation, and coordination of activities. By adopting open innovation strategies and fostering efficient collaboration, healthcare institutions in Indonesia have the potential to enhance their overall performance. Hospital performance has managerial implications, which healthcare administrators can use to improve hospital performance. The strategic management of hospital performance entails monitoring performance, executing quality improvement efforts, optimizing resource allocation, fostering teamwork, and supporting innovation. These methods can assist hospital managers in enhancing patient care and performance. Hospitals should adopt open innovation to foster collaboration between doctors, patients, and external stakeholders, including tech businesses, universities, and government organizations. The first stage is to create an open, collaborative, and innovative culture. Create a communication and engagement platform, such as an online portal or a physical venue for brainstorming and idea sharing. Next, identify hospital innovation opportunities. It includes patient care, hospital operations, medical technologies, and healthcare delivery methods. To collaborate and share ideas, hospitals should reach out to technological businesses, academic institutions, and government bodies. This is possible through partnerships, collaborations, and collaborative projects. Patients can also provide information and innovative ideas. Increase patient participation through advisory boards, focus groups, and surveys to understand patient needs and preferences. Implement an innovation process that involves ideation, assessment, and execution. It may require creating an innovation team, reviewing ideas, and implementing



successful innovations into hospital operations. In Indonesia, hospitals still need to understand and adapt that innovation and collaboration finally become one of the solutions to major problems in the healthcare industry with patients. This is the responsibility of all aspects, especially the government, to prioritize the standard of hospitals in Indonesia. However, collaboration between different types of hospitals, public and private hospitals, and also the capacity of hospitals should be the reason for how they should collaborate and just give it a chance to answer these problems. By working together, it is hoped that it should solve all the issues and complex situations that are happening in every hospital. Finally, track patient happiness, clinical outcomes, and financial performance to evaluate innovative activities.

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