The role of institutional capacity in developing teleconsultation: identifying dimensions and indicators. Case study: Health services in the Coquimbo Region, Chile

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Abstract

Institutional capacity refers to an organization's ability to execute its functions effectively and efficiently. It encompasses various factors, including organizational structure, human resources, financial resources, infrastructure, managerial and operational processes, transparency and accountability, innovation and flexibility, and collaboration and networking. Institutional capacity is paramount for successful program implementation, project execution, and the achievement of development goals. Teleconsultation, the remote delivery of medical advice, diagnosis, and recommendations via communication technologies, has gained significant prominence. This study aims to identify the key dimensions and indicators of institutional capacity that influence the development of teleconsultation. In this context, health services in the Coquimbo Region, Chile has been selected as the case study for analysis. Through a comprehensive literature review, this research seeks to understand how institutional capacity impacts the successful implementation of teleconsultation. The VRIO framework was utilized to organize the significance of the identified institutional capacity factors in teleconsultation. The research findings highlight the critical role of institutional capacity in teleconsultation success. Specifically, factors such as organizational structure, human resources, financial resources, infrastructure, managerial and operational processes, transparency and accountability, innovation and flexibility, collaboration, and networking are essential. These factors, in turn, are composed of various sub-factors. In essence, the success of teleconsultation is contingent upon the level of institutional capacity, which necessitates careful measurement.

Keywords: Human Capital, Institutional Capacity, Teleconsultation, Healthcare Organizations and Institutions, Health Services.

Introduction

With the advancement of technology and communication, a new form of communication has emerged and continues to expand. One significant area impacted by this development is the healthcare sector, where teleconsultation has emerged to meet the needs of a large segment of society. The human and physical infrastructure of organizations utilizing teleconsultation significantly influences their success (Chapman & Arunatileka, 2010; Alkmim et al., 2015). This human and physical infrastructure can be conceptualized as institutional capacity.

Institutional capacity refers to the ability and capability of organizations, institutions, or systems to effectively and efficiently perform their tasks. Institutional capacity is essential in several ways; it allows organizations to maintain sustainability in the face of changes and challenges; organizations with high capacity can manage their resources more efficiently and consequently achieve better results with fewer resources; organizations with high capacity are better able to identify and respond to societal needs and problems and can design and implement effective policies and programs to address them; when institutions are efficient and effective, public trust in them increases, which can lead to stronger cooperation and social participation; organizations with high capacity can respond more quickly and effectively toenvironmental and technological changes and create the necessary innovations to maintain and improve their performance. In summary, institutional capacity is the foundation for the optimal performance of institutions and organizations and plays a significant role in achieving development and welfare goals for society (Garcia-Estevez et al., 2024; Abulatif & Oliveira, 2024; Spekkink, 2013). Teleconsultation refers to the remote

delivery of healthcare services, including medical advice,diagnosis, treatment, and follow-up care, through telecommunication technologies such as video calls, phone calls, or messaging apps. This service enables patients to receive medical care without physically visiting healthcare facilities, making it particularly beneficial for individuals in remote areas, those with mobility challenges, or during public health crises that necessitate reduced in-person contact.

Successful implementation of teleconsultation requires a robust institutional capacity, which encompasses the necessary human and physical infrastructure. Various studies have identified several factors influencing the success of teleconsultation. Some studies have highlighted the impact of technology and infrastructure (Maroju et al., 2023), while others have emphasized the importance of security and privacy (Ansarian & Baharlouei., 2023; Bhowmik & Karforma., 2023). Other studies have focused on the role of education and awareness (Ghaddaripouri et al., 2023; Wetzlmair et al., 2022), cultural and social acceptance (Tri Aji & Ramadani, 2024), and management and organization (Aguirre-Sosa & Vargas-Merino, 2023; Bangert & Doktor, 2023). Given the critical role of institutional capacity in the success of teleconsultation projects, this research aims to identify the key indicators of institutional capacity that influence the successful implementation of teleconsultation in healthcare services.

Literature review

Numerous studies have been conducted on teleconsultation, but fewer have delved deeply into the concept of institutional capacity in teleconsultation. Below are some of the most significant research studies that have explored teleconsultation and its connection to specific dimensions of institutional capacity.

Mohammed et al., 2023 conducted a study to investigate the factors influencing healthcare professionals' acceptance of telemedicine technology in the public sector of Morocco, with the aim of preparing for the potential widespread adoption of this technology in the country. Their research methodology was based on qualitative analysis and semi-structured interviews with healthcare professionals. The results of their study indicated that performance expectancy, effort expectancy, compatibility, facilitating conditions, perceived usefulness, and social influence positively impacted healthcare professionals' behavioral intention to adopt telemedicine technology.

Kobeissi & Hickey (2023) conducted research to present an innovative telehealth model supported by systems theory to manage the complexities of implementing telehealth in healthcare organizations. Their model, which utilizes Donabedian's approach to quality assessment, is introduced as an organizational infrastructure that demonstrates how policies, organizational factors, provider competencies, and patient health determinants can influence the safety, equity, and higher quality of telehealth. This framework assists leaders in designing, reviewing, and evaluating telehealth programs within organizations, especially as healthcare systems transition to the digital age.

Nehta & Chaudhary (2022) investigated the infrastructure and systems of telemedicine and remote health monitoring. Their study explored the role of information and communication technologies (ICT) in improving access to medical services, increasing the efficiency of the healthcare industry, and overcoming temporal and spatial barriers between patients and hospitals. Additionally, technological developments in telemedicine, including the role of quality of service (QoS), interoperability, and user adaptability, as well as the challenges and obstacles facing telemedicine, were discussed. Their research demonstrates how telemedicine can enhance patient care, reduce diagnosis variability, and provide socioeconomic benefits for healthcare systems, patients, and physicians. It also highlights the growth of remote health monitoring and its impact on the environment.

Rianawati et al., 2022 conducted research to examine the impact of combining social cognitive theory and social capital on users' willingness to use telemedicine during the COVID-19 pandemic. Their research method was quantitative and was conducted through an online survey. Structural equation modeling (SEM) was used to analyze the causal relationships in the model. The results of their study show that social capital and social cognition have a positive impact on users' intention to use telemedicine.

Sein & Thapa (2018) investigated the role of social capital in providing quality healthcare through a telemedicine project in a remote region of Nepal. This research was conducted as an interpretive case study and focused on the mechanisms and conditions that facilitate the implementation process of telemedicine. Their results showed that a group of critical actors, leveraging supportive social capital, successfully provided quality healthcare to disadvantaged groups in these remote villages. The findings suggest that social capital, as a facilitating condition, can significantly address developmental challenges, such as providing quality healthcare through information and communication technologies (ICT).

Materials and methods

This study is applied in nature and employs a descriptive-analytical research method. To gather data and information, the research initially conducted a comprehensive literature review to identify indicators related to institutional capacity. Subsequently, based on the conducted studies, an analysis was performed to evaluate the role of each of these indicators in teleconsultation. In this context, Health Services in the Coquimbo Region, Chile has been selected as the case study for analysis. The VRIO framework was utilized to organize the significance of the identified institutional capacity factors in teleconsultation.

Results

Relationship between institutional capacity indicators and teleconsultation

Numerous factors contribute to an organization's institutional capacity, which can vary depending on the nature of its work table (1). Teleconsultation also requires specific institutional capacity. Figure 1 illustrates the institutional capacity indicators necessary for the success of teleconsultation in hospitals and healthcare organizations.

Table 1. Institutional Capacity Indicators

Institutional Capacity indicators	Reference
Organizational Structure	Barman & Maclndoe, 2012
Human Resources	Velez-Ramirez et al., 2022; Khatijatusshalihah, 2017
Financial Resources	Bilicka & Scur, 2024
Infrastructure	Garcia-Estevez et al., 2024; Ouassou et al., 2024
Managerial and Operational Processes	Gasco-Hernandez et al., 2022
Transparency and Accountability	Urquia-Grande et al., 2022; Miadenova, 2022
Innovation and Flexibility	Khan et al., 2023; Fan et al., 2023; Lim & OK, C, 2021
Collaboration and Networking	Gasco-Hernandez et al., 2022

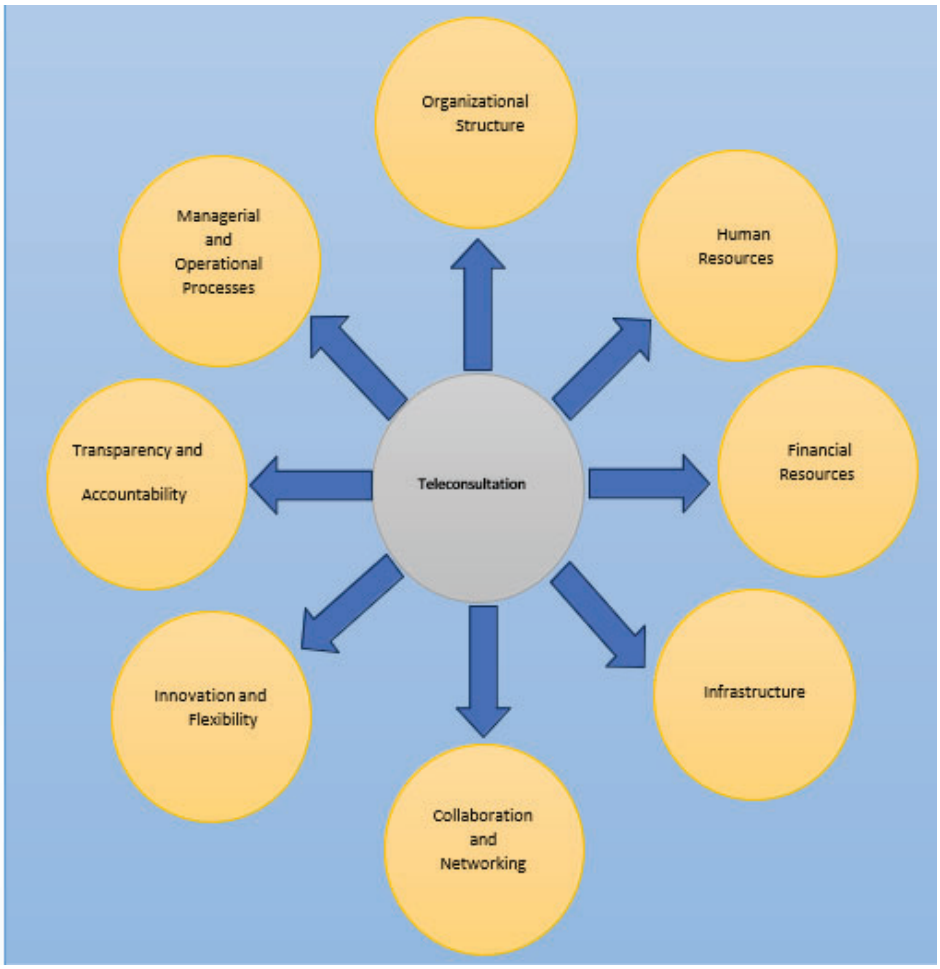

Figure 1: Relationship between institutional capacity indicators and teleconsultation outcomes Source: Author (2024)

The role of organizational structure in teleconsultation

In a teleconsultation system, organizational structure plays a pivotal role in the success and effectiveness of teleconsultation, as it provides a framework within which all related activities and processes are carried out in a coordinated and efficient manner. Organizational structure defines who is responsible for what tasks. This includes assigning responsibilities to physicians, nurses, technicians, and technical support teams to ensure that all aspects of remote service delivery are well-managed. An effective organizational structure improves the flow of information and communication among team members. This is particularly crucial in teleconsultation, where interactions between different teams and between patients and specialists are of great importance. Organizational structure determines how resources (such as technology equipment, manpower, and time) are optimally allocated to deliver teleconsultation services efficiently. Organizational structure also helps ensure compliance with laws and regulations related to teleconsultation services. This includes adhering to privacy, information security, and service quality standards (Chen et al., 2019; Chakraborty et al., 2023).

The role of human resources in teleconsultation

Human Resources (HR) is critical in teleconsultation or remote consultations. These roles include workforce management, ensuring necessary skills and training, and supporting staff to provide quality services to patients. By providing skilled personnel, offering essential training, and helping employees, HR plays a fundamental role in the success and quality of teleconsultation services. HR is responsible for hiring and selecting suitable individuals for

various roles within a teleconsultation system. This includes physicians, nurses, IT specialists, and other staff required to provide remote services. HR must ensure that employees receive the necessary training to use teleconsultation technologies and manage remote communications with patients. Training can include topics such as using medical software, respecting patient privacy, and communication skills. HR plays a significant role in monitoring and evaluating the performance of employees in a teleconsultation environment. This involves assessing the quality of services provided, patient satisfaction, and identifying employees' training and development needs.

Effective time management and scheduling are essential for providing timely services without delay in teleconsultation. HR can improve efficiency and reduce workload by creating flexible work schedules and allocating resources appropriately. HR must ensure that all employees comply with laws and regulations related to teleconsultation services, including privacy and information security issues (Gagnon et al., 2007; Mahdavi et al., 2023).

The role of financial resources in teleconsultation

Financial resources play a pivotal role in the success and sustainability of teleconsultation services by providing the necessary funding for technology, training, staff compensation, and cost management. Teleconsultation requires advanced technologies, including medical software, secure communication systems, and supporting equipment such as robust servers and digital tools. Financial resources must be allocated effectively to ensure these technologies are continuously updated and maintained.

Another crucial role of financial resources is to fund employee training and development. This includes training programs for utilizing new technologies, managing remote communications, and adhering to quality service standards. Financial resources must be handled regularly and appropriately to pay salaries for staff, medical professionals, and technicians. This helps retain skilled labor and motivates the provision of quality services.

In teleconsultation, costs must be carefully managed to prevent resource wastage. This includes managing technology maintenance costs, operational expenses, and securing resources for

service improvement and development. Ensuring maintenance and updates: Teleconsultation services require continuous maintenance and updates of technology systems. Financial resources must be allocated appropriately for this purpose to ensure optimal system performance (Hassan et al., 2022; Fernandez Coves et al., 2022).

Infrastructure in teleconsultation A robust and up-to-date infrastructure is vital to ensure the delivery of high-quality teleconsultation services, data security, and effective communication between patients and healthcare providers. Infrastructure in teleconsultation forms the foundation for providing efficient and effective services. Adequate infrastructure ensures that healthcare providers can securely and reliably connect with patients and conduct remote medical consultations.

Information and communication technology infrastructure includes high-speed internet, powerful servers, secure communication systems (such as video conferencing platforms and secure messaging), and medical software that enable transferring medical data and remote communication between doctors and patients. Teleconsultation infrastructure includes digital medical equipment such as remote monitoring devices (monitors, blood pressure monitors, portable echocardiography devices) that allow patients to send their medical results to doctors in real time.

One of the most essential parts of the infrastructure in teleconsultation is security systems to protect sensitive medical data. This infrastructure includes the use of encryption, firewalls, and security protocols to ensure the confidentiality and security of patient information. Specialized software platforms for teleconsultation are required to be user-friendly, secure, and reliable. These platforms should provide features such as sending and receiving images, videos, medical records, and maintaining consultation records.

Support infrastructure includes technical and IT teams for system maintenance and troubleshooting, data centers for data storage and management, and 24/7 support services to resolve potential user issues. The infrastructure must be compatible with various patient devices (such as smartphones, tablets, and computers) so that patients can easily use teleconsultation services (Kobeissi & Hickey, 2023; Verma et al., 2023).

Managerial and operational processes in teleconsultation

Strong managerial and operational processes help organizations effectively manage teleconsultation services, maintain service quality, and improve patient experience. Managerial and operational processes in teleconsultation play a critical role in ensuring the efficiency and effectiveness of service delivery. These processes include resource management, planning, coordination, monitoring, and evaluating teleconsultation systems' performance. Managerial processes involve detailed planning for the implementation of teleconsultation services, organizing resources (such as human resources, technology, and infrastructure), and setting specific goals and

strategies to achieve desired outcomes. Managing and coordinating activities between different teams (physicians, nurses, technicians, and IT teams) is essential to ensure that all departments work simultaneously and in coordination to provide services to patients. Managerial processes include monitoring the performance of teleconsultation systems, evaluating the quality of services provided, and implementing quality controls to maintain high standards in service delivery. This monitoring can include obtaining feedback from patients and analyzing performance data. In teleconsultation, effective time management is crucial to ensure timely responses to patients and prevent delays in service delivery. This includes scheduling consultations, managing physicians' time, and optimizing processes to reduce patient waiting time. Identifying and managing risks associated with teleconsultation, such as security issues, technical failures, and patient privacy concerns, is a vital management task. These processes help prevent problems and minimize their impact. Operational processes should be designed to allow for the continuous development and improvement of

teleconsultation services. This includes implementing new methods, using feedback to improve services, and adapting to changes and new patient needs. Creating and maintaining effective and positive relationships with patients through managerial processes helps increase patient satisfaction and trust. This can include establishing standard procedures for communicating with patients, managing complaints, and providing appropriate support. Organizational and operational processes must ensure that all aspects of teleconsultation comply with legal and professional regulations and standards, including issues related to privacy, data security, and medical ethics (Park et al., 2020; Aguirre-Sosa & Vargas-Merino, 2023).

Transparency and accountability in teleconsultation

Transparency and accountability in teleconsultation are paramount as they help build patient trust, enhance service quality, and ensure adherence to ethical and legal standards. Transparency involves providing patients with clear explanations of the remote consultation process, information about costs, patient rights and responsibilities, and how their personal data is used. This empowers patients to make informed decisions about using teleconsultation services. Service providers should provide patients with complete and accurate information about physicians, their qualifications, specializations, and experience. Additionally, the processes related to collecting, storing, and using patient data should be clearly explained.

Transparency and accountability in teleconsultation mean adhering to medical ethics. This includes respecting patient rights, protecting their privacy, and providing quality, impartial services. In case of errors or problems during the teleconsultation process, organizations and service providers must be accountable and take full responsibility. This may include apologizing, correcting mistakes, and providing explanations to patients.

Transparency and accountability also mean full compliance with laws and regulations related to teleconsultation. Organizations must ensure that all their activities comply with legal standards, especially in the area of data protection and information security. Transparency and accountability also mean organizational responsibility, which involves being accountable to stakeholders, employees, and patients for decisions and actions taken (Kaplan, 2020; Catapan et al., 2022).

Innovation and flexibility in teleconsultation

Innovation and flexibility in teleconsultation enable organizations to stay at the forefront of change, improve their services, and best meet the evolving needs of patients. Innovation and flexibility in teleconsultation play a key role in adapting to rapid changes in technology, patient needs, and healthcare developments. These two principles help organizations improve their services, increase efficiency, and provide a better experience for patients. Innovation in teleconsultation involves using new technologies such as artificial intelligence (AI), machine learning, and the Internet of Things (IoT) to improve diagnosis, treatment, and remote monitoring. These technologies can increase the accuracy and speed of services and help providers make better decisions. Creating and updating software platforms that provide a better user experience for patients and physicians is another aspect of innovation. These platforms should be designed to be easy and practical and provide access to medical data, video conferencing, and other remote services.

Flexibility means the ability of organizations to quickly adapt to changing patient needs and new conditions. This includes the ability to provide services at different times, personalize consultations based on the specific needs of patients, and offer various communication options (such as chat, video calls, and voice calls). When the demand for teleconsultation services increases or decreases rapidly, flexibility helps organizations manage their resources optimally and ensure smooth system operation. This may involve adjusting work schedules, increasing or decreasing the number of staff, and using automated technologies. Innovation and flexibility

help organizations adapt quickly to changes in the legal, economic, and technological environments. This may include complying with new regulations, taking advantage of emerging market opportunities, and preparing for potential crises. Organizations can use innovation to develop new services that meet more patient needs, such as specialized remote consultations, continuous monitoring of the health of chronic patients, or providing online health education (Phuong et al., 2023; Haleem et al., 2021; Vasco et al., 2023).

Collaboration and networking in teleconsultation

Collaboration and networking in teleconsultation allow organizations and healthcare providers to deliver more comprehensive, efficient, and accessible patient services by leveraging shared knowledge and resources. Collaboration and networking in teleconsultation are crucial in improving service quality, enhancing efficiency, and expanding access to healthcare. These principles help organizations and healthcare providers make the best use of available resources and knowledge and provide more comprehensive services to patients. Collaboration among physicians, nurses, mental health professionals, and other healthcare providers is essential in teleconsultation. This collaboration can take the form of multidisciplinary teams that work together to provide comprehensive services to patients, including specialized consultations and information sharing on complex cases. Networking with hospitals and healthcare centers can give patients access to a broader range of resources and services. These connections can include referring patients to specialists or conducting additional tests at physical facilities, which improves the quality and accuracy of remote consultations. By networking with other healthcare and non-healthcare organizations, it is possible to expand teleconsultation services to remote areas and underserved populations. These networks can include non-governmental organizations, insurance companies, and governments. Collaboration between the public and private sectors can provide the financial and technical resources needed to develop and implement teleconsultation programs. These partnerships can help improve infrastructure, increase access to services, and reduce treatment costs (Tan et al., 2023; Belber et al., 2023).

Organize the identified institutional capacity factors affecting teleconsultation based on the VRIO framework

To evaluate the resources and capabilities of Health Services in the Coquimbo Region, Chile, the VRIO framework was employed to determine whether these institutional capacity indicators can lead to a sustained competitive advantage in the successful implementation of teleconsultation. This framework examines four key criteria: Value, Rarity, Imitability, and Organization. Given the nature of institutional capacity indicators, it can be stated that these indicators are significant in teleconsultation table (2).

Table 2. Organize the identified institutional capacity factors affecting teleconsultation based on the VRIO framework

Institutional Capacity indicators	Valuable?	Rare?	Costly to imitate?	Exploited by the organization?
Organizational Structure	Yes	Yes	No	Yes
Human Resources	Yes	Yes	No	Yes
Financial Resources	Yes	Yes	No	Yes
Infrastructure	Yes	Yes	No	Yes
Managerial and Operational Processes	Yes	Yes	No	Yes
Transparency and Accountability	Yes	Yes	No	Yes
Innovation and Flexibility	Yes	Yes	No	Yes
Collaboration and Networking	Yes	Yes	No	Yes

Conclusion

With the rapid advancement of communication technology, teleconsultation has emerged as a viable alternative to in-person visits. The successful development of teleconsultation requires the availability of human infrastructure and institutional capacity.

This research aimed to identify the various factors constituting institutional capacity, specifically focusing on teleconsultation. Results revealed that organizational structure, human resources, financial resources, infrastructure, managerial and operational processes, transparency and accountability, innovation and flexibility, collaboration and networking are critical components of institutional capacity in this domain.

It is important to note that institutional capacity is a prerequisite for any organizational development and change. Without this capacity, achieving sustainable development goals is not feasible. Moreover, the significance of each dimension of institutional capacity varies depending on the specific context and research topic, requiring more in-depth investigations. Given the dynamic and evolving nature of technology, institutional capacity must be continuously updated and adapted. Accurate measurement and management of these capacities are essential to successfully implementing teleconsultation and achieving development goals. Finally, considering the strong correlation between intra-organizational social capital and institutional capacity, it can be concluded that strengthening social capital in organizations with high institutional capacity can significantly contribute to sustainable community development. This topic requires further in-depth research in the field of teleconsultation.

Chile and the Coquimbo Region possess the necessary infrastructure for the development of teleconsultation, particularly in the technological aspect. Assessing institutional capacity for the development of teleconsultation in the Health Services sector will identify deficiencies related to institutional capacity indicators in the Health Services sector.

Recommendations for researchers

- Research on measuring institutional capacity in teleconsultation.
- Measuring satisfaction with teleconsultation among providers and users conducting
- A study analyzing the gap between perceptions and expectations of institutional capacity Conducting
- Future studies on institutional capacity factors in teleconsultation in the future

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