CORVINUS UNIVERSITY OF BUDAPEST

LEADERSHIP COMPETENCIES, SUSTAINABLE STRATEGIES, AND ENERGY EFFICIENCY INITIATIVES FOR DRIVING ORGANIZATIONAL CHANGE IN HEALTHCARE

DOCTORAL THESIS

Supervisors: Dr. Éva Krenyácz and Dr. Zoltán Csedő

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Chapter 1: Introduction

1.1 Research framework and outline

My doctoral research focuses on leadership characteristics and managerial dynamics in healthcare organizations through the lens of strategic and operations management, and various theoretical perspectives, such as evolutionary economics, sustainability theory, and resource-based view. Montreuil (2023) expresses that healthcare organizations are predisposed to an array of change drivers, such as the global healthcare crisis noted during the COVID-19 pandemic, which can drastically and radically affect their operations. In many instances, changes become necessary in healthcare systems to adjust to patients' growing needs encapsulated in the ever-dynamic demographic alterations, and the technological adaptations within sociopolitical and economic contexts (Milella et al., 2021). However, literature evidence also displays diverse critical challenges that come alongside the operational changes in healthcare organizations, including staff resistance and fatigue, and financial and resource constraints among others (Shaik et al., 2023).

These challenges thus call for a well-organized, tactical, and shrewd managerial and leadership approach toward initiating and managing organizational changes (Harrison et al., 2022; Muluneh & Gedifew, 2018). Scholars often emphasize that healthcare organizations have a crucial need for effective management since they make significant contributors to global economic growth (Henke & Martin, 2009; Papanicolas et al., 2018). In the process, healthcare leaders are challenged to employ an array of skills and practices for smooth transitions that consider employee welfare, minimal service disruptions, and sustained productivity (Chatterjee et al., 2023; Kossyva et al., 2023).

Therefore, I have been curious to dig deeper into the established evidence to boost my tacit and explicit knowledge for better and more worthwhile knowledge contributions within the scholarly environment of healthcare leadership and management as my current occupational role and career aspiration. I can only do so if I gain a comprehensive understanding of the current healthcare leadership competency, approaches to change management, and sustainable practices, such as energy utilization. Accordingly, this dissertation is developed from three research papers that I previously published in different journal sites addressing the three different concepts that currently stand strategic in healthcare management. Collectively, these concepts offer insights into the complex interplay between healthcare leadership competencies, including sustainability practices, strategic management, and reform adaptation within Jordan's healthcare system.

The three papers are:

1. Krenyácz, Éva, & Alotaiby, R. A. M. (2022). Analysis of leadership competencies based on organizational change: Case of education hospitals of Jordan. *Vezetéstudomány Budapest Management Review*, 53(10), 56–67. https://doi.org/10.14267/VEZTUD.2022.10.05
2. Alotaiby, R., & Krenyácz, É. (2023). Energy efficiency in healthcare institutions. *Society and Economy*, *45*(4), 494-511. http://dx.doi.org/10.1556/204.2023.00013
3. Alotaiby, R. A. M., & Krenyácz, É. (2024). Challenges and opportunities in healthcare reforms in pre-and post-COVID-19 crisis: A case of Jordan. *Problems and Perspectives in Management*, *22*(1), 80-93. http://dx.doi.org/10.21511/ppm.22(1).2024.08

Nevertheless, the other three complete research articles already presented different ideas on the healthcare leadership and healthcare systems management and their competency in sustaining service provision and addressing change drivers from different approaches, including narrative literature review, and qualitative and quantitative empirical investigations.

The first paper, published in 2022, presents an empirical outcome of the investigation that identified the diverse clinical leadership skills, characteristics, and practices, and how they relate to the leaders' demographic features as key drivers for organizational change. The study was conducted in Jordanian educational hospitals and published in a Hungarian journal. In a review, it was noted that leadership characteristics have been implicated in change management by influencing staff mindset through their effective communication competence and attributes (Weintraub & McKee, 2019). As such, this paper argued that healthcare leaders' characteristics hold a critical niche in driving both strategic and operational changes in healthcare organizations. Interestingly, this article has attracted significant attention from scholars, with over 132 reads since its publication.

The second paper explored energy efficiency and utilization in healthcare institutions, as the other cluster of change drivers in healthcare systems, from the perspective of a review. It identifies innovative measures to save energy utilization and offers insights into sustaining future operations. In a relatively recent study, Mousa and Othman (2020) express that green practices may positively influence and sustain healthcare operations over long periods. Hence, the examination of energy utilization has been regarded in this paper as another paramount driver for healthcare change and operation sustainability. So far, from the online publications, there have been at least seven citations, 2,526 reads, and two recommendations from other scholars.

The last paper describes the various challenges and opportunities that arose in Jordanian hospitals during and after the outbreak of COVID-19. This paper uses a qualitative approach to explore these challenges and opportunities as another group of change influencers. Healthcare crises, such as COVID-19, have already been noted in some literature articles as critical influencers of radical organizational change practices (Hughes Spence et al., 2023; Keyworth et al., 2024). Hence,

unexpected global disease outbreaks, exemplified by COVID-19 stand out as a critical change driver that needs managerial consideration, as discussed in this research. This paper has attracted at least three recommendations, two citations, and 123 reads from various readers since its online publication.

Despite the three papers being treated relatedly in this dissertation, it must be noted that these studies present different ideas and are outcomes of different investigations in different time periods but are linked together under the dominant concept of this study, which is leadership dynamicity. Even though these papers may be treated independently since they present a comprehensive format and structure of a research paper, such as the introduction, literature review, methods, results, and conclusion, they are motivated by the same idea of looking at resilience in leadership practices in managing changes or crises in healthcare.

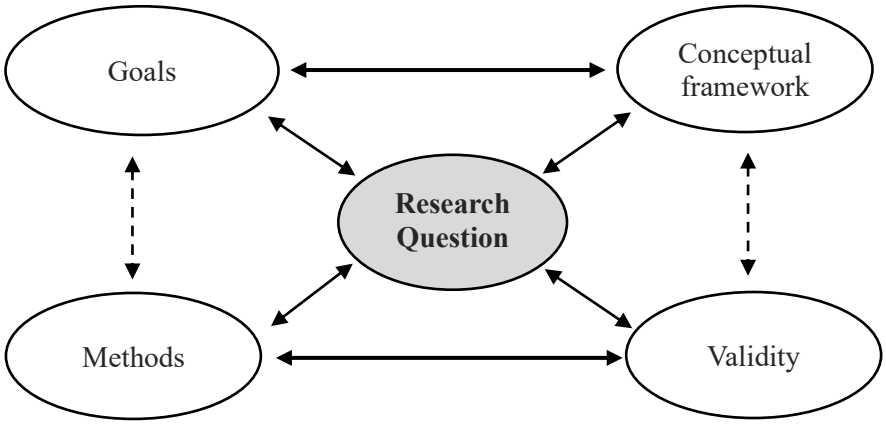
All these papers have been co-authored and presented in the third person's voice. These papers are thus embedded in this dissertation in their original format. The references used in these papers have also been added in their original format, according to the publication guidelines of the respective journals. All the references have been pasted at the end of each paper in their original format.

This dissertation has been formatted in a specific order that commences with the initial sections presenting the research framework, goals, paradigm, methods, and questions. Henceforth, the three papers are presented followed by a summary, theoretical contributions and managerial implications, and directions for future research.

Regarding the research design, this study applies the structure created and presented by Maxwell (2009), which is one of the many models suggested to guide research. According to the author,

researchers can apply any design in their study so long as it aligns with the core concepts and phenomena in their research. Accordingly, the suggested design interlinks five main concepts, including the study goals, conceptual framework, validity, methods, and most importantly, the research questions (Figure 1). Even though Maxwell (2009) designed the model for qualitative researchers, it still has the inherent features typical of any research, whether quantitative or mixed.

Figure 1. Research design



Source: Maxwell (2009, p. 217)

Guided by the research design presented in Figure 1, the subsequent sections of this dissertation will present these crucial concepts related to this study, including the research goals, research questions that guide the researcher's target, the conceptual framework, the methods used in the study, and the validity issues.

1.1.1 Definition of the main concepts used in the dissertation

This dissertation uses and applies many concepts related to the administration of healthcare organizations in a dynamic sense. However, this section will describe six critical concepts that

closely define the study, including healthcare reforms, which encompass sustainable strategies and change management, leadership characteristics, practices and competencies, strategic management, and resource-based view as the core theoretical model applied in organizations' management.

1.1.1.1 Change management

Organizational change management is a concept highly discussed in the literature. Organizations ordinarily operate on blueprint protocols and the 'used-to' routines before internal or external forces create a need for change. Changes are often adopted as a way of improvement or survival (Russell-Jones, 1997). Banerjee and Lowalekar (2021) describe a change in a complex process that involves complex interactions among organization members as influenced by the organization's culture, values, top managerial outlook, and stakeholders' perceptions. In healthcare organizations, continuous reforms often cause shifts in the routine operational protocols, which require a keen and structured approach of the management and leaders to maintain a continuous flow of critical services while shifting operations (Lowe et al., 2018).

The careful and structured approach of management in handling such shifts thus describes the concept of 'change management', which is a crucial element in this research and an exhibit of healthcare leaders' resilience in sustaining healthcare operations. Change management is a process that goes through modifications within an organization in order to keep up with customer demands (Anderson & Anderson, 2010; Cameron & Green, 2019; Kotter, 2007). Depending on the sociocultural context of their operations, leaders often exhibit professional skills and personal qualities (traits) to ensure success in implementing organizational change, and this has a strong bearing on their behavioral attributes (Kirsch, Chelliah & Parry, 2012). Accordingly, scholars have noted that cultures with steep gradients in power distance, hierarchical structures, and reliance on

rules over relationships are likely to encounter stronger resistance to change as opposed to those with little aspects of power distance and individualism (Harzig & Hofstede, 1996; House et al., 2004; Nardon & Steers, 2009). These cultural features influence leaders' behaviors and practices toward change management (Kirsch, Chelliah & Parry, 2012).

Change management often assumes a structured approach, usually guided by established theories and frameworks to hook stakeholders' interests and commitment, and to reduce stakeholders' resistance, especially during a crisis, as witnessed in the case of COVID-19 (Da Ros et al., 2024; Shaik et al., 2024). According to Russell-Jones (1997), change management can be defined as "the process of moving from the current state to the 'vision' of the future and involves a degree of transition which may also result in 'pain' for some or, more commonly, all." This definition presents a scenario that would often rub the employees the wrong way, hence the need for strategic managerial skills and competencies to address the employees' concerns and inflict a positive attitude towards the desired change. The leaders' ability to manage employees' interests still affects a change toward practice improvement, which is the central interest of this study as it points toward leadership competency in strategic and operational management (Wong et al., 2022).

1.1.1.2 Healthcare reforms

Health reforms are widely discussed concepts in the literature. Unfortunately, only a few scanty articles attempted to delineate its definition, an observation that may indicate the neglect of its roots in healthcare quality. In this dissertation, healthcare reforms are considered one of the core strategic forces upon which healthcare leaders' resilient practices are testable.

Even without a comprehensive definition, the outcomes of healthcare reforms are visible and noticeable worldwide, whether in low-income or developed countries. One of the most discussed

exhibits of health reforms is the Universal Health Coverage (UHC), which the World Health Organization (WHO) (2010, p. 7) describes as a scheme where "all people can obtain the health services they need, of good quality, without suffering financial hardship when paying for them." Other exhibits of healthcare reforms have also been noted in the improvements in the quality-of-service delivery, efficiency of services, reduced disease burden in a population, and improved access as well as equity and sustainability of the healthcare services (Kirchhoff et al., 2019; Guo et al., 2022; Yan et al., 2021). As such, the core intent of healthcare reforms seems to be rooted in the quality, convenience, equity, and number of people reachable by the named healthcare service, as well as the affordability of those services (Atun et al., 2015; Ho et al., 2022; Yip et al., 2019).

In an attempt to provide a logical definition of healthcare reforms, Kirchhoff et al. (2019, p. 590) expressed that reforms are "processes in which national states make changes that involve various degrees of intervention in institutionalized practices in hospitals." As such, the state, through the Ministry of Health and the affiliated organizations strives to climb to the apical rank in deciding the course of a country's reforms. Again, the definition of Kirchhoff and colleagues presents a remarkable concept about reforms, that they are 'institutionalized' within organizations. This means that reforms become unanimously accepted by the organization's management before incorporation into practices (Manyazewal et al., 2016).

From the phenomenon of institutionalization, this dissertation also looks at reforms as a concept that can solely influence only a single organization. For example, a named healthcare system can, based on the provisions of the state regulations, transform its practices within its institutions without reverberating such changes to the entire state (Nilsen et al., 2020). However, Gilbert et al. (2015) argue that such innovations that arise from a single institution are often politicized, and most literature sources often look at reforms as a nationalized change, carried out by a country or

region in response to shifts in the socioeconomic status and healthcare demands (Millar et al., 2016). Nevertheless, examples of reform instances scatter across the internet, highlighting the remarkable changes like the Singapore regional health system and the patient-centered medical home model of Maryland, USA (Yan et al., 2021).

Healthcare reforms depend on the change drivers and facilitators, which may include the readiness for changes among the staff, socio-political status, and resource capacity, including human workforce, demographic changes, leadership strategies, and organizational culture and values (Chreim et al., 2012; Lavoie-Tremblay et al., 2018; Ouedraogo et al., 2023; Turja, 2022). Some of these change facilitators are internally situated within the health administrator's docket and realm of operations while others are only controlled by unpredictable external factors, such as sociopolitical forces among many other factors (Contandriopoulos et al., 2018). Nevertheless, this dissertation is more interested in the internal drivers and facilitators that inform and influence change management decisions and competencies.

1.1.1.3 Leadership competency

White (1959), first used the term competency to describe leaders' personality features that facilitate their inspiration, motivation and role performance. A few years later, another scholar, McClelland (1973) used the same term competency to describe the superior performance of organization employees before it could gain a significant niche in the management practice within healthcare and non-healthcare organizations. McClelland (1973) even further presented a stance that leaders' competence assessments are better at examining their performance capability than Intelligence Quotient tests.

A couple of decades later, a group of researchers, Hellriegel et al. (2008) attempted to define competency by describing it as a "sets of knowledge, skills, behaviors, and attitudes that a person needs to be effective in a wide range of positions and various types of organization" (p. 2). Having occupied a significant space in the management arena, scholars have gradually and tightly embedded the term competency into management, terming it as 'management competency' (Bennis, 2009; Lucia & Lesinger, 1999). According to Lucia and Lesinger (1999), management competency can be defined as "a descriptive tool that identifies the skills, knowledge, personal characteristics and behaviors needed to effectively perform a role in the organization and help the business meet its strategic objectives" (p. 5). As such, competency encompasses both personal attributes and professional qualities of leaders, which define their performance in healthcare administration (Ayeleke et al., 2018).

Ayeleke et al. (2018) also stress that competent leaders, whether in healthcare or non-healthcare settings often demonstrate certain desirable features, skills, behaviors, attitudes, and values. Competent leaders demonstrate diverse features, like emotional intelligence, strategic thinking, effective communication, resilience, and adaptability in different circumstances (Lucia & Lepsinger, 1999; Thorndike, 1920). These are universal features that help these leaders meet the expected performance, especially in creating and influencing positive change within the organization. Nevertheless, competency features come from different sources, including training, educational approaches, and professional development schemes, which collectively contribute to the leader's development and skills in handling every administrative operation (Ayeleke et al., 2019).

In other cases, scholars explain that leader development can also arise from individual leader development, a concept known as 'identity-based leader development' (Day, 2013). This theory

explains that the identified features of an individual can give them an advantage in leadership qualities above others. The qualities come from the continuous interaction of the leader and their subjects, within a given context of organizational culture or values. Even though the intervention methods significantly contribute to a leader's development, it is also believed that the perceptions of a leader towards the interventions also influence their leadership development. Those with strong positive perceptions tend to demonstrate higher levels of commitment to the interventions, which accelerates their competency.

1.1.1.4 Operations management

Healthcare institutions and organizations are revelational and endless practices, dispensing services in intricate and complex environments that need a keen overview of all activities and awareness of every stakeholder's needs. Consciousness over every operation is thus crucial in the first steps towards effective management practice and reducing waste (Kuan et al., 2023). The best way to keep every activity under check and to reduce waste is to lean on scientific data, evidence, and knowledge, rather than feelings or intuitions – which are attributed to 'scientific management' practices (McLaughlin, 2008). However, the term 'scientific management' gradually evolved the operations management, which is driven by knowledge-based management (KBM), where leaders infer their decisions based on data, evidence, and information is a key feature in operations management.

The root concepts of KBM sit with Taylor (1911), who explained that there is only one best way of managing organizations' operations and that one has to carefully study and analyze the existing evidence before arriving at that way. Going by Taylor's explanation, healthcare operations need to lean on evidence and proper knowledge background that improve over time to a standardized work

plan. Currently, even though there is no conventional way of defining operations management in healthcare, McLaughlin (2008, p. 21) provides a better explanation:

> … the design, operation, and improvement of the processes and systems that create and deliver the organization's products and services. Operations managers plan and control delivery processes and systems within the organization. The goal of operations management is to more effectively and efficiently produce and deliver the organization's products and services. Healthcare professionals have realized that the theories, tools, and techniques of operations management if properly applied, can enable their own organizations to become more efficient and effective.

Some scholars also assert that developing proper operations management in healthcare should significantly borrow from lean practice (Matthias & Brown, 2016) and Deming's (1986) 14 points for management that urge leaders to establish constancy, operate within set philosophies, make constant improvement, continuous training, supervision and eliminate barriers, among others. These features are strongly rooted in knowledge, and they help achieve better operations in terms of service provisions in healthcare organizations.

1.1.1.5 Strategic management

Etymologically, the term 'strategy' is obtained from a Greek word that literally translates as 'army leader' (Huebner & Flessa, 2022). Therefore, strategy has to do with everything that army leaders should know about the war, how to attack the opposing forces, how to mobilize the needed instruments, and an awareness of when to withdraw. Every effective strategy revolves around four main concepts: the long-term consequences of any engagement, the apical role of the top leaders, the complexity of the issue, and the uncertainty of the consequences (Chandler Jr, 1969; Müller-Stewens & Lechner, 2005). Suriyankietkaew and Kungwanpongpun (2022) indicate that with unexpected occurrences in healthcare, strategic management skills are becoming almost a basic requirement for every healthcare organization needed to sustain service delivery.

Strategic management refers to 'doing things the right way' (Huebner & Flessa, 2022). However, in order to do things the right way, one needs to forecast the likely consequences of the actions since the operations may end up with complex and unexpected unfolding. Therefore, strategic management requires organizations to assess and manage their risk-handling capacity based on the quantity of resources they have (Kash et al., 2014). Still, the strategies should point towards clear and concise goals and expected outcomes, guided by strategic management tools such as Management Control Systems (MCS) and current technology like machine learning (Biswas & Akroyd, 2022; Salhout, 2023; Alipour et al., 2022).

1.1.1.6 Resource-based view (RBV)

Resource-based view is a concept of strategic management that describes the resources of a firm to its competitive advantage (Barrutia & Echebarria, 2015). According to Wernerfelt (1984), the RBV focuses on each firm, separately, examining their profit margins and entry or exit from the market within the industry. Every organization has a unique bundle of resources, including the physically visible and the invisible (abstracts, such as culture, knowledge, and even patents) (Ferlie et al., 2015). Since these resources are different, the RBV can only view each firm distinctively as heterogeneous entities with different features within the industry. The differences in resources profile contribute to the differences in the firm's performance.

Moreover, RBV also looks at the performances of firms that are different and unique to themselves. The uniqueness is brought about by the resource profiles that make it hard for the other firms to copy. Firms that know how to utilize their resources well will turn out to be better performers with competent output with a competitive advantage (Barney, 1991). Such firms would be able to have easier control over their resources and earn the advantage over others owing to the features of their resources – "valuable, rare, difficult to imitate by others and exploitable by the firm's

organizational" (Ferlie et al., 2015, p. 128). In this way, the RBV gives a firm a dynamic capability, core competencies, absorptive capacity, and ambidexterity; that is, the ability to survive changes in the market systems and demand/supply standards where firms partner, split, or even exit the industry (Kosiol et al., 2023; Raisch & Birkinshaw, 2008).

1.1.2 Summary of the theoretical concepts and how they relate to the topic

Three main concepts emerge from the three research studies included in this thesis, which interrelate within the main guidance framework presented in Figure 4. These concepts have been examined in detail covering strategic and operational management, leadership competency, healthcare reforms, and change management. These five concepts cluster together under three main domains which form the core focus of this research, including the healthcare leadership practices and competencies, change management practices and sustainability strategies.

Leadership practices and competencies are the foundational forces that drive organizational change in healthcare. Accordingly, effective healthcare leaders should possess skills that can inspire, motivate, and enhance collaborative operations within the facility. Additional skills, such as strategic thinking, emotional intelligence, and the capacity to handle complex healthcare situations are vital for adequate management of the dynamic healthcare systems. At the same time, healthcare leaders with desirable leadership qualities can help sustain the operations. Sustainable practices are vital in healthcare as they help achieve long-term goals without negative impacts on patients and employees' wellbeing. Again, it is only through effective leadership practices that healthcare organizations can embed sustainable practices into their culture, values and principles.

One of the growing concerns in healthcare leadership in terms of sustainable practice is energy efficiency and utilization. Implementing energy efficiency practices needs competent leadership

skills and technical expertise toward green building designs, renewable energy sources, and waste reduction programs. These can be implemented through effective change management practices within the organization. As such, change management is another integral element within this research, which strongly depends on leadership competencies and has a significant impact on energy efficiency. Nevertheless, driving a change through organization requires appropriate leadership qualities that can foster an environment for smooth implementation of energy efficiency initiatives. Overall, the concepts discussed above collectively paints a picture of how leadership competencies can enable effective implementation of sustainable energy efficiency strategies for a positive transformation in healthcare organization.

1.2 Research goals

Conventional research studies have a specific target as the endpoint of the investigation. In successful cases, the end point should culminate in meeting the researchers' expectations and the pre-outlined mission, traditionally known as the research goals. Research goals point at the target or mission of the researcher and there are three basic classifications according to Maxwell (2009): including the personal, intellectual, and practical goals, which will guide this research inquiry. Even though this research outlines these three types of goals differently, it is crucial to note that there is no clear-cut difference when it comes to achieving singly standing research aims – hence the overlap.

According to Creswell (2009), personal goals often address the researcher's intrapersonal question of 'should' the study be conducted. The question of should, in this context, leans more on the perspective and interests of the researcher, bound by issues of competencies, time, resources, and career progression as the first priority. Accordingly, in this regard, my personal goal in conducting this research is to advance pragmatic knowledge and my career and collaborate with other scholars

in the field of healthcare management, gaining deeper insight into leadership competencies, energy utilization, and change drivers in the contemporary sense. In the end, I would achieve significant personal and professional development from different dimensions, including scholarly competency.

Creswell (2009) further delves deeper into the concept of a personal goal, indicating that "all researchers should consider how the study and its heavy commitment of time will pay off in enhancing career goals, whether these goals relate to doing more research, obtaining a future position, or advancing toward a degree" (p. 16). In my case, my personal goals are to advance my professional qualifications towards attaining a doctoral degree in the field of healthcare management to boost my tacit and explicit knowledge for better and more worthwhile contributions in my current workplace and to elevate my niche in the knowledge management arena within the scholarly environment of healthcare leadership.

Moreover, my personal goal of conducting this study is mainly rooted in the academic enthusiasm at the core of my career mission, to contribute to the existing body of knowledge and make consistent improvements regarding healthcare leadership and management. Nevertheless, I have already made several research publications that can signal the budding interest in contributing more knowledge and evidence to the field of academia, particularly in healthcare leadership and management.

My practical goals do not deviate widely from my personal goals with the two overlapping at the points of academic and career progression. Conducting conventional research studies comes with a myriad of challenges and pressures, such as time and resource limitations, that would practically pay off my resilience and perseverance in life. My main focus is to understand the healthcare

leadership dynamics in Jordan from a researcher's point of view. This would help me contribute to better management practices in the future for the betterment of citizens' health. My other practical goal is to advance my knowledge in healthcare management through frequent interaction and collaboration with expert researchers in this field. As such, my practical goals in this research would improve my professional, career, and even personal life improvements.

Again, I have intellectual goals that overlap with my practical and personal goals. I have two goals in this regard – (1) to develop a better understanding of the management dynamics, including leadership practices, change management, and energy utilization in the Jordanian healthcare sector and (2) to contribute my knowledge to the literature bodies regarding the same management concepts for the betterment of other regions. I have a mission to publish my paper in reputable journals where scholars and other experts in healthcare management can access for knowledge gain. Moreover, I have an intellectual goal to gain deeper insight into the philosophical concepts, models, and frameworks around management and leadership that apply to complex healthcare systems. Such knowledge would build a strong theoretical stance upon which to infer future management challenges.

1.3 Research problem and relevance

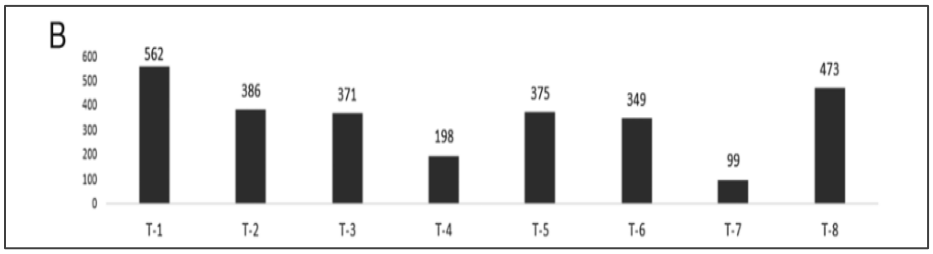
Leadership principles and managerial approaches used in a given organization have a critical influence in determining the success trajectories of the named organization, whether in healthcare or a non-healthcare setting. Due to the heavy influence of the managerial and leadership roles in the performance and progress of an organization, there has been a strong interest in understanding various leadership and management features of healthcare organizations towards improving their operations and overall output. According to Henry Mintzberg's (1980) model of professional bureaucracy leadership in organizations, such as healthcare, particularly hospitals that have

clusters of skilled and professional workers, there is a high chance of significant bureaucratic influence in managerial decisions and change management. The change process in an organization with professional bureaucracy may thus be complicated, requiring the consideration of employees' interests (Cheng, 1990). Nevertheless, there has been ever-growing interest in healthcare management in terms of reforms and changes.

From the semantic analysis done by Zengul et al. (2022) on the publication trends about healthcare management between 1998 and 2018, there is an interesting observation in journal publications about healthcare management, which points towards researchers' rising concern over leadership and transformation, healthcare workers' wellbeing and healthcare service delivery. The same study noted that there has been a declining interest in the performance of organization, technology, patient-care care, and innovation.

Zengul et al. (2022) further presented a graphical impression of the increase in the publications under each topic, and there is an exhibit of comparatively higher interest in healthcare leadership transformation (T-1) than the other research areas (Figure 2).

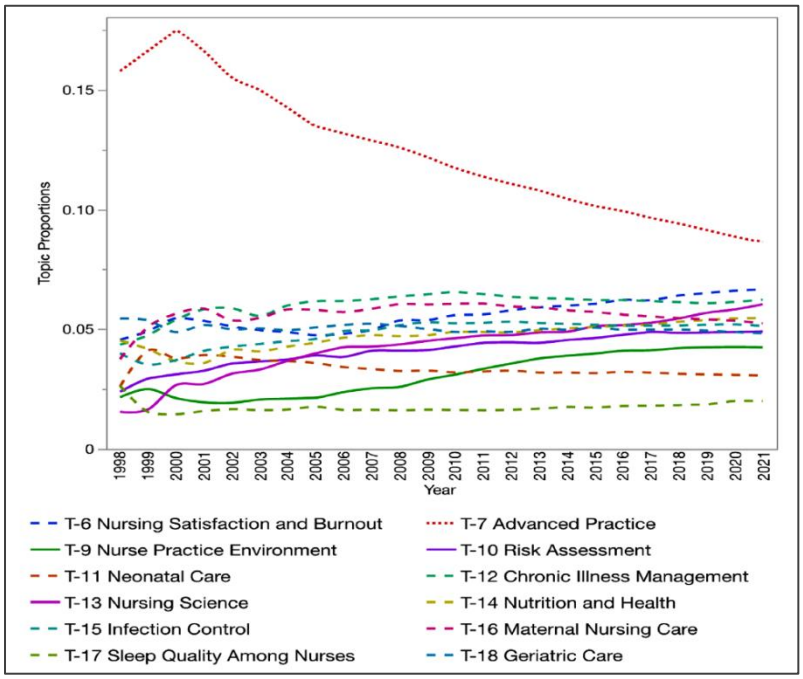
Figure 2. Trends in healthcare management publications



Source: Zengul et al. (2022 p. 149): T-1: Leadership and Transformation, T-2: Organizational Performance, T-3: Workforce Wellbeing, T-4: Finance, T-5: Patient Centeredness, T-6: Delivery of Care Issues, T-7: Technology and Innovation, T-8: Managerial and Gender Issues.

Moreover, the text mining and network analysis by Oner et al. (2014) noted that, among the many topics in nursing research, only three topics showed an upward trend, including nursing science, nurse practice environment, and risk assessment (Figure 3). These are core concepts in management and leadership that inform critical decisions regarding crisis detection, aversion, and management.

Figure 3. Trends in nursing research publications



Source: Oner et al. (2014, p. 8)

The rising interest in healthcare leadership and transformation gives a clue about the weight that healthcare leadership has in the dynamic environment of healthcare service delivery. In fact, it is out of such dynamicity that robust, vigilant and adaptable healthcare management practices should be situated. For the same reason, this study focuses on the Jordanian healthcare management and the dynamic forces around its strategic and operational management practices as well as leadership competency in handling the revolutionary nature of service demands.

Healthcare is highly dynamic, volatile, and sensitive due to the critical niche it has in human life. However, every healthcare system in every environment of its operation is often subjected to a unique range of factors influencing its operations that need special addresses and solutions. Jordanian healthcare is one such kind that faces an array of challenges in meeting its long-term goals towards meeting the growing healthcare needs and quality, most of which are exacerbated by the influx of Syrian refugees in the country (El Arab & Sagbakken, 2018; Dator et al., 2018). Notable challenges in the Jordanian healthcare system arise from resource constraints, environmental concerns, the ever-rising healthcare costs, and sustainability practices, which affect energy utilization too (Alnsour & Moqbel, 2023; Lahn et al., 2023; Rawabdeh & Khassawneh, 2018; Rawashdeh, 2018).

The steady rising costs in the Jordanian healthcare systems call for strategic solutions that can only be addressed through sensitive and sustainable management and leadership approaches. Rawabdeh and Khassawneh (2018) examine healthcare financing policies and present a steady increase in the costs of healthcare financial demands over the years. Their exposition, which commences in the early 1990s, describes that Jordan initially spent 9.6% of its GDP on healthcare service delivery. Subsequent allocation fell to 8.7% in 2016. Nevertheless, most of the expenditures are footed by the government (over 65%). The high expenditures also come with a biased picture that Jordanian health expenses go to treatment rather than preventive measures. Nevertheless, this study presents a concern that needs a strategic managerial approach.

Resource constraints are another critical issue that affects almost every healthcare system in middle-income economies. In the case of Jordan, the healthcare system management has to deal with a plethora of such challenges, including limitations in the skilled workforce, equipment, and health infrastructure, including the health information system (Jalghoum et al., 2021; Shaheen et

al., 2020). According to the theoretical perspectives of the resource-based view of healthcare management, the experienced limitations in the system resources literally weigh down the operations. Again, it is acceptable that resources are often limited, and a strategic approach to managing them in limited units is vital for sustainability. Yet, the strategic managerial approach and leaders' perspectives on the economic utilization of the available resources are poorly understood in the Jordanian context, characterized by refugee influx amidst other challenges.

Moreover, the sustainability of the healthcare system operations does not go without sound awareness and concerns over the environmental concern – the safety of the environment. The production of hazardous wastes and the utilization of the natural resources of the environment requires keen consideration of the healthcare systems' management (Blass et al., 2017). Balancing the input and output in terms of resources and wastes aligns with the theoretical concepts of circular economy where business operations need the awareness of the environment and decouple from resource depletion by regenerating natural resources, and at the same time, protecting their sources (Kalmykova et al., 2018; Resnitzky et al., 2021). As Liu et al. (2022) express, the circular economic models are currently applied to ensure environmental sustainability. Again, despite the well-established theoretical perspectives on environmental concerns, there are scanty pieces of evidence in Jordan regarding the competencies and approaches utilized by healthcare leaders toward meeting the desired sustainability.

A robust, vibrant, and skillful approach to healthcare leadership is necessary in addressing the dynamic changes around healthcare operations. Effective and competent leadership skills are needed to address the internal and external forces that bombard the operations of healthcare systems. Consider the Jordanian context, which is characterized by the ever-changing demographic patterns, shifts in nature and quantity of healthcare demands, socioeconomic alterations, and

reform recommendations (Khader et al., 2023), yet with a critical gap in the data-driven evidence about sustainability strategies. Hence, it is likely that the current leadership approaches in the Jordanian healthcare systems have not displayed their competency in addressing the complexities of the sustainability of their operations, which puts a barrier between the integration of healthcare activities and energy-efficient practices.

Therefore, my doctoral research proposes an empirical approach to exploring the current leadership competencies alongside their preparedness to handle healthcare crises. As such, their capacity to handle drastic changes and reforms through skillful change management skills will be investigated. Of central interest is their leaders' ability to navigate through the complex socioeconomic, cultural, policy, and political landscape toward ensuring sustainability in healthcare service delivery. This is relevant in the Jordanian context that strives to elevate its healthcare service delivery and capability with the growing health needs, influenced by the increasing surge of refugees (Dator et al., 2018). Nevertheless, it is arguable that changes and reforms in healthcare organizations are natural and bound to ensue with the changing technological environment, economic changes, and natural unforeseen crises, like Covid-19. Due to the expected and unexpected changes, adequate skills and knowledge in handling them are paramount.

1.4 Research paradigms applied

Scholars acknowledge that the concept of research paradigms remains a sensitive and dynamic issue in the academic arena, having undergone continuous and evolutionary changes over time to reflect on researchers' philosophical standpoints, beliefs, ideologies, and methodologies (Kivunja & Kuyini, 2017; Li & Jing, 2020). The research paradigm is often attributed to Khun (1996)), who first published the concept in the book, *"The Structure of Scientific Revolutions."* After that, various scholars have presented divergent perspectives on what and how research paradigms

should be interpreted in the academic field. For instance, Bogdan and Biklen (1998, p.22) defined a research paradigm as "a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research." A relatively simpler explanation was put forward by Cohen and Manion (1994) as "philosophical intent or motivation for undertaking a study." Later on, the perspective presented by Mac Naughton et al. (2001) later provided insight into the core concepts that frame research paradigms, including epistemology, methodology, and validity criteria. From the various definitions and perspectives, a research paradigm is a set of shared beliefs, assumptions, and the general worldview that shape researchers' approach to their academic inquiry (Ejnavarzala, 2019).

Every research paradigm is primed within four classic framework features, including epistemology (how we know reality), ontology (what is reality?), methodology (research approach), and axiology (role of value) (Kivunja & Kuyini, 2017). Three principal features can explain the rationale behind the applicability of a named paradigm in social science research.

Epistemology: The nature of knowledge, its scope, and validity (Mertens, 2005). In my study, the empirical approach to discovering knowledge about reality about various concepts around healthcare leadership stands out. In this case, the constructivist viewpoint of knowledge development and mining is overshadowed (Bogenschneider, 2016). Leadership practices and their competencies in creating and sustaining positive organizational change can only be adequately determined from measurable points.

***Ontology*:** examines the researcher's underlying beliefs about reality embedded [in the research data] (Kivunja & Kuyini, 2017). In my study, reality is construed from the realism stance, which disjoins it from human perceptions. Accordingly, the nature of leadership practices and their

approaches to sustaining organizational changes do not relate to the research subjects' views; the two are independent. However, I also believe in critical realism, the view of reality by my research participants in relation to their social environment, culture, or even experience. Either way, reality can only be measured from its stand-alone point, an argument that strongly supports empirics.

Methodology: The research approach varies. The most applied research methodology is quantitative, which depends on quantifiable units to describe a phenomenon objectively. Empirical data will drive my study to clarify the specific concepts about healthcare leadership practices.

Based on the described philosophies, four research paradigms, including positivism/post positivism, interpretivism/ constructivist, critical theory, and pragmatism paradigm have been widely applied by researchers in different academic fields (Mackenzie & Knipe, 2006; Sułkowski et al., 2020). While many researchers directly apply these research paradigms to guide their studies, some scholars in the field of social science have coined a modified form of these concepts in social science.

Accordingly, Burrell and Morgan (1979) developed a more intriguing matrix orienting the four paradigms towards their objective and subjective discourse, and their relevance to social regulation and change. The Burrell and Morgan model identified radical humanists, interpretivism, radical structuralist, and functionalists. While many research studies in healthcare leadership do not explicitly identify the research paradigm that guided their studies, their methodological approaches could still help to understand their paradigms. Nevertheless, many healthcare leadership and change management often conform to the three methodologies, i.e., quantitative, qualitative, and mixed research. Therefore, it is noticeable that these researchers often apply positivism, interpretivism, and critical theory in healthcare leadership practices.

It is arguably acceptable that healthcare leadership and change sustainability can conform to any of the three core research paradigms and conventional methodologies. For example, the positivist approach, which bases its principles on rationalistic and empiricist philosophy, can be applied to effectively explain the direct linkage between leadership practices and efficiency in crisis management or quality of services. Creswell (2003) explains that the positivism paradigm sits on the core pillars of determinism philosophy whereby causes can be directly linked to the outcome effects. Based on this argument, leadership competency is measured by the efficiency of quality of care or sustainable improvements. On the other hand, the interpretivism paradigm strongly depends on the argument that reality can be coined from social structures and that the participants' view of a phenomenon is sufficient to explain the facts in the situation (Mackenzie & Knipe, 2006). As such, the views among healthcare leaders or workers can also inform the status quo of healthcare leadership and approaches to change sustainability.

Researchers in healthcare leadership can apply various paradigms and methodologies to explain concepts in leadership and management. However, it must also be noted that, while any paradigm can be used, some paradigms would align better with some topics than others, as illustrated in the deterministic theory of positivism above. The quality of healthcare leadership accrues and can be influenced by a wide range of factors in an organization, including the leaders' traits as devised in the trait theory, as well as the organization elements, such as culture and values, team relationships, resource capacity, and external issues like the state policies (Alilyyani et al., 2018; Figueroa et al., 2019; Sarto & Veronesi, 2016). Theoretically, these elements should be examined as change drivers with significant niches in organizational operations. Their quality of measurability tends to lean more towards the principles of quantitative research methods and methodology than those that

describe the subjectivism aspects, even though theory-driven research, such as qualitative designs, may help build more theories around it.

Scholars express that the perceptible relationships between leadership qualities and the various influencing factors denote a possible interconnectedness and stability of social systems (Tsoukas & Knudsen, 2003). In this way, a healthcare organization can be viewed as a society of various parts, including multiple departments, stakeholders, and professionals, who coordinate to achieve a common goal through principles that signify a classic social order. Therefore, I would argue that studying leadership in healthcare conforms best aligns with the factionalism and positivism theoretical viewpoints described by Burrell and Morgan (1979).

Functionalism and positivism stances tend to reduce the complexity of social factors in a society or any social setting to simpler and measurable units, which can inform our knowledge about reality and casual relationships (Janićijević, 2011). Nevertheless, Billis (2010) asserted that "organizational research has primarily been positioned in a functionalist compartment, and that alternative approaches have hardly been used in the analysis of management, business economics, and governance." Hence, even though there are some traces of subjectivism in my data, understanding the larger picture of leadership competencies, change management, and sustainability strategies in healthcare requires an overall objective view primed in the principles of functionalism paradigm, which "approaches the general sociological concerns from a standpoint which tends to be realist, positivist, determinist and nomothetic" (Burrell & Morgan, 1979, p. 27).

Apart from the leadership practices, it is also vital to consider and discuss the core features, theories, and philosophical stances that underpin managerial features in healthcare organizations. As stated before, strategic management involves setting goals and analyzing opportunities and

threats toward meeting such goals in the short or long run. Six theories are discussed in this subsection, focusing on healthcare leadership practices and organizational change management towards growth.

Resource-based view: this is the theory of strategic management that links organizational competitive advantage to the unique set of resources it possesses (Ferlie et al., 2015). The unique firm resources can be viewed from different perspectives, including culture and values, information system, human capital, innovativeness, and technological competencies, which gives them an edge over similar firms. In healthcare organizations, there has been increasing pressure to prioritize patient practices with minimal resources (Arefin et al., 2021; Mohammad Shafiee et al., 2024; Sharan et al., 2023). As such, healthcare organizations with the advantage of a better productive resource structure would exhibit better performance in all sectors, including leadership and management.

Evolutionary economics*:* the milestones made by firm economies in terms of growth and developments over time are highly dynamic and can be theoretically considered from the basic biological concepts of evolution (Chizaryfard et al., 2021; Rake et al., 2021). However, the evolutional changes can also be considered from a broader perspective with unpredictable effects on the firm's growth. The effects of the firm's external environment have also been noted, and they affect sustainability practices, such as energy utilization in the healthcare industry (Gregson et al., 2015; Schot & Kanger, 2018). Healthcare organizations are subject to performance improvement over time, influenced by reforms and other unexpected operational and structural changes, considered evolutional in natural settings.

Penrose theory of firm growth*:* this economic theory proposes that firms often undergo a 'Penrose effect', i.e., a constant and natural development over time; however, determined by the nature of resources and managerial competency (Burvill et al., 2018; Lahy, 2020; Penrose, 1959). Like other firms, healthcare organizations undergo a continuous growth process where internal changes lead to expansion alongside the alterations in the growing object (Penrose, 1959). The growth initiates changes that must be accommodated in the routine operations and available resources – a process that needs effective leadership strategies for sustainability.

Sustainability theory: organization operations become sustainable when firmly anchored on a triple bottom line encompassing economic, environmental, and social features (Al-Emran, 2023; Hossain et al., 2022). Firms with competent leadership, which entrenches knowledge management on organization culture and spreads to factor in the economic use of resources, are more likely to strike sustainable growth (Arkoh et al., 2023). Healthcare organizations with exceptional prowess and tactics in sustaining their service provision are at the upper hand in future progress.

Circular economy theory: unlike the traditional linear economy of "take, make, and dispose of", the usage of resources in a firm should not lead to a linear depletion of such resources with subsequent environmental degradation (Balogh, Pónusz & Kozma, 2019; Cui & Zhang, 2018; Kalmykova et al., 2018). Strategic management in healthcare needs a plan that ensures efficient resource usage with minimal waste and minimal adverse effects on the environment to enhance longevity in service provision and sustainability. Nevertheless, there has been an upscaling urge from the United Nations' Sustainable Development Goals (SDGs) for healthcare systems to gear towards sustainable objectives (Hofstetter et al., 2021).

Organizational ambidexterity: a firm's dynamic capacity to handle current and future demands through strategic planning and management practices (Duncan, 1976; March, 1991). Foglia et al. (2019) explain that ambidexterity ensues in current healthcare management practices due to the growing expectations of current and future changes in service demand. Moreover, with the sudden changes in healthcare operations that have previously been witnessed, an effective schematic plan is needed by healthcare leaders to adapt and sustain their operations.

1.5 Research gaps and research questions

Scholars recommend literature reviews as the best approach to establishing research gaps and believe they should precede every evidence-based research study (Clarke et al., 2007). Indeed, it is very likely that a thoroughly done literature review has the potential to unveil gaps in the previous empirical studies for subsequent research studies. However, the different kinds and approaches of literature reviews also vary in the nature and level of evidence they exhibit (Burns et al., 2011; Faggion et al., 2017). For instance, systematic reviews of randomized control trials and meta-analyses are the best evidence for informing practice (Gupta et al., 2018; Robinson & Goodman, 2011). These reviews involving RCTs are also considered the best approaches to identifying research gaps. Therefore, most researchers often conduct systematic reviews to help them identify the gaps for further studies.

Nevertheless, the other forms of literature reviews, such as narrative, integrative, and even scoping reviews, are also reliably used to explore various topical phenomena and can be used to identify research gaps (Thorne, 2018; Torraco, 2016). Accordingly, identifying research gaps that intrigued my doctoral research was done through narrative reviews, but at different levels. The first level was done through the background exploration of the research phenomenon. The second level was done through a thorough narrative of literature articles. Accordingly, notable research gaps were

found in the amount and quality of evidence regarding the healthcare leaders' preparedness to deal with healthcare crises, managing healthcare changes and reforms, and competencies in sustainability practices, which include energy sustainability.

Many studies have been conducted in Jordan to assess various managerial practices and operational reforms, change agents, and readiness for change in the healthcare system and organizations (Alzoubi et al., 2019; Jalghoum et al., 2021; Mrayyan, 2020; Milella et al., 2021). These research studies have pointed out various recent outcomes regarding the ever-evolving nature of healthcare operations. For example, Jalghoum et al. (2021) identified various change drivers in e-health services, including resource availability, policies, privacy issues, and the nature of healthcare institutions, including culture and values. Despite the evidence, some persistent gaps and challenges still need further exploration and research in the Jordanian context. The gaps arise in four domain areas: the specificity of change drivers, inadequate evidence, drivers' sustainability, and comparative view.

It is undeniable that various change drivers have been identified in the literature. However, the specificity of these change drivers is missing in some cases, especially when leadership characteristics are involved. In one of the related studies, Freihat (2021) noted that "this 'individualized consideration' helps manage the change approach that may appear within the reengineering process and cooperate with employees to embrace such change." Their findings pointed toward the implications of leadership characteristics, albeit with a limited focus on the transformational leadership style. Other researchers, including Alkarabsheh et al. (2022), have only given weight to transformational leadership in managing healthcare changes. Yet, Aboramadan et al. (2021) stressed the weight of leadership roles and characteristics in sustaining healthcare operations. This motivates the current study to draw on the various leadership

approaches and characteristics that are core drivers of organizational change in the Jordanian healthcare sector.

Moreover, there is inadequate evidence that links leadership practices as critical healthcare change drivers and the sustainability of the changes. It is apparent that the existing research already identified various change drivers, including economic and health needs (Alqutob et al., 2020; Suleiman et al., 2020). inadequate empirical evidence exists about leadership competencies in navigating and sustaining organizational changes in the Jordanian context.

Moreover, by including other elements, such as environmental factors like energy utilization in change management, there becomes a need to have a comparative view from different economic statuses. The long-term sustainability of these change drivers is poorly explored, giving an incomprehensive view of some unintended consequences of the named change drivers.

Lastly, some of the most informative studies conducted in Jordan about change management have not reflected on the specific frameworks to guide their approach. For instance, research by Jalghoum et al. (2021) about the Jordanian healthcare adoption of the current information system did not consider the critical role of the resource-based view framework in explaining the organizations' approach to introducing new technologies. This approach leaves a gap in the fundamental role of organizational resource utilization and the firm's progress. Indeed, the implications of other theoretical frameworks, such as Penrose's theory of organization development and circular economic view of resource utilization, are under-studied in the Jordanian healthcare system.

Therefore, my dissertation focuses on addressing these gaps by using a set of research questions that explore (1) leadership competencies and characteristics as change drivers in strategically

managing organizational change, (2) understanding the status of energy efficiency and utilization in healthcare institutions, which encompasses energy management, conservation strategies and techniques in hospitals, and (3) exploring the challenges and opportunities brought about by COVID-19 crisis, as environmental factors implicated in healthcare leadership in Jordanian healthcare system. The specific research questions are addressed in the subsequent chapters of this dissertation: Chapter II, Chapter III, and Chapter IV, as highlighted below.

1.6 Conceptual framework

The unifying point of convergence among the outlined research questions emphasizes leadership as the common concept connecting change management, innovation, and crisis response, ultimately leading a change and shaping the future of healthcare organizations. Therefore, this research presents a classic interconnection between change management, innovation and sustainability, and response to COVID-19, which rightly rotates around leadership practices.

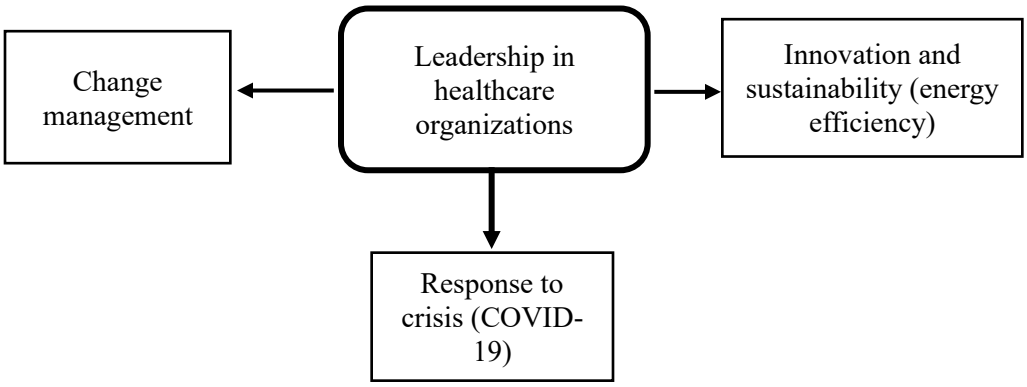


Figure 4. Study conceptual framework

This framework provides an interaction of various concepts that have not been extensively studied in the literature, thereby creating a need to pursue the outlined research questions. For instance, even though leadership has been deeply studied by previous researchers, there is still little evidence regarding leadership competencies in the educational hospitals in Jordan. The gap is even more

apparent when examined in the context of crisis management, such as COVID-19 and sustainable development practices. This research would thus provide current evidence on the linkage between competent leadership practices and crisis management, alongside change management, for better preparedness in case of future crises. Moreover, there is scanty research done in Jordan about energy efficiency and utilization in healthcare institutions, especially when linked with healthcare leadership practices. This gap thus surfaces the need to assess the status of energy efficiency and utilization in healthcare institutions.

Chapter II: Analysis of leadership competencies based on organizational change: Case of education hospitals of Jordan

The first article in my dissertation uses the quantitative approach to examine the healthcare leaders' competencies and behaviours toward addressing organizational changes. This investigation was necessary to provide a narrow picture of the Jordanian healthcare leaders' preparedness to address crises in healthcare operations and sustain the healthcare service delivery activities within the available resources. Moreover, this article draws on three key theoretical concepts – the sustainability theory, circular economics, and resource-based view- to fully explain the fundamentals of leadership practices and competencies in healthcare systems. As such, healthcare leaders' skills, knowledge, and awareness are paramount to understanding future organizational trajectories.

In every organization subjected to internal and external influences, it is expected that changes would naturally occur reflecting on the changing contextual contingencies and the dynamicity of firm growth (Da Ros et al., 2024; Tucker & Cirella, 2018). Having the knowledge of such possibilities, yet with little evidence to explain them in the Jordanian healthcare context, the following two questions surfaced;

RQ1: What are the main leadership characteristics in Educational Hospitals of Jordan?

RQ2: What demographic variables impact leadership characteristics in Educational Hospitals of Jordan?

With the focus on finding answers to these questions, the quantitative article found the various leadership characteristics and practices, including empathy, innovation, and integration, and the sociodemographic factors that affect them, such as the gender and age of the leaders. These quantitative outcomes were further used to guide the subsequent research to understand sustainability approaches exemplified in the energy utilization efficiency avenues. Moreover, according to the chosen research design, the quantitative research outcomes were crucial in feeding the subsequent explorative qualitative study.

Chapter III: Energy efficiency in healthcare institutions

The second article in this study used the narrative review to understand sustainability approaches within the healthcare industry. Energy is an environmental factor that affects leadership approaches in every healthcare operation (Sherman et al., 2020). Indeed, many scholars, over a long time, have acknowledged the significance and value of energy utilization in the healthcare sector and the volatility around its availability and sustainability (Aunión-Villa et al., 2021; Bawaneh et al., 2019). In the previous studies, Čongradac et al. (2012) acknowledged the intensifying attention of energy optimization in large industries, such as healthcare, for sustainable operations. Therefore, whenever a question of circular economy emerges in the healthcare sector, one of the critical issues that stand out is the energy utilization and sustainability plan. Organizations with competent leaders would thus create effective strategies for optimizing their energy utilization activities, reflecting the need to understand leadership competencies as the driving forces.

The narrative review focuses on two research questions:

RQ1: What is the status of energy efficiency and utilization in healthcare institutions?

RQ2: What are the energy management, conservation strategies, and techniques in hospitals?

Through an exploration of the existing literature sources, the responses to these questions highlight the various energy optimization approaches in multiple places, reflecting on the questions about technology-driven management practices in Jordan regarding energy utilization. This review identified various techniques and approaches healthcare organizations use to optimize their energy utilization, such as renewable energy sources to sustain the available resources in a circular economic design. Outstandingly, some of the most current studies, such as Fang (2023) stress green energy as the most sustainable energy source in healthcare. Most importantly, the outcome of the review article and the quantitative research study highlights the essence of competent, flexible, and adaptable management practices in sustaining healthcare operations, including unexpected crises.

Chapter IV: Challenges and opportunities in healthcare reforms in pre-and post-COVID-19 crisis: A case of Jordan

The third chapter addresses one principal research question whose direction aligns with the quantitative research outcomes in terms of leadership preparedness in managing crises in hospitals. In fact, the qualitative study was designed as a sequel to the outcomes established from the quantitative study – following the sequential explorative research design. The specific leadership characteristics were identified in the quantitative article, which called for further exploration to examine how these leaders deal with the unexpected changes brought about by COVID-19 as an example of the healthcare crisis. In other words, the qualitative study explored the practicality of the Jordanian leaders' competencies in the healthcare crisis to exhibit their skills in sustaining

healthcare operations. Accordingly, the challenges and opportunities that arose from the events would be used as windows through which to examine the leaders' capacity to handle crises.

> **RQ1:** Which challenges and opportunities arose in the Jordanian healthcare systems due to the outbreak of COVID-19?

The qualitative investigation identified various challenges and opportunities alongside the health reform strategies. The study identified three key aspects of opportunities, such as improvements in infection control practices, staff education, and patient management, which emerged as exhibits of resilient management techniques, enabled by various management practices, including staff training, monitoring, and provision of social support. At the same time, persistent challenges were noted in terms of heavy workload, stress, fatigue, and shortages among healthcare professionals. These outcomes focused more on the health workers, who, according to the resource-based theory, are crucial components of organizational resources with a capacity to push the organizational performance above the rest of the firms in the industry.

1.7 Research methods

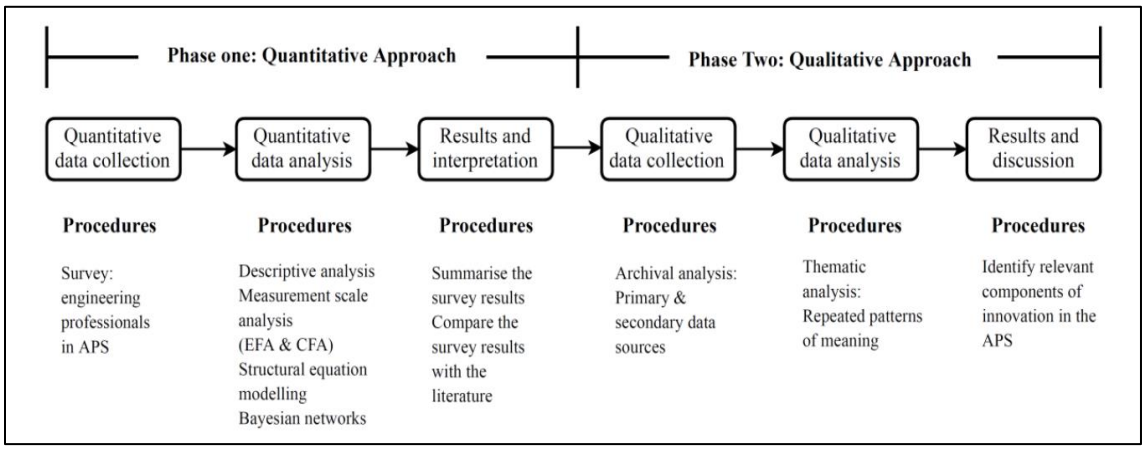
Scholars assert that research methods are the foundation of empirics that define conventional research practices, and it is only through the sound judgment of the methods that we can tell the rigor and internal validity of the study outcomes (Patten, 2016; Yanow & Schwartz-Shea, 2015). Therefore, in this subsection, I will describe the methodology and design that I applied to achieve the study outcomes. Nevertheless, it is essential to note that the discrete methods used in the three papers have also been presented separately.

There are three types of research methodologies, with each sub-diverging into many different research designs, which only conform best with specific research objectives (Coy, 2019). In my study, which focuses on three different concepts, there is an apparent need to combine

methodologies to explore the topic from various angles. Therefore, the mixed research methodology becomes the most suitable and appropriate approach. In addition to the mixed research, I used a literature review to augment my research and explore the available evidence and milestones made in the named research area. However, it must also be noted that there are different research designs under the mixed methodology, including triangulation, sequential exploratory design, and sequential explanatory design (Creswell, 2009). These designs conform best to different research scenarios.

In this dissertation, I applied the sequential explanatory design, which combines various methods. Creswell (2013) describes the explanatory sequential mixed method design as a methodological approach that commences with collecting, analyzing, and interpreting the quantitative research data before using the same outcomes to inform the sequel study of qualitative data to explain the outcomes. Scholars explain that this design is used mainly to clarify or expand quantitative results (Draucker et al., 2020; Toyon, 2021). Accordingly, the quantitative research spearheaded the study since I have a better quantitative background, and the qualitative responses were subsequently sought to explain specific phenomena in the preceding quantitative investigation. The overview of the design and flow of processes is presented in Figure 5, and the rationales for methods used in the three articles are explained in the subsequent sections.

Figure 5. Sequential explanatory design



Source: Wipulanusat et al. (2020, p. 489)

According to the sequential explanatory design, the quantitative study first investigated and analyzed leadership competencies according to the principles of organizational change. Three key leadership attributes were noted, including "integration in clinical leadership, empathy, and innovation." Interestingly, the quantitative investigation pointed toward the healthcare leadership's preparedness for smooth organizational change and service quality improvement in Jordan. Subsequently, the qualitative investigation focusing on the challenges and opportunities in healthcare reforms in the pre- and post-COVID-19 crisis identified three positive outcomes from effective change management practices, including "improvements in infection control, staff education, and patient management protocols." The healthcare leaders noted that even though crisis management in healthcare comes with various challenges, competent leaders can still mince out positive rewards by handling the changes effectively. Activities such as adequate staff training, providing social support, and regular monitoring of the staff were also noted to be effective in handling crises in healthcare organizations. As such, the outcomes of the qualitative and quantitative studies are used in this dissertation to complement each other and provide evidence

for a better understanding of healthcare leadership practices, especially in terms of crisis management.

1.8 Validity and reliability issues

Many scholars, including Sürücü and Maslakci (2020), assert that any conventionally done research should be able to present valid, reliable, and replicable outcomes, especially in quantitative studies. The same applies to qualitative studies, which need to be rigorous and credible in terms of data collection and presentation of the results (Noble & Smith, 2015). Therefore, in this subsection, I will discuss three aspects of validity, i.e., the internal, external, and construct validity, and the reliability of the study.

Internal validity: describes the extent and accuracy with which the study design and methods, including analysis, are done to eliminate potential bias and possible effects of the confounding variables (Sürücü & Maslakci, 2020). In my study, notably, the quantitative parts employed rigorous data analysis methods, with the significance level in the correlational tests being set at $\alpha = 0.05$ (with an error variate of 5%).

External validity: Lesko et al. (2020) describe external validity as the ability of research study outcomes to be applied in populations or settings where the study was not conducted. In other words, it holds on to the features of generalization and applicability of research outcomes in the real world. Accordingly, in the quantitative research, I considered recruiting representative sample participants with heterogeneous features to give a picture of the real-world demographic structure. Moreover, when it comes to the qualitative study, I also considered the transferability of the data and naturalistic approach to conducting the study as recommended by Smith (2018, p. 137), who expressed that “to help guide how generalization might be considered, four different types of

generalizability are presented: naturalistic generalization, transferability, analytical generalizability, and intersectional generalizability." Therefore, the outcomes from this research may be applied to similar contexts and settings.

Construct validity: the accuracy with which a measurement tool or study investigates the constructs that it was meant to measure (Flake et al., 2017). In my research, which focused on leadership competencies, sustainable strategies, and energy efficiency initiatives for driving organizational change in healthcare, the construct validity was considered from multiple angles. In the first instance, the research instruments were validated before being applied in the study for data collection. From the second perspective, the study employed various approaches to narrow the phenomenon of investigation, using literature evidence, empirical data, and my own experience in research to focus the study on the specific aim. Lastly, the phenomenon was operationalized and contextualized in the healthcare leadership to give a precise focus on the healthcare leadership attributes and approach to change.

Reliability: the consistency of observed outcomes over different times or repeated measures using the same tool (Louangrath & Sutanapong, 2018). However, reliability is often considered from the perspective of instruments and scales. In this study, the reliability of the questionnaire used in the quantitative part was assessed by assessing the Cronbach Alpha values, which were all above 0.88 (Table 4). Therefore, the scale was considered relatively good for data collection.

1.8.1 Literature review

My doctoral dissertation is constituted of three papers, one of which is a narrative review conducted to identify the integral factors and gaps within the thematic research area of healthcare leadership and sustainability practices. The review was guided by three theories, including the

resource-based view, circular economy, and sustainability theory. Under the guidance of these theories, the narrative review was conducted in an open manner but reflecting the essential components, including the research question definition, articles search and retrieval, articles scrutiny and data extraction, analysis and synthesis of data, and critical evaluation (Chaney, 2021; Ferrari, 2015). Dehkordi et al. (2021) explain that the narrative reviews do not have a restricted blueprint guideline and can "address multiple questions in a more subjective manner without explicitly specifying selection criteria in retrieving articles" and following the IMRAD format of introduction, methods, results, and discussion. Nevertheless, despite the irreproducibility of the narrative reviews, they still have the strength of presenting fresher conceptions of ideas due to a consolidated approach involving many different articles (Green et al., 2006).

Moreover, in my narrative review, I opted to follow the snowballing approach of article identification and the database technique of retrieving relevant articles. Regarding the database search, I performed a search for the articles on four sites, including PubMed Central, ProQuest, Science Direct, and CINAHL. The initial search yielded numerous articles of more than 350, which were further trimmed down using specific inclusion criteria. Ultimately, 42 articles were considered to be relevant for the discussion. In addition, the remaining articles were snowballed among the reference lists and general online search engines. In the end, after removing the extra copies of similar articles, a total of 26 articles were used in the discussion, which was done with an integrative approach.

Moreover, literature review was also used in the two empirical-based research papers, i.e., the qualitative and quantitative research papers. For example, in the quantitative paper, which sought to examine leadership competencies based on organizational change in education hospitals, an integrative review was done using snowballed articles. The same was done in the qualitative paper,

which analyzed challenges and opportunities in healthcare reforms in pre- and post-COVID-19 crisis. Reviewing the previous research was crucial as it helped to note the persistent research gaps and the possible research approaches proposed by the earlier researchers (Lambert & Lambert, 2010). Accordingly, the review was done to provide insight into the general view of leaders' approaches to resource optimization, resilience, adaptation, and sustainability techniques in healthcare organizations. In the process, two principal research questions were addressed: (1) what is the status of energy efficiency and utilization in healthcare institutions? (2) what are the currently applied energy management, conservation strategies, and techniques in hospitals?

1.8.2 Quantitative research

As described in the previous section of this dissertation, which talked about research design, quantitative research was first done to identify the key variables and outcomes regarding the leadership competencies and behaviors regarding the sustainability and management of organizational changes. The goal of this research was to provide background information on leadership practices in general and their ability to handle radical and unexpected changes in the hospital. Accordingly, this study sought to answer one main research question: what are the clinical leadership characteristics exhibited by the clinical leaders in Jordanian educational hospitals?

The quantitative research methodology was applied, and the quantitative data was collected from a selected group of research participants. A descriptive design was used, which provides insight into the status of a phenomenon without data manipulation (Siedlecki, 2020). Again, the study was conducted as cross-sectional research instead of a longitudinal one based on time limits and the need to assess leadership practices in one instance.

The study was conducted as a survey using a questionnaire administered to the selected research participants before performing data analysis to conclude (Appendix A). The participants consisted of senior employees, middle-level employees, and heads of departments in two teaching hospitals in Jordan. They were included in the study based on their indiscrete willingness to take part without any compensation, and a total of 110 subjects acceded to the call. An already-validated research questionnaire was borrowed from Allam (2016). The questionnaire consisted of 7 leadership dimensions, which had between 7 and 10 items – the total items was 56, which were scored on a 5-point Likert scale.

The outcome data was analyzed statistically using the SPSS software, version 22. Three main statistical tools were used –descriptive statistics, ANOVA and multiple variance analysis. Accordingly, various leadership competencies, such as empathy, integration, and innovation, were noted in regard to change management in healthcare. These variables were further explored in the qualitative study.

1.8.3 Qualitative research

The third paper applied semi-structured interviews to explore the healthcare leaders' perceptions of the challenges and opportunities presented by the outbreak crisis of COVID-19. This second study was informed by the previously noted variables from the quantitative research.

The study was done in a procedural manner that commenced with the identification and recruitment of the participants. Accordingly, a total of eleven participants were included in the study. Two of them were working as administrative managers, two worked as head of nurse managers, one headed the emergency department, another one headed the newly formed COVID-

19 department, three were managers in the quality department, one was a human resource manager, and lastly, one was a director of the infection control unit.

Data was collected from the research participants using a semi-structured interview guide, which the researcher developed. The interviews focused on three main areas; '*How can the hospital integrate the Jordan healthcare reform into the daily operations?*' '*Have there been changes in your hospital performance and quality of healthcare service delivery over the time of the COVID-19 crisis*?' and '*What management practices do you employ in running the daily operations of this hospital before and after the COVID-19 crisis*?' These questions addressed three main issues. In the first two questions, the study sought to establish the extent of changes and modifications brought about by the healthcare crisis. This was crucial in outlaying a background platform upon which healthcare changes would be managed. The last question sought to establish the management practices employed by healthcare leaders in managing crises. Again, this last question incorporated the core aspects of leadership practices in managing changes and reforms.

The interviews, which lasted between 40 and 60 minutes, were administered to each participant privately in a face-to-face fashion. The interviews were recorded and transcribed verbatim. Thematic analysis was done on the transcripts, a process that began with the extraction of codes before clustering them together to form themes as described by Clarke and Braun (2017). The thematic outcomes were thus presented according to the study's aim.

1.9 Jordanian healthcare system

The Jordanian healthcare system stands with unique features in the Middle East and North Africa (MENA) region as the leading provider of healthcare services in terms of quality of services (Nazer & Tuffaha, 2017). However, in a more holistic view, Tamimi et al. (2024) describe that the

Jordanian healthcare system shares basic features of any healthcare system makeup, including the blended operations that involve private, NGO, and government-owned facilities, including university hospitals. Still, there are scholarly praises bestowed on its outstanding quality of services and financial management, which comes from government, out-of-pocket, and insurance, which provide a glimpse of its policy and managerial capabilities (Al Hijaa, 2023; Khader et al., 2023; Gedeon & Al-Qasem, 2019).

The healthcare system in Jordan provides high-quality services with a skilled workforce that is dedicated to research and evidence-based service provisions (Madaeen & Adeinat, 2018; Salim et al., 2021). Moreover, scholars describe the Jordanian healthcare system as dynamic and scalable, often working towards improvement, some of which are already evident in the gear towards Universal Health Coverage (UHC) (Khader et al., 2023). While talking about the transformations, the Jordanian healthcare system has undergone endless transformational changes in the past couple of decades, with landmark events scattering across technological advancements, the introduction of e-health services, and expansion of facilities (Alazzam et al., 2021; Obeidat & El-Salem, 2021). The success of these transformations can be linked to the dynamic and fluid leadership practices that promptly respond to changes in demand and quality (Tamimi et al., 2024).

Nevertheless, the increasing number of refugees in Jordan has brought about rapid and expected changes in the Jordanian healthcare system, which would otherwise override the available resources if not for the highly adaptable management. Rawabdeh and Khassawneh (2018, p. 153) describe that the last two decades have been characterized by many changes in the Jordanian healthcare system, including:

> …high rate of population growth, the country's restricted resources, epidemiological transitions generated by the lower prevalence of communicable diseases and high

> prevalence of non-communicable disease, re-emergence of several entirely eradicated diseases such as tuberculosis (TB) and malaria, as well as the poor quality of care, the substantial rise of both the young and elderly populations, and the rapid increase in the cost of healthcare provision.

These changes have put a significant amount of pressure on the national healthcare management systems, i.e., the MOH, to adjust quickly and accommodate the growing demands. With the adjustments going on, the government also took into consideration the need to control the utilization of critical healthcare assets to maintain future operations (Rawabdeh & Khassawneh, 2018). Some of the significant changes include the expansion of insurance coverage to cater to the health of people with low incomes, elevating the state and increasing the coverage of primary healthcare facilities, and streamlining the hospital administrations with the principal focus of reducing the average waiting time and improving the overall quality of healthcare services delivered (Higher Health Council, 2014; World Bank, 2017).

1.10 Results of empirical research on leadership competencies, sustainable strategies, and energy efficiency initiatives on organizational change management

The role, significance, and impact of leadership competencies, sustainable strategies, and energy efficiency initiatives on organizational resilience are apparent in the literature. Regarding leadership qualities and competencies, a research study conducted by Al-Qura'an (2015) in Jordan empirically showed that leaders who apply transformational leadership style are more likely to achieve smoother organizational change, with little resistance from stakeholders than those who use other leadership approaches. A closely similar outcome was noted by Mansaray (2019), who showed that leadership approaches and leaders' competencies are critical in leading a successful change in an organization. Nevertheless, leaders with competent skills find it easier to influence their staff and even motivate them towards the desired course of action, thereby meeting the organizational goals (Battilana et al., 2010; Kotter, 2008; Graetz & Smith, 2010).

It is through shrewd leadership qualities that an organization applies sustainable strategies for sustaining its operations despite external and internal forces. This is particularly crucial in a healthcare environment where unforeseen circumstances often arise (Dawson, Burgess & Latuszynska, 2023). Despite the vast issues discouraging and barring a smooth application of circular economy in healthcare, some researchers have pointed out its crucial benefit in lifting operations under circumstances of resource scarcity (D'Alessandro et al., 2024; MacNeill et al., 2020). Similarly, recent evidence shows that new technologies, with circular business model innovation such as wastewater treatment plants and utilization of eco-innovation networks through collaborative strategies can significantly help enhance energy sustainability in healthcare organizations (Csedő, Magyari & Zavarkó, 2024; Csedő, Zavarkó, & Magyari, 2023; Pörzse, Csedő, Zavarkó, 2021). Other researchers, such as Csedő et al. (2021) also indicate that network-based innovation management approaches can be safe and effective for sustainable energy utilization in organizations.

Further evidence also shows that the adoption of recycling of some medical equipment and green practices can significantly lead to significant improvements in the environment and cost utilization (Campion et al., 2015). Still under the concept of research optimization for sustainability, Magyari, Zavarkó and Csedő (2022) indicate that innovation, alongside dynamic and strategic management practices, can enhance the success of environmental, social, and governance in healthcare organizations, which are crucial elements for driving change and sustainability.

There are also research outcomes that emphasize the sustainability-oriented organizational changes, which directly spotlight the central significance of healthcare leaders' roles in influencing organizational change (Csedő, 2023). At the same time, it points to the essence of organizational change management towards adopting new technical approaches to enhancing energy utilization

in organizations. For example, there is many research evidence that demonstrates the significance of adopting new technologies and other innovations to boost sustainability in organizational operations (Csedő, Zavarkó, & Magyari, 2023; Pörzse, Csedő, Zavarkó, 2021). These pieces of evidence give a clue to the crucial role of adaptive leadership practices in implanting such new measures to better service deliveries and other core organizational operations.

Energy efficiency stands strong within the packages of effective leadership practices in healthcare as it helps control expenses and sustain operations. A study conducted by Eckelman and Sherman (2016) in the USA noted that safe environmental practices can significantly help reduce healthcare expenditures through energy savings and by reducing pollution, which would otherwise lead to more health problems. The direct implication of reducing costs associated with energy purchases in healthcare is supported by the evidence demonstrated by Hohne, Kusakana, and Numbi (2020, p. 569), who reported that "average possible energy savings ranged from 50%–70% at the conceptual level, while energy savings of 15%–30% may be expected for energy-efficiency initiatives at the active level." These findings illustrate how leadership, sustainability, and energy efficiency collectively drive impactful organizational transformation in healthcare.

1.11 Structure of the dissertation

This dissertation is organized into five discrete chapters that present different but related concepts of discussion under the identified topic. The first chapter of this dissertation focuses on the introductory and methodology issues. As such, it presented the research goals, an overview of the framework and design as well as the paradigm that guides this research. The core aspects of healthcare management are well elaborated. Further, I have also outlined the research questions that guide my project. After that, I have also described the chosen methodology and methods as well as the validity of various study features. In the subsequent chapters, I will present a detailed

outlay of my study outcomes in terms of three already published research papers about the topic: leadership competencies, sustainable strategies, and energy efficiency initiatives for driving organizational change in healthcare.

The second chapter will, therefore, present the paper that analyzed leadership competencies based on organizational change in Jordanian education hospitals through a quantitative approach. The third chapter will present the outcomes of a literature review focusing on energy efficiency in healthcare institutions. The last paper, occupying the fourth chapter used qualitative approaches to examine the challenges and opportunities in healthcare reforms in pre-and post-COVID-19 crisis in Jordan. Lastly, chapter five will summarize the most significant outcomes of this dissertation before outlining the theoretical contributions and implications of findings in healthcare management.

2 Analysis of leadership competencies based on organizational change: the case of Education Hospitals of Jordan

2.1 Abstract

Leadership skills and attributes can improve the performance of organizations and contribute to positive and sustainable organizational change in the dynamically changing healthcare sector. The study examines the clinical leadership characteristics in Educational Hospitals of Jordan and how clinical leadership competencies relate to the demographic variables. To understand clinical leadership characteristics, a quantitative descriptive study was conducted using an international framework (Medical Leadership Competency Framework). A total of 110 clinical leaders were asked with a validated questionnaire, and the data were analyzed by using the multiple variance analysis. In the hospitals studied, the most typical leadership characteristics were integration in clinical leadership, empathy, and innovation, and the gender and age of health leaders have a significant impact on the degree of clinical leadership. The development of clinical leadership skills is time-consuming but essential to be prepared for environmental and organizational change, especially skills related to managing staff and the work environment.

2.2 Introduction

Research is carried out in a number of Hungarian healthcare institutions, which are mainly focused on the core business of the medical profession; management research is very rarely included in the Hungarian scientific circulation. The novelty of our study is the “boldness” of the topic itself: Hungarian clinical managers are averse to the exploration of managerial activities, styles, and competencies, one of the reasons for which is the highly regulated institutional environment based on ethical principles and professional norms. The international literature not only presents research

and results related to the management of hospitals but also creates training programs and workshops based on them, which support the management activity. In our study, we point out that in many countries, proactive-minded professional support institutions are integrating new methodologies (e.g. National Health Service, American Hospital Association, American Medical Association), which publish documents and professional materials that are suitable for domestic adaptation and comparison of research results.

Our research draws attention to the fact that the international literature examines several aspects of clinical leadership and presents a questionnaire survey on leadership competencies, the results of which can be channeled into suggestions and responses that respond to the challenges of a dynamically changing healthcare environment. The actions and proposals of institutions with similar problems can be instructive for us as well, not just for Jordanian teaching hospitals. In this research, we look for the answer to the extent to which clinical leadership competencies in Jordanian Educational Hospitals are reflected in the behaviour of clinical leaders. As clinical leadership characteristics also depend on demographic variables (age, gender, professional experience, occupation, leadership level, and culture (Pagon, Banutai & Bizjak, 2008)), in our second research question we examine the relationships between leadership competencies and demographic variables. Due to the inevitability and dynamism of change (Komashie, Mousavi & Gore, 2007; Van Rossum et al., 2016; Gopee & Galloway, 2017), preparation for change is highlighted in the competencies examined. Finally, we compare the results of the empirical research with the data in the literature and examine the applicability of the study in Hungary. At the end of the article, we discuss the limitations of the research and provide an overview of additional research areas.

2.3 Literature Review

Healthcare institutions carry out healing activities, which can be characterized by a high degree of heterogeneity, i.e. they provide a wide range of health services due to the complex care activities of hospitals and the diversity of patient groups (Krenyácz, 2015). To lead these organizations, Jonas (2011) coined the definition of clinical leadership as “a clinical health care professional who defines, inspires, and promotes value and vision, and whose clinical experience and skills are focused on (organizational goals and their achievement). to meet the needs of the patient." Leadership can be defined as a process aimed at controlling, leading, and influencing the behaviour of others in order to achieve the set organizational goals (Arnold et al., 2004; Bernthal, 2005; Brooks, 2006; Caldwell et al., 2010, Bokor, 1996, Csedő & Zavarkó, 2019 a, b). Leaders have diverse roles in their organizations, highlighting the pioneering role of positive organizational change (Bondas, 2006; Csedő et al., 2018).

These complex organizations require special skills (Gopee & Galloway, 2017; Ledlow & Coppola, 2013; Barr & Dowding, 2019) for clinical leaders in medical-professional and practical decision-making skills (Salhani & Coulter, 2009; Boedigheimer & Gebbie, 2001). They need to cope with changes in the healthcare environment and service needs (Begun, Tornabeni & White, 2006) and promote the productivity of healthcare staff (Sims, Faraj & Yun, 2009). Clinical leadership plays a crucial role in providing appropriate health services, managing resources transparently, and strengthening preparedness for development (Mair et al., 2012; Mosadeghrad, 2014). Managing sophisticated and complex healthcare activities requires a rapid and coordinated response from clinical management and healthcare professionals (Davidson, Elliott & Daly, 2006), and dynamically changing healthcare service needs require us to make organizational changes from time to time while healthcare is constantly transforming (Salmond & Echevarria, 2017).

In the literature review, we present the clinical leadership characteristics and personality traits. Then address the role of leaders in change management and conclude the review with a review of competency frameworks and methodologies, which also includes the selection of our research framework.

Clinical leadership qualities and personality traits

Leaders have different personality traits that are related to their psychological structure. To explain the psychological character of leaders, "trait theory" (see also trait theory, dispositional or dispositional theory) is used, according to which each person has innate traits and characteristics that determine whether or not they become productive leaders (Arnold et al., 2004 Brooks, 2006). Leadership skills are addressed in other theories: the theory of leadership styles, the theory of the administrative network, the theory of continuous line leadership, and the theory of dimensions. (Bernthal 2005). These theories appear in the healthcare sector but only in international research, so we summarize the results of some health management research below.

Examining the leadership characteristics of nursing managers (Silva et al., 2016) were able to identify five different leadership characteristics: 1) motivating others to take action, 2) sharing inspiration and vision, 3) modeling the pathway, 4) motivating and inspiring others, and 5) process challenges. It has also been confirmed that employment and time spent in nursing depend on nursing practice, but clinical leadership also depends on other factors. Janssen (2004) examined the characteristics of senior hospital managers in a sample of 116 managers. The results showed that leadership is affected by time spent on work experience, duration of training, extra effort, satisfaction, work relationships between senior management, and perceived effectiveness. In

addition, there is a weak relationship between the values that leaders perceive as collectivist or individualist and the leadership style they perceive.

Alloubani & Almatari (2014) examined how hospital managers perceive the importance of hospital training: research has confirmed that the characteristics of transformational leadership have a positive effect on organizational outcomes and teamwork and even enhance workforce-oriented values and participant efficiency. Abdrbo (2012) compared the leadership characteristics of nursing leaders with different qualifications and observed significant differences due to different training programs. In addition to the characteristics and training of managers (professional and management education and training), the researchers also pointed out the importance of communication. Shahin (2011) examined employee perceptions of hospital managers, confirming that there is a significant difference in the perceptions of managers and employees: managers preferred a team-based approach to transformational leadership style. Employees, on the other hand, explained that managers did not present a transformational leadership style: they do not adequately represent employees, and their opinions are ignored. Communication is an essential element of leadership, as evidenced by the fact that employees of transformational leaders find their leaders more effective (Al-Mailam, 2004). The researcher also pointed out that employees of private hospitals are more likely to perceive their leaders 'transformation style' than those working in public hospitals.

The role of clinical leadership in change management

A recent qualitative study (Nilsen et al. 2020) identified the characteristics of successful organizational change in healthcare in terms of management functions. The researchers conducted 30 semi-structured interviews with Swedish healthcare workers (physicians, nurses, and assistants)

to examine the factors and impact of successful change management. The research revealed that successful organizational change depends on the chances that managers can influence change among employees, value change, and prepare for change. The competence and knowledge of the health manager are paramount in facilitating organizational change. Comprehensive research on the implementation of organizational change (Aarons et al. 2015) demonstrated that leadership training has a positive impact on supporting organizational change led by health leaders and improving managerial preparedness. In the same year, Holten & Brenner (2015) published their work, which also examined the relationship and impact between leadership and successful organizational change management in relation to the reactions of leaders to change. The results of a large-sample longitudinal questionnaire survey showed that transformational and transactional leadership styles have a positive effect on manager engagement. Researchers have also found that leadership and commitment to change are related to employee appreciation and willingness to change.

An examination of authentic leaders (Cserháti et al., 2021) showed that leaders act in accordance with their strict values, and sensitivity to their environment is reflected in their leadership attitudes. Agote, Aramburu & Lines (2016) examined employee trust and emotions experienced as a result of authentic leadership in organizational change in the context of quantitative research involving HR managers. The results of the data processed by the structural modeling method show that authentic leadership skills directly influence positive emotions, trust, and the propensity for positive organizational change, i.e. the positive qualities of health leaders contribute to the success of organizational change.

Examining the differences between clinical leadership levels, Kumah et al. (2016) point out that managers need not only the support of senior management, but also five critical competencies to

implement change: technical competencies, effective communication, employee support through change (coaching), problem-solving skills and conflict management, and effective team building and team leadership. The “soft” change management approach of the “frontline clinical leader,” especially lead nurses, is based on transformational principles, while senior managers focus on managerial principles (Moen & Core 2012).

Frameworks and methodologies of clinical leadership competence

Effective leadership is one of the key factors in ensuring professional and high-quality health care (Kramer et al. 2004, Martin et al. 2012). An evaluation study by Martin et al. (2021) examined the impact of the RCN Clinical Leadership Program on the development and effectiveness of competencies in nursing leaders in Switzerland. Researchers have reported that the program introduced has improved clinical leadership competencies and related services.

According to the American Hospital Association (AHA) (2015), leaders in a healthcare organization must have diverse skills that include: decision-making ability, planning and organizing ability, courage to act, and leadership in organizational change or just the ability to resist. The Clinical Leadership Competency Framework (CLCF) and the Medical Leadership Competency Framework (MLCF) (2012) propose seven leadership aspects for effective leadership of healthcare institutions: adaptive clinical leadership, empathic clinical leadership, clinical leadership tools, integration clinical leadership, clinical leadership tools, innovative clinical leadership, clinical leadership tasks, and recent development. The quantitative methodology used in the present research uses the categories of the Medical Leadership Competency Framework (MLCF) (2012), so the interpretation of these concepts is presented in more detail in Table 1.

Table 1. Definition of Clinical Leadership Concepts

Leadership aspect	Interpretation of the leadership aspect
Adaptive clinical leadership ***Adaptive clinical leadership***	The ability of clinical leaders to respond to or prepare for issues that may affect the development of high-quality patient care and professional relationships.
Empathy	The emotional connection between the clinical leader and the medical staff and the extent to which the clinical manager understands the workplace situation invest energy in emotional understanding and provide emotional security for healthcare personnel.
Clinical leadership tools ***Inventory clinical leadership***	Clinical leadership ability to create an environment in which healthcare personnel can achieve a high level of performance while performing their work with satisfaction.
Integration ***Integrating clinical leadership***	The integration of clinical leadership means the ability to apply strong moral principles to influence the workplace to such an extent that strict ethical standards guide decisions and actions.
Innovative clinical leadership ***Innovative clinical leadership***	The ability of clinical leaders to provide creative solutions by putting their vision or values into practice or by themselves becoming a force for change through their values (role model).
Clinical leadership responsibilities ***Clinical leadership service***	The willingness of clinical management to provide continuous, high-quality health care and the ability to monitor and improve the needs of their employees.
Development of leadership tasks ***Improving services leadership***	Continuous involvement and commitment, striving for development and innovation, making plans for change based on a variety of evidence.

Source: MLCF (2012)

The Clinical Leadership Competency Framework, developed by the National Health Service (NHS) Leadership Academy (2010), sheds light on five areas of health service delivery: direction setting, personal presentation, collaboration at work, service management, and service development. In order to improve the quality and patient safety of healthcare services and implement organizational change, clinicians must be competent in all five areas of leadership. Within each area, there are four categories, called elements, which have been divided into four competencies. These describe the activities or outcomes that every clinician should know. The above document names these leadership elements in detail, here we list only the leadership areas and their elements (Table 2).

Table 2. Elements of Clinical Leadership Competency Framework

1. Presentation of personal characteristics • 1.1 Developing personal awareness • 1.2 Self-management • 1.3 Continuous personal development • 1.4 Integrity **2. Cooperation at work** • 2.1 Network development • 2.2 Building and maintaining relationships • 2.3 Encouraging contribution • 2.4 Teamwork **3. Service Management** • 3.1 Planning	• 3.2 Resource Management • 3.3 Managing people • 3.4 Performance Management **4. Development of services** • 4.1 Ensuring patient safety • 4.2 Critical appraisal • 4.3 Encouraging development and innovation • 4.4 Facilitating Transformation **5. Designate direction (as goals)** • 5.1 Identifying the context of change • 5.2 Applying knowledge and evidence • 5.3 Decision making

Source: NHS (2010)

2.4 Presentation of research methodology

The research aims to examine the clinical leadership competencies of King Abdullah University Hospital and Jordan University Hospital (hereafter Jordan Teaching Hospitals) based on their readiness for organizational change. The research sought to answer the question of the extent to which clinical leadership competencies are reflected in the behavior of clinical leaders and how they relate to the demographic variables of the investigated leaders.

The population of the research is the senior, middle, and department heads of the Jordan Teaching Hospitals, who represent a total of 208 people for the two hospitals. The willingness to participate was 52%, and we were able to process the results of nearly half of the responses from almost 110 executives (Table 3). The willingness to participate may distort the research results, so we will address this separately when presenting the research limitation. The table below shows the demographic variables of the study sample.

Table 3. Demographic characteristics of the sample

Variables	Categories	Frequency	Rate (%)
Gender	Man	63	57
	Woman	47	43
Age	<30 years	35	32
	30-40 years	45	41
	40-50 years	17	15
	> 50 years	13	12
Leadership level	Senior manager	40	36
	Middle leader	45	41
	Class leader	25	23
Experience	<5 years	30	27
	5-10 years	40	37
	11-15 years	20	18
	> 16 years	20	18
Profession	Doctor	40	37
	Nurse	55	50
	Other	15	13

Descriptive statistical analysis presents the different demographic characteristics of the selected study participants in Table 3. The proportion of male and female fillers in the hospitals was 57–43% for the two teaching hospitals. In terms of leadership level, 41% of participants were middle-level, 31% senior, and 23% were departmental leaders, with more than half of the participants being senior nurses. Participants were outstanding, i.e., 41% were between the ages of 30 and 40, 32% were under the age of 30, and the other age groups were 12-15%. The number of practical years developed similarly to the age groups, 27% of those without 5 years of work experience, 37% of those with 5-10 years of experience, and 18-18% of those with 11-15 years of age and over 16 years of experience were exposed in the sample.

The leadership role of hospital managers was examined in the framework of quantitative descriptive research, using data from a validated research questionnaire (Allam, 2016). The fact that we were able to rely on a validated questionnaire based on a methodology that depicts professional workshop work (NHS) meant that the data were highly secure. The questionnaire

includes seven factors to explore different dimensions of clinical leadership characteristics (Figure 1), and each clinical leadership factor covers 7 to 10 questions in a total of 56 questionnaires. The factors were to be assessed on a 5-point Likert scale, as follows: 5 - strongly agree, 4 - agree, 3 - neutral, 2 - disagree, 1 - strongly disagree. The application of the Likert scale gave managers the opportunity to assess managerial competencies not in relation to each other but on their own.

The data received were analyzed using descriptive statistics and multivariate analysis of variance (MANOVA) (Hotelling test) with SPSS version 22. The Arabic version of the original English questionnaire Allam (2016) was used, so we calculated the Cronbach Alpha and Pearson correlation index to examine the validity and reliability of the questionnaire included in the study. Based on the Cronbach Alpha values, all seven scales of the questionnaire show excellent reliability (> 0.70) and thus strong internal consistency, with Pearson correlation results reflecting good content validity (> 0.40).

Table 4. Reliability (Cronbach's Alpha and Pearson correlation)

Variables	Item number	Cronbach's alpha	Pearson correlation
Adaptive clinical leadership	8	.90	.60
Empathy	11	.91	.55
Clinical leadership tools(inventort)	10	.93	.44
Integration	8	.90	.51
Innovation	7	.89	.67
Clinical leadership services/responsibilities	6	.88	.54
Development of leadership tasks / *Improving services leadership*	5	.90	.43

2.5 Research results - statistical data tables

The descriptive statistics show that the competencies of the clinical managers of the selected Jordanian teaching hospitals can be measured with the presented questionnaire, i.e., the examined elements appear in the behavior of the clinical managers. The analysis further examines how key

clinical leadership competencies are reflected in managerial behaviour, whereby integration showed strong application in leadership while other qualities like empathy, innovative clinical leadership, and adaptive clinical leadership were on average, and the rest were weakly applied in leadership (Table 5).

Table 5. Clinical leadership elements

	Elements	Average	Scattering
1	Integration	3.36	1.34
2	Empathy	2.47	.58
3	Innovative clinical leadership	2.41	1.32
4	Adaptive clinical leadership	2.39	.61
5	Clinical leadership services	2.07	1.05
6	Clinical leadership tools/inventory	1.99	.89
7	Development of leadership tasks/ Improving services leadership	1.78	.71
	Complete	2.35	.55

Multivariate analysis of variance (MANOVA) was performed using the Hotelling test in order to examine the relationships between the variables. Statistical results showed that of all independent variables, only the gender ($F = 4.124$, $p = 0.044$) and age ($F = 5.514$, $p < .001$) of managers had a significant effect on clinical managerial behaviour (Table 6).

Table 6. Relationship between participants' demographic variables and clinical leadership characteristics

	Type III sum of square	df	Mean Square	F	Sig
Gender **Hotlling** amount 66,059	5,909	1	5,909	4.124	.044 *
Age 61.025 = **Hotlling** amount	135,182	1	135,182	5,514	.000 *
Leadership level 30.058 = **Hotlling** amount	.002	1	.002	.541	.993
Experience 14,695 = **Hotlling** amount	.199	1	.199	.139	.710
Profession 18.154 = **Hotling** amount	1,172	1	.563	.393	.675
Error	295.201	103	1,143		

Total	461,857	109	

** Significant at level of (α = 0.05)

In order to examine the differences in leadership characteristics based on the age of the leaders, we performed a Scheffe post-test on the age groups (Table 7). By Examining the age groups in pairs, it can be said that there is a significant difference between the "40-50 years" and "under 30" age groups. Based on these, it can be assumed that the development of leadership skills is a longer process, which, according to the data, begins to be incorporated into the behaviour of managers over the age of 40; there is no significant difference between those aged 30-40 and those under 30.

Table 7. Scheffe test

Age	Below 30 years	Between 30-40 years	Between 40-50 years
Less than 30 years	-	0.87	0.06 *
30 less than 40 years	-	-	0.08
40 to less than 50 years	-	-	-

2.6 Interpretation of clinical leadership competencies in the studied hospitals in the context of previous research results

The research results from the presentation of clinical leadership elements (Table 4), respectively, these demographic variables relationships evaluations, along with referring back to the literature deed findings.

Research has shown that effective clinical leaders prioritize integration, grounding their decisions and actions in strong moral principles and ethical norms. This integrative approach fosters collaboration and coordination, which are essential for organizational success and change (Matthews et al., 2018). This system of norms affects the whole of healthcare, yet the standard deviation of the values assigned to the competence can be said to be very high compared to the other competencies as well.

Empathy (empathic clinical leadership) was also highly valued in the study population. Among healthcare workers, managers see emotional understanding and safety as their managerial responsibilities. The emotional relationship between managers and employees is very significant in healthcare organizations and is also highlighted in effective change management (Agote, Aramburu & Lines, 2016), as confirmed by the empathy program for nursing managers (Gunther et al., 2007). Innovative clinical leadership is also an average competency among the managers surveyed. However, attention should be drawn to the value of high standard deviation here, which indicates that managers do not think uniformly about this. However, innovative clinical leadership helps to lead effectively by improving the quality of care, i.e., service (Stanley, 2012).

Another competency closely related to change management is adaptability, i.e., the ability of managers to respond and prepare for issues that may affect high-quality patient care and the development of professional relationships. Adaptive leadership competence is one of the less common competencies based on our statistical analysis, although healthcare institutions need to adapt quickly and appropriately to the ever-changing health needs of the population (Al-Hussami, Hammad & Alsoleihat, 2018; Battilana et al., 2010; Salmond & Echevarria, 2017; Kazmi & Naaranoja, 2018).

Several authors, including Patterson et al. (2011), noted that health change is driven by technological advances, improved quality of care, population expansion, and changes in demographic patterns. The ability of clinical leaders to focus on implementing creative solutions belongs to the type of innovative leadership. This factor appeared as the average competence used in our research and shows a similarly high standard deviation, which is presumably due to the differences in the medical-professional fields.

Surprisingly, the weakest competencies used are the use of clinical leadership tools and the development of leadership roles. The former involves creating a satisfied work environment that contributes to high levels of performance, and the latter involves managerial engagement and commitment.

It is undeniable that healthcare organizations are subject to operational change, which is conditional on the readiness of senior managers and department heads for change. However, based on the reported results, it is necessary to develop the competencies of the studied managers so that Jordanian teaching hospitals can prepare for the changes and respond to them with effective change management strategies (Hussain et al., 2018; Appelbaum et al., 2015).

Relationship between demographic variables and clinical leadership characteristics

The statistical results of our research show that the gender of managers has a significant ($F = 4{,}124$, $p = 0.044$) effect on clinical and managerial behaviour. Literature publications and research ideologies also show that the gender of clinical leaders determines leadership characteristics. Gender balance is essential in changing competencies in nursing leadership (Rozier, 1996). A study by Herrera et al. (2012) found that gender determines egalitarianism and assertiveness within organizations. While some researchers can show a significant correlation between variables, others do not confirm the correlation (Alghamdi, Topp & AlYami, 2018). It is clear that women's leadership style is different from that of men; the difference can be traced back to two things. One reason is that women easily overcome the covert rejection of their female leadership authority (the general perception that the leader is a man), and another reason is that women handle human relationships better (Kossek & Buzzanell, 2018). The female leadership style reflects women's life

strategy, i.e., a holistic approach to different aspects of life that includes different roles for women (Al-Shamrani, 2013).

The positive relationship between age and clinical leadership ($F = 5.514$, $p < .001$) indicates that the experience gained has an impact on leadership characteristics. The age group study confirmed that there is a significant difference between managers over the age of 40 and managers under the age of 40, i.e., the development of leadership skills is a longer process that, according to the data, begins to be integrated into the behaviour of managers over the age of 40. There is no significant difference between those under 40 and those under 30. Numerous literature publications demonstrate that age is a significant factor in clinical leadership characteristics (Goldenberg, 1990; Kondrat, 2001). Leaders acquire more and more skills as they age, and this is related to personal trait theory, which confirms that the quality of leadership development correlates with age (Costa, Jr. & McCrae, 2006; Pervin, 1994; Budakand (2018)). Older leaders are better able to control their emotions than younger leaders (George, 2000; Fariselli, Ghini & Freedman, 2008), meaning that emotional intelligence is an essential element of leadership (Kulkarni, 2014), and older leaders have more advanced planning skills, implementation, and control than their younger peers (Singh & Srivastava, 2012). The ability to control emotions and feelings correlates with personal and social skills in change, management such as stress management, integrity, compassion, teamwork, and self-management (Pagon, Banutai & Bizjak, 2008).

2.7 Conclusions and summary

Healthcare institutions provide heterogeneous services in a dynamically changing environment rich in technical innovations but highly controlled by norms and rules, with the help of employees with vastly different characteristics (Norzailan, Yusof, and Othman, 2016; Krenyácz, 2017), giving clinical leadership competencies unique skills (seven competencies were captured in the applied

model) in which the leader is able to think flexibly (Weiner, 2020; Lorenzi & Riley, 2013) and analyze critically independently of organizational issues.

In the Hungarian environment, there is little research on healthcare institutions that examines management and their competencies. In this article, we pointed out that the workshops of proactive-minded, internationally accepted professional institutions that integrate methodologies are suitable for other countries to use, and the results of the research can be fed back to the heads of the institutions concerned or even to the legislator, maintainer, and financier. Even if there is an area that is alien to health care operations, leadership (e.g., transformational leadership, shared leadership, or perhaps the very concept of leadership) because, in our opinion, it is moving forward on the path to development. In our research, we have demonstrated, based on the literature, that healthcare organizations are undergoing continuous change, which is significantly influenced by the management and change management skills of clinical managers (Daft & Lane, 2008; Santra & Alat, 2001). Using the seven leadership aspects proposed by the Medical Leadership Competency Framework (MLCF, 2012), we sought to understand clinical leadership characteristics. Then, we conducted research to assess the clinical leadership competencies of Jordanian Teaching Hospitals. A quantitative descriptive study was conducted with a questionnaire survey of 110 leaders, and then the data collected were analyzed by multivariate analysis of variance.

In Jordanian teaching hospitals, the use of clinical leadership competencies is average, with integration into clinical leadership and empathy as the most widely used competencies, i.e., managers rated these competencies with the highest values, which are not outstanding at all (using a five-item Likert scale). With an average of 3.4 for integration and 2.5 for empathy). The behaviour of clinical leaders balances between three principles (based on the National Center for

Healthcare Leadership (2004) model Herd et al., 2016): people, transformation, and execution. Thus, in order to manage change in healthcare organizations, managers need to know the human resources, the way of implementing the plans, and the changes to be implemented, for which adaptive and innovative managerial competencies are essential.

Previous empirical research has classified the clinical leadership role of Jordanian teaching hospitals as a productive and effective leadership style, and this study reports "only" average leadership characteristics for selected teaching hospitals. Hence, these hospitals are only moderately prepared for change. In addition, research has shown that clinical leadership characteristics are highly dependent on the age and gender of clinical leaders and that the same effect exists on leaders 'readiness for change and change management skills(Katsaros, Tsirikas & Kosta, 2020; Adam, 2022).

The research found that the gender and age of health managers in the studied institutions have a significant effect on clinical leadership characteristics. Acquiring leadership competencies and building them into leadership competencies is a time-consuming process, and we will see the practical impact of success within the organization in years to come. Every organization needs to be competent leaders who increase the performance of the organization by sharing their values. However, it takes time for an organization to develop and put into practice a culture of positive values, skills (and their sharing) (Miller et al., 2001), such as training organizational leaders, involving their employees, and providing a framework for evaluation, rewards, and promotion elaboration. Not only are all these time-consuming processes, but their lack can directly delay the progress of development (Conger, 2005). The last key message of the article is the importance of competence training (leadership training), the presented environment, and organizational characteristics. It is essential to point out the necessary competencies, share the positive research

results of competence development (which we highlighted in our research), and then give feedback.

2.8 Limitations of research and further research directions

One of the main limitations of the research is that the survey was conducted exclusively among Jordanian Hospitals, so we can only give a picture of a slice of the entire hospital sector; our research may well be considered as a pilot analysis to thoroughly investigate the relationship between clinical leadership competencies and demographic factors. Another possible research direction is to extend the study to the entire population. In the case of teaching hospitals, the results of the training and programs implemented in the meantime can be confirmed by another survey. In addition, it is worth examining what can lead to inadequate leadership skills in each hospital.

Another limitation of the research is the willingness to complete it (52%), as it limits the interpretive framework by the lack of information on the reasons why some doctors did not participate in the research (overload, administrative /technical reasons, but even which would have an impact on the published results). If the willingness to fill can be traced back to the workload of managers, it is recommended that decision-makers feed this back to them.

Presumably, there is a difference between the mindset of management levels: the skills of senior managers and the competencies of clinical (professional) managers may differ, which indicates further research directions. Further research may be needed to examine the different leadership styles of women working in the clinic through change management goggles, as women are more resilient and sensitive to any minor organizational change, and their concern for the organization keeps them alert to possible change (De La Rey, 2005).

3 Energy Efficiency in Healthcare Institutions

Abstract

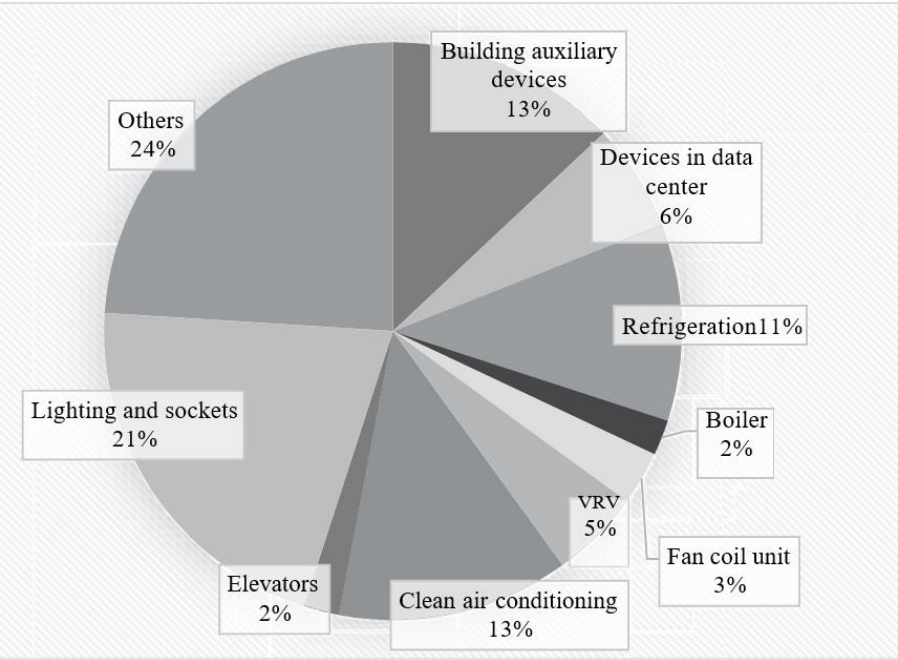
The Environmental Protection Agency classifies healthcare as one of the leading energy-consuming industries. Extensive energy is needed around the clock in healthcare institutions for lighting, ventilation, and operating medical equipment. However, healthcare institutions worldwide are growing concerned over the sustainability of energy utilization. This narrative review thus seeks to examine energy efficiency and utilization in healthcare institutions and energy management and conservation techniques and make recommendations for future optimal usage. The paper notes that healthcare institutions use different quantities of energy from diverse sources, including hydropower, biomass, solar energy, and wind power. However, energy consumption varies from one institution to another, with the number of beds and intensity of healthcare operations, with an average of 0.27 MWh m^2. Moreover, this review also identified various techniques and measures to enhance energy efficiency, such as the variant refrigerant flow technology and the combination of renewable energy sources with diesel generators to reduce the cost of electricity. Overall, healthcare institutions need energy management systems, such as automated energy monitoring technologies, to check the systems' efficiency. The same techniques can also help Middle Eastern healthcare institutions with efficient energy utilization. Ultimately, the literature review aims to introduce an approach that focuses on reducing site-level consumption of energy while increasing the quality of the energy used, hence, helping reduce energy costs while conserving the environment.

1.1 Introduction

Healthcare institutions like hospitals are complex organizations requiring excessive amounts of energy to ensure continuity of service provision (Zaza et al. 2022). Healthcare institutions are subdivided into several functioning departments, each recording different energy consumption rates. For example, Johnson (2010) noted that in the United States, healthcare facilities included physicians' offices, clinical laboratories, outpatient and inpatient centers, and general medical and surgical hospitals, among others. Each facility needs substantial energy for services and activities such as medical scanning and the sterilization of surgical tools by radiation. For example, medical institutions in the USA account for 10.3% of the total energy consumption of the healthcare sector. Such massive energy consumption in medical institutions contributes to increasing environmental pollution levels, among other emissions, and increasing carbon footprints in the atmosphere (Teke–Timur 2014). Notably, energy consumption in healthcare institutions arises from space heating, cooling, ventilation, steam production, equipment usage, lighting, cooking, and domestic hot water.

The size of healthcare facilities, such as hospitals, is a critical predictor of energy usage in healthcare institutions (García-Sanz-Calcedo 2014). Efforts have been made to ensure their sustainability by establishing alternative energy sources and environmentally friendly energy uses to minimize the emissions of greenhouse gases. This paper discusses the literature on energy consumption management, sustainability, and efficiency in healthcare organizations under two thematic areas: hospital energy consumption and energy management, efficiency, and energy conservation strategies in hospitals (Figure 5).

Figure 6. Electricity consumption in hospitals



Source: Shen et al. (2019, 8)

There is a global power problem due to increasing concerns about global warming. Sources of power are under scrutiny to eradicate fossil fuels that emit greenhouse gases. Studies have established mechanisms to reduce energy consumption in all sectors while maintaining and enhancing efficiencies. In healthcare institutions, for example, insufficient energy means the loss of more lives and increased errors. Machines are taking over human labor to ensure effectiveness and efficiency, and as technology is incorporated into medical institutions, energy is a primary necessity. However, technology comes with unprecedented drawbacks, particularly in energy management. Therefore, there is a need to identify the best methods to promote efficiency and effectiveness while educating consumers about power consumption and improving the immediate environment. The present literature review identifies the causes of intensive energy consumption in healthcare facilities and proposes reliable energy management methods. The study investigates

energy consumption in private and public hospitals under secondary and tertiary categories in different climatic zones (globally). These levels may vary depending on the country; in the United States, for example, the secondary and tertiary categories include Level I, II, III, IV, or V, which are defined by the kinds of resources available and the number of patients admitted annually (McClure et al. 2020). Similarly, the study disregards categorization in terms of adult and pediatric facilities and brackets them as one entity under the two major categories, that is, secondary and tertiary healthcare facilities. The primary objective of energy efficiency and strategic thinking lies in reducing site-level energy consumption while increasing the quality of the energy used. The interventions discussed to aid in reducing carbon emissions at healthcare institutions since efficiency drives sustainability.

1.2 Review Methodology

This literature review was conducted through electronic database search engines. All relevant articles related to the topic were included in the study based on specific criteria. The identified research articles were scrutinized, organized, and discussed under two key sub-topics: energy efficiency and utilization in healthcare institutions and energy management, conservation strategies, and hospital techniques. Similarly, the literature reviews included articles from different regions and continents to establish a general viewpoint regarding the topic under investigation. The search was also carried out on national government and healthcare websites across the globe. The healthcare databases used were PubMed, ProQuest, Science Direct, World Health Organization, and CINAHL.

Other websites and corporate websites included in the search were health management.org, eHealth4everyone, Research Gate, the U.S. National Institute of Health, and the National Department of Energy. Also, a manual data search was conducted on Google Scholar as a reference

list of other relevant peer-reviewed articles. The investigation aimed to identify research articles on energy consumption and management in healthcare institutions. Notably, articles written and published within the last ten years were prioritized to attain the objectives of the present literature review. Nonetheless, other essential studies published more than ten years ago were incorporated to reinforce the conclusions and the final findings of the most recently selected articles. The research concentrated on studies focusing on healthcare institutions and was based on secondary data to formulate findings.

3.3 Thematic outcomes from literature: energy consumption, management, sustainability, and efficiency in healthcare organizations

This section presents an exposition of the thematic outcomes from literature under two main topical areas. The first thematic outcome is energy efficiency and utilization in healthcare institutions. Under this section, three sub-elements are covered: the impact of healthcare facility design and the nature of hospitals on energy consumption, the effect of climatic zones on energy consumption in hospitals, and the implication of intensive energy consumption in hospitals for climate change. The second thematic outcome focuses on energy management, conservation strategies, and techniques in hospitals.

3.3.1 Energy efficiency and utilization in healthcare institutions

3.3.1.1. Impact of healthcare facility design and the nature of hospitals on energy consumption

Healthcare institutions like hospitals are the most energy-intensive buildings, and the healthcare industry represents a substantial portion of total commercial building energy consumption in the United States (García-Sanz-Calcedo 2014). Whereas hospitals have several unique features that promote higher energy use, researchers, knowledge designers, and operators have a broad recognition concerning the reduction of energy consumption while maintaining economic benefits

to the healthcare industry. Gatea et al. (2020) say that healthcare services are housed in facilities ranging from tertiary care hospitals with extensive technical facility characteristics calling for the specific infrastructure of the offices and other critical departments. Most hospitals globally use electricity and natural gas as their primary sources of energy (C˘ongradac et al. 2012). In China, for example, Ji et al. (2019) document that the two primary sources of energy are utilized in almost all medical institutions. Most research notes that as the size of the hospital increases, the number of beds per room increases; therefore, power consumption increases as the number of beds grows per hospital. Hospitals with more patient beds record higher energy consumption than those without beds (Tang et al. 2016). The problem of energy use generally attracts a lot of attention, particularly concerning efficiency and the underlying benefits of climate change (Cygan´ska et al. 2021). In modern healthcare institutions, increased energy consumption triggers a continuous increase in electricity costs and the depletion of natural gas, which generate significant environmental outcomes (Bujak 2010). According to Cygan´ska and Kludacz-Alessandri (2021), the determinants of energy consumption in Polish hospitals include the size of the healthcare facility, and the medical activities carried out on the hospital premises; however, a multivariate backward stepwise regression analysis pointed out climate zones as a moderating variable in energy consumption in most Polish healthcare institutions. A similar study by Alhurayess et al. (2012) showed that electricity and heat consumption were directly proportional to the number of beds, doctors, and medical operations performed in any given medical facility.

Similarly, the number and size of the intensive care units and the operating theatres add additional power consumption. Another class is attributed to the hospital's medical activities and general operations. Medical products can be traced by several metrics, including admission or discharge, days of admission, and the total number of patients per day (Silvestro et al. 2017). Energy use in a

healthcare institution tends to increase with the number of medical services provided. Most studies on energy consumption in hospitals have focused on energy usage at a micro level, putting together energy demands and room features in buildings (Cannistraro et al. 2017).

Additionally, previous studies have stressed that healthcare institutions' primary predictors of energy consumption include the size or facility area, the nature (type) of the services, the number of patients, and the employees (Bagnasco et al. 2017). A study conducted in Spain focused on determining sources of high energy consumption among Spanish banks; the results showed that energy usage was directly proportional to the number of employees, the total number of energy-consuming devices, and the size (area) of the banking premises (Gonzalez et al. 2018). An analogous study was conducted among twenty Spanish hospitals (García-Sanz- Calcedo et al. 2019). The study calculated energy efficiency indicators that were a function of several factors, including the building's total size, the number of employees, and the number of hospital beds. According to a Brazilian study, energy consumption variability resulted from hospital size, location, and the number of patient beds in the healthcare facility (Bawaneh et al. 2019).

Similarly, the complexity of the services offered by the hospital contributed to increased energy consumption while providing energy standards coupled with the efficiency of the medical equipment (C˘ongradac et al., 2012). Other significant studies, including García-Sanz-Calcedo et al. (2019) and Wang et al. (2016), attributed the energy consumption in healthcare institutions to the hospital's activity indicators, represented by the total number of annual discharges, operations, hospitalizations, rescue operations, laboratory tests, endoscopy, and births. Regardless, studies focusing on the impact of hospital activity on energy consumption are infrequent.

Importantly, Morgenstern et al. (2016) established that the number of surgical operations is a critical factor in defining power consumption levels because surgery requires a lot of resources, including energy-intensive equipment. Also, advanced medical facilities conduct complex surgical operations requiring expensive equipment, advanced operational systems, critical life-support systems, and sterilization procedures (Dadi et al., 2022).

A critical factor affecting energy consumption is the degree of medical device use, particularly in areas directly associated with treatment and diagnostics (Szklo et al. 2004). The demand for electricity in hospitals is rising due to the introduction of sophisticated digital medical equipment and devices. A dramatic observation of the association between energy consumed during inactivity and usage hours is evident. When not in operation, CT scanners, linear accelerators, and MRI scanners need 64, 36, and 47% of their weekly energy consumption, respectively (García-Sanz-Calcedo et al., 2019; Ma et al., 2022). Many researchers have associated high energy consumption in healthcare institutions with environmental and climatic factors and geographic location (Dadi et al., 2022; Esmaeili et al., 2011). However, in the U.S., massive energy consumption in healthcare facilities is directly attributed to the number of hospital admissions, the region of the hospital, climatic conditions, and the characteristics of medical equipment and activities in any given hospital (González González et al., 2018; Hijjo et al., 2015; Kauko et al., 2014). Dadi et al. (2022) maintain that too much energy is directed toward running medical and monitoring equipment, diagnostics, outdoor and indoor lighting, air treatment, summer air conditioning, and computerized and security systems.

3.3.1.2 Impact of climatic zones on energy consumption in hospitals

Climatic zones are critical in determining energy consumption among Chinese hospitals (Ji–Qu 2019). According to the findings of Ji and Qu (2019), among 100 Chinese hospitals, statistics

indicate a significant disparity in energy use in four selected climatic zones. Hospitals in hot summer and warm winter regions register annual electricity consumption of 140.7 KWh m^2, and this value is reduced by about 67.9%, translating to 45.2 KWh m^2 in cold areas. The study underlined that yearly electricity usage is higher in hot summer and warm winter regions due to increased air conditioning system use (Wang et al. 2016).

Regardless, larger hospitals in warmer climatic regions indicate more energy consumption, and hospitals in hotter climatic zones use more energy than those in the coldest areas (Hijjo et al. 2015). The highest energy consumption costs are observed at specialist hospitals using energy-intensive x-rays, tomographs, or the most sophisticatedly equipped surgical theatres. Operating theatres prove to be the largest determinant in increased energy consumption and the high cost of electricity in Poland (Silvestro et al. 2017). Most of the literature highlights three main characteristics defining energy consumption in healthcare institutions (Dadi et al. 2022; Gatea et al. 2020; González González et al. 2018). The first feature regards the capacity of a hospital, which is determined by the size or total area of the hospital rooms and the number of patient beds in each room. In hot areas, there is a need for increased power use; the most researched energy use predictors include the climatic zone or the location of the hospital. The climatic zone of a hospital determines the lighting conditions and the thermal limits. All three factors above affect overall energy usage regardless of performance and must be accounted for in energy planning in the healthcare industry (Alhurayess-Darwish 2012). Other studies have highlighted weather conditions as a substantial predictor of high hospital energy consumption. Studies agree that climatic conditions significantly influence energy consumption in healthcare facilities (Cygan´ska–Kludacz-Alessandri 2021). According to Aunión-Villa et al. (2021), climate affects energy consumption in several ways due to non-linear energy consumption patterns in response to weather

and climate change (Zaza et al. 2022). For instance, increased air conditioning demands more energy in hot or warm environments.

Likewise, in warmer climatic zones, reduced heating demands lower the need for natural gas, electricity, and oil (Shen et al. 2019). A study in the United States by Wang et al. (2014) concluded that energy consumers in warmer climates and geographic locations depend more on electricity than other available energy sources, such as natural gas. Additionally, in winter, the same consumers use less heating fuel; in summer, cooling systems increase electricity bills (Shen et al. 2019).

While there is agreement between the findings of most researchers in different countries, the energy consumption levels are relatively distinct. For instance, a study by Gatea et al. (2020) showed that in a Spanish hospital for standard operating conditions, energy consumption was 0.27 MWh m^2, 9.99 MWh/worker, and 34.61 MWh/bed, which is less compared to energy consumption in United States hospitals. The geographic location directly influences energy use in Spanish hospitals but does not rely heavily on the number of hospital admissions like in American healthcare facilities (Moghimi et al. 2014). In Malaysia, hospital energy consumption in hot climatic regions is relatively high; therefore, measures are being called to address the surging energy costs. Among Malaysian healthcare facilities, extensive energy consumption is associated with conditioning, lighting, equipment, and lifts (Moghimi et al., 2014).

Nonetheless, in Malaysian healthcare, for example, where the primary energy source is electricity with a supply of close to 75% of the total hospital consumption, the average annual electricity consumed by the hospital was 44,637,966 kWh, of which 63% was used by air conditioning systems and 17% by lighting. This consumption rate is higher than estimated by the Malaysian

rating systems and standards, which recommend an average of 200 kWh m^2 per year—1 for hospitals (Moghimi et al. 2014). Ultimately, much attention has been shifted towards climatic zones as a critical predictor of energy consumption in significant hospitals globally.

Thermal energy is primarily used in air conditioning and heating of medical rooms, sanitary water production, kitchen services, laundry, and sterilization procedures. Energy consumption in hospital premises for these purposes in several states accounts for around 41% of total consumption (Dadi et al. 2022). However, as mentioned by Silvestro et al. (2017) and reinforced by Wang et al. (2016), energy use may vary from one country to another, with examples of Spain (23%), Japan (25%), China (23%), UK (39%), Brazil (50%), Switzerland (47%) with the United States and Canada recording the heaviest annual electrical and thermal energy use per gross floor space for a standard hospital (C˘ongradac et al. 2014).

Elsewhere, Rohde et al. (2015) determined the energy and usage patterns of medical equipment used in hospitals in Norway, finding that the daytime energy intensity of installed medical equipment alone was closing at 90 kWh m^2 per year. Conclusively, climatic zones promote excessive energy consumption in healthcare institutions, regardless of the size or nature of the hospital.

3.3.1.3 The implication of intensive energy consumption in hospitals for climate change

According to Mihut et al. (2018), thermal comfort in a building has a higher priority than efficiency, yet energy efficiency implementation defines the nature of thermal comfort. The literature points out that a structure consists of multiple zones, compounding heat transfer and balance among the zones (Chen et al. 2014). However, the electrical load in one zone tends to increase owing to the differences in the neighboring zones' thermal characteristics, which arise

from diverse occupancy. A German study revealed that hospitals emit the most potentially toxic gases into the atmosphere (González González et al. 2018). The study also showed that German hospitals' annual heat generation per hospital bed needed an energy input of over 17,000,000 MWh. Such high consumption is the main contributor to global environmental hazards due to the increased emissions of toxic gases. Similar discoveries were made in Taiwan, where the installation of heating ventilators and air conditioning systems is the primary predictor of energy consumption (Chen et al. 2014). Energy consumption in healthcare institutions can, however, be reoriented to ensure less consumption and more sustainable healthcare facilities if the proper procedures and strategies are put in place by energy-controlling agencies and related policymakers (González González et al. 2018).

3.3.2 Energy management, conservation strategies and techniques in hospitals

Healthcare institutions such as hospitals incur colossal energy bills, raising a concern that researchers, technologists, and policymakers need to prioritize. The increased development of information and computerization has played a critical role in the automatic control and management of human activities in all sectors. Numerous strategies and interventions have been proposed to reduce energy consumption in healthcare facilities. The methods aim to restructure healthcare power consumption by focusing on hospital building designs, room facilities, and other power-intensive activities (Kolokotsa et al. 2012). Most of the techniques proposed include control algorithms and the combination of different types of actuators and sensors for optimizing various sub-systems, which may consist of ventilation, lighting, cooling, and heating; use of alternative water sources enhanced Hybrid Automatic Voltage Control (HAVC) systems; renewable energy and green building initiatives (Kolokotsa et al. 2012; Papadopou- los 2016).

Cˇongradac et al. (2014) categorized the available ways of increasing energy efficiency into two classes. These classes include controls at the level of the room and the level of the entire object. Moreover, intelligent control in a single room can be focused on room heating, lighting, and ventilation. This method of managing energy consumption is related to ventilation control through monitoring carbon (IV) oxide concentration levels in the HAVC system and the room. Equally, such interventions can improve humidity and reduce room heating by controlling external blinds (Cˇongradac et al. 2014; Papadopoulos 2016).

Cˇongradac et al. (2014) suggest that building modeling be simplified so that the entire architecture is measurable and consists of known figures of values that include object dimensions and the total space, room types, and average temperatures, among other factors (Santa-mouris 2012). The previous strategy aimed to increase the usability of the buildings while allowing for verification, validation, and the practical uses of the buildings, what the authors refer to as 'the object.' As proposed by Cˇongradac et al. (2014), the most suitable method of energy saving in a hospital is installing a thermostat, meaning heating is reduced while cooling is increased, which saves close to 10% of the total energy used in heating. Other methods of saving energy in a hospital, as proposed by Kolokotsa et al. (2012), include time schedules, timers, and heating curves to calculate energy savings for the entire building. The methods' implementation is cost-efficient and has simple procedural steps (Kolokotsa et al. 2012; Papadopoulos 2016).

Notably, healthcare facilities are energy intensive owing to the necessity of increased micro-climatic control, contemporaneity, strict set limits for humidity and temperature, the need for air conditioning within the patient rooms, and exceptional facilities within the hospital like the operation of scanners and theatrical equipment (Ascione et al. 2013). Hence, there is a need to focus on energy-saving approaches that can be achieved by improving the thermal and physical

features of the building. Ascione et al. (2013) proposed that energy consumption in healthcare institutions can be minimized by reevaluating the HVAC systems. The HAVC method is effective in reducing energy consumption, as evident at the National Institute for Cancer Treatment 'G. Pascale' in the Mediterranean region (Ascione et al. 2013). The system improves the indoor comfort of patients and hospital employees while reducing energy demands from organic or fossil fuels. The entire design encompasses all the components of the building, starting with the external walls, which are designed to reduce the overall thermal transmittance by approximately 2.86 W m^2K). In comparison, windows have been designed with air cavities and metal frames, allowing adequate ventilation with approximately 3.2 W m^2K thermal transmittance. This approach enables the buildings to use less energy to ventilate rooms in all climatic and weather conditions.

In hot areas, the heating system is redesigned and replaced with fossil fuel instead of electricity to reduce energy usage in heating and cooling. The central heating system consists of four gas boilers rather than electric coils. All four boilers produce nearly 8,024 kW of energy (Gaspari and Fabbri, 2017). This amount of power provides steam used in the heating plant, with each steamer producing 2,000 kW of thermal energy and DHW circuits using dedicated exchangers. Such orientation allows the heating system's exchangers to send hot water to the distribution loop, which helps serve all the utilities for the entire hospital building's heating space. For cooling purposes, cold water production is partly centralized and initiated by two chillers; refrigerators are also installed to run fan coils (Ascione et al., 2013). HAVC systems reduce annual power consumption in refurbished buildings. In hot areas, the heating system is redesigned and replaced with fossil fuel instead of electricity to reduce energy usage in heating and cooling. The central heating system consists of four gas boilers rather than electric coils. All four boilers produce nearly 8,024 kW of energy (Gaspari et al. 2017). This amount of power provides steam used in the heating plant, with

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The sustainable development model aims to ensure that managers of healthcare facilities effectively implement strategies that minimize costs incurred by hospitals while allowing efficient and effective use of the available resources (Rodríguez et al. 2021). Nonetheless, the implementation of sustainable development focuses on essential issues like patient logistics, energy and water efficiency, effective waste management programs in healthcare facilities, source reduction approaches, and green purchasing. Such techniques allow healthcare institutions to contribute towards enhancing sustainable development in the healthcare sector. Hospital managers should involve organizational stakeholders to achieve energy savings, improve hospital waste efficiency management, conserve water, and monitor other general expenditures. The involvement calls for appropriate training of hospital staff and increasing energy-saving awareness (Rodríguez et al. 2021). A proposal by the World Health Organization concerning the Healthy Building Initiative contributes to a crucial improvement in sustainable healthcare development, particularly in healthcare systems (Rodríguez et al., 2021).

Optimizing energy efficiency within hospitals and healthcare facilities is a primary issue in the energy conservation field (Rodriguez et al. 2020). However, despite the available robust technologies, several barriers hinder the vertical development of sustainable and energy-saving

interventions. These barriers include but are not limited to economic incentives, appropriate technology, and insufficiently enforceable regulations and laws from policymakers and local authorities (Rodríguez et al. 2021). Other barriers include technical ones related to inadequate information and knowledge and technological irreconcilability. The incompatibility of up- coming energy technologies with the present building becomes a critical obstacle to installing modern energy-saving systems such as HAVC (Wang et al. 2016). In Chinese public hospitals, Wang et al. (2016) recommended that hospital builders deploy best practices and employ demonstrable energy-efficient building projects that reduce high energy demands. Policymakers in China need relevant laws to moderate the pricing laws while providing alternative energy sources like installing biogas plants for efficient hospital waste management or recycling, reducing greenhouse gas emissions (Tong 2020).

Currently, the green building concept is the societal consensus. Applying energy conservation and management systems is critical for establishing and constructing green hospitals (Mihut et al., 2018). This approach requires the integration of information technology and energy management. Most industries have shifted attention towards the green concept for energy management, sustainability, and reduced energy costs (Sahamir et al., 2019). Green hospitals call for restructuring buildings to save water, electricity, and other resources. Pan et al. (2018) propose a model for establishing green hospitals where the system aims to improve energy supply reliability, progress operation management levels and equality, shorten power failure times, and apprehend the intelligent power supply system. The strategic project named the hospital electric energy management system entirely relies on the theory and application of green building concepts. The proposed system incorporates several functions and setups to guarantee safe transmission, distribution, and use of electrical energy, but the power supply system has to satisfy particular

power quality requirements (Tong, 2020). Depending on the actual situation of the hospital premises and the national power standards for the Chinese power systems, the proposed technique monitors the most critical parameters of the power supply system. The system monitors the operational status of the analogue output of the low-voltage distribution system. Every individual analogue quantity is effectively reflected. The analogue quantity includes three-phase voltage on the incoming line, three-phase current on the incoming line, transformer temperature, significant line harmonics, system active power, reactive power and apparent power, system active power, reactive power, system frequency, and system power (Liu et al., 2016).

Moreover, the hospital electric management system effectively monitors all stage quantities of the low-voltage power distribution system safely, reliably, and automatically, like switching signals and position signals of circuit breakers. The model provides safe, reliable, economical, efficient, and scientific energy use. With the development of green hospitals, the electric energy management system of hospitals can play a critical role (Huo, 2021).

García-Sanz-Calcedo (2014) established a direct relationship between energy consumption and the number of healthcare users. Furthermore, the amount of energy used daily in a hospital directly correlates with the hospital's size and design. Therefore, García-Sanz-Calcedo (2014) suggested optimizing the building floor and argued that appropriate planning of the architectural infrastructure is a critical element in meeting energy efficiency necessities. There is a pressing need to minimize the amount of unnecessary space within a hospital building to reduce energy consumption. The strategy can be achieved by building designers by reducing hallways and other unnecessary passageways, which account for approximately 20% of power consumption in healthcare facilities. Designing small buildings for the healthcare industry to control power

consumption sets new challenges for reducing the number of services, employees, and patients (Johnson, 2010).

The concept of the green hospital has been adopted in American hospitals as well, but with less efficiency (García-Sanz-Calcedo, 2014). Green building initiatives are essential to reducing environmental pollution from hospital waste. Johnson (2010) mentions that the United States medical industry produces nearly two million tons of waste annually, with harmful gas emissions into the atmosphere and contributing to global warming. The green policy aims to reduce energy usage. An example of such a hospital is Dell Children's Medical Center in Austin, Texas, with over five courtyard healing gardens characterized by native plants. As per Johnson (2010), other green policies include recycling hospital waste, using highly recyclable materials in construction, and establishing ponds that capture runoff water from buildings. The U.S. Green Building Council's LEED silver standard is critical in ensuring healthcare institutions adhere to green policies (Billanes et al., 2018; Hendron et al., 2013).

Billanes et al. (2018) state that maintaining the general concept of bright green buildings does fit hospital buildings, given that procedural guidelines are followed in renovating energy-efficient healthcare facilities. Therefore, Billanes et al. (2018) proposed the establishment of a bright green building that uses both technology and processes to create a safe, healthy, and comfortable facility, enabling productivity and well-being for its beneficiaries (Chías et al. 2017; Lee et al. 2019). Bright green buildings are energy efficient since they adopt sustainable designs and standards to allow for indoor air quality, minimize energy consumption and carbon emissions, and provide reliable power. The initiative enables the installation of renewable energy systems like wind turbines and solar P.V. storage to replace diesel and electricity (Hijjo et al., 2015).

Teke and Timur (2014) proposed a more advanced energy-saving model incorporating HAVC technology. The system requires the use of energy-efficient motors and variable-speed drive systems. The system improves energy savings and reduces power consumption, particularly in HAVC systems in healthcare organizations. Notably, the proposed plan contains a water-cooled chiller instead of individual designs. The central system consists of an air conditioning system that utilizes equipment to distribute the cooling media to exchange heat while supplying air from one point to another in the hospital building (Teke–Timur, 2014).

Similarly, the HAVC system includes a boiler heating unit, the ventilation unit consists of fans, and the cooling unit consists of a chiller. Both cooling and heating are used in different weather conditions. The heating function is used in cold weather or climates, and the cooling unit is used in warm weather and hot climates, which addresses the issue of excess power consumption due to the challenges of climatic zones (Teke–Timur, 2014, p. 225).

Wang et al. (2016) argue that retrofit projects are based on consolidated and simplified methods, including surveys, energy consumption estimates, predesign, related benefit estimation, final design, construction, and effectively achieved energy-saving assessments. The analyses are often made difficult by heterogeneous and incomplete reference data. For example, calculation tools are based on standard climate files, which, because of climatic fluctuations, can also give values significantly different from the periods considered experimental references. Therefore, it is recommended that hospital buildings be built on HAVC models with clear guidelines for recycling and using solar energy to replace hydroelectric power and natural gas as primary energy sources.

Energy management in healthcare organizations calls for close monitoring from the organization's management team. According to García-Sanz-Calcedo et al. (2017), the organization needs to

undertake maintenance audits to determine if the management of the actions conducted in the hospital building is adequate and to anticipate future demand trends. Silvestro et al. (2017) illustrate that maintenance and frequent monitoring of energy consumption while filtering out unnecessary energy use stimulated an average annual decrease of approximately 20% in the demand for corrective maintenance with a yearly saving of 500 MWh in energy consumption. Also, the report demonstrated a reduction in the emission of greenhouse gases giving an average saving of 75,000 euros in year 1, without additional costs or extra investment (García-Sanz-Calcedo – Gómez-Chaparro, 2017).

The establishment of alternative water sources enhances hospital energy savings, as demonstrated by (Silvestro et al., 2017). Alternative sources may include desalination water plants that use less energy than the standard water treatment procedures in hospitals. The literature directs that reclaiming onsite alternative water sources decreases the need for offsite desalinated water, decreasing energy consumption, particularly for irrigation water end use, unlike water features, which are energy intensive even for an onsite system. The more water used, the better the energy ratio (Seguela et al., 2017b). This element highlights the advantage of using onsite alternative water sources to minimize desalinated water and energy waste (Seguela et al., 2017a). In addition to alternative water sources, hospitals are directed to use renewable and solar energy for daily operations, which proves cost-effective (Kantola et al., 2013; Nourdine et al., 2021).

3.4 Conclusions and Recommendations

Healthcare facilities are among the most energy-intensive of all commercial buildings. The literature shows that hospitals need enormous energy to keep them functioning and deliver the quality patient services they desire. However, the most life-saving equipment and critical rooms are the key contributors to excess power consumption. Increased number of patients, building size,

number of employees, climatic conditions, and building design are the most underlined determinants of power consumption in healthcare institutions. In addition to power consumption, the literature emphasizes environmental hazards caused by healthcare institutions, including poor waste management and the release of greenhouse gases into the atmosphere. Many hospitals' current energy consumption rates can be minimized by adopting robust techniques and policies. For instance, most of the literature proposes adopting the green concept, which allows for the establishment of sustainable and energy-efficient hospitals. Proper waste management, adoption of advanced HAVC systems, recycling waste materials, use of recyclable materials in construction, use of alternative energy and water sources, and use of a renewable energy source are among the leading proposals to reduce power consumption in healthcare institutions. Conclusively, many efforts and strategies have been established to overcome the energy consumption challenges in hospitals, such as insufficient funds and improper management, slowing the adoption and implementation of the interventions. Today, few hospital buildings have adopted green building technology, implying that policymakers and authorities must invest more in establishing environment-friendly healthcare institutions.

From environmental and energy standpoints, and under the issue of energy efficiency in healthcare institutions, healthcare facilities need to reduce unnecessary spaces within the hospital building to reduce power consumption. Furthermore, hospital premises need to firmly adhere to the policies governing environmental conservation through renewable energy sources and invest more in solar energy. Through recycling and proper waste disposal, hospitals can reduce the emission of greenhouse gases into the atmosphere.

The literature suggests that healthcare facility managers must stress energy management as it is more effective in reducing energy usage, particularly in small hospital buildings. Therefore,

concerning energy efficiency management in public governance, health centers with similar features and equipment should have directors who effectively manage the operational costs of the building. Ultimately, the green building concept tends to transform all healthcare organizations in terms of energy efficiency and sustainability. Healthcare organizations need to consider renovating hospital buildings to meet the standards of green building initiatives for managing energy consumption and the environment.

Shen et al. (2019) provide unique and applicable energy-saving approaches in healthcare institutions. For instance, the authors argue that hospitals need to find better ways to control air conditioning systems' energy use. Notably, the fresh air volume of the central air-conditioning system is constant in most large healthcare facilities; thus, it is impossible to adjust the new air volume according to the actual flow of people. Therefore, there is a pressing need to change the air supply amount according to the indoor carbon dioxide level to save energy consumption for fresh air treatment. Similarly, there is no distinction between a 24-hour operation and operating time-only operation in the air conditioning and hot and cold-water transmission and distribution systems. Therefore, the hot and cold water in the main pipe requires 24 hours of continuous circulation, resulting in a waste of water pump energy. Reasonable divisions must be made according to usage conditions, like outpatient service and office work, which are only operational during working hours.

As noted by many scholars, lighting systems consume more energy in hospitals (García-Sanz-Calcedo, 2014; Cygan´ska & Kludacz-Alessandri, 2021; Alhurayess & Darwish, 2012). Shen et al. (2019) propose a more robust method of minimizing such energy waste. According to the researchers, the lighting of the medical building is mainly controlled by the personnel in each functional area, and the lighting control circuit in the public space is integrated. It cannot be

adjusted according to the needs of the sub-regions. It is recommended to use multiple channels to control the lighting in each public area independently, to rearrange the illumination in well-lit spaces, and to use light sensors to achieve energy savings automatically. In addition, it is found that garage lighting is always on for 24 hours, even when no car enters the garage. Besides, in the open area, the lights are turned on during the day, wasting energy. Therefore, it is paramount to use a microwave induction system. A light sensing system is applied to the outdoor lighting of the garage, and the lighting is automatically powered off in the daytime. Conclusively, the literature review has detailed reliable energy efficiency and strategic thinking interventions that minimize the site-level consumption of energy while increasing the quality of the energy used. The interventions discussed to aid in reducing carbon emissions at healthcare institutions and illustrate that efficiency drives sustainability, which is critical for the management of healthcare institutions.

4 Challenges And Opportunities in Healthcare Reforms in Pre- and Post-COVID-19 Crisis: A Case of Jordan

Abstract

The COVID-19 crisis presented devastating effects on global healthcare, and Jordan was no exception. During such unforeseen challenges, attention shifts to healthcare leadership and management. However, limited research explored the leadership adjustment in Jordanian hospitals during the pandemic. Therefore, this study examined the challenges and opportunities that arose alongside the outbreak of the pandemic in Jordanian hospitals from the leaders' perspectives. Semi-structured interviews were conducted with healthcare managers in three Jordanian hospitals, focusing on three key areas: healthcare reform integration, the impact of the COVID-19 crisis on hospital performance and healthcare quality, and management practices to handle the pandemic. Interviews were transcribed and thematically analyzed. Eleven hospital managers in seven administrative positions were involved. Three thematic outcomes were noted regarding the integration of healthcare reforms into the Jordanian healthcare system: sources of reforms, challenges of reform integration, and timely integration of the reforms. Positive impacts of the crisis on the Jordanian hospitals' performance and quality of healthcare service delivery, which are considered opportunities, resulted in three thematic outcomes: infection control protocol, staff education, and patient management. On the other hand, three thematic concepts emerged as challenges of the COVID-19 crisis: workload, stress and fatigue, and staff shortages. Lastly, this study noted three thematic outcomes regarding management practices adopted by the Jordanian healthcare systems to deal with the pandemic: staff training, monitoring, and social support.

4.1 Introduction

The effects of COVID-19 crisis were directly felt in healthcare, touching different aspects, such as resources, health workers well-being, and leadership adjustment (Ahern & Loh, 2021; Grimes et al., 2022; Sabetkish & Rahmani, 2021). Leadership adjustments, notably in the managerial domain, were necessary to contain these effects (Lobdell et al., 2020). These leaders had to come up with or give direction toward implementing measures to contain the virus. Most of the adaptive measures were formulated by the management before being communicated to individual healthcare facilities in a process that descended from top management to subordinate staff. This approach acknowledges the critical role and diverse managerial approaches of healthcare leadership in crisis management (Aitken & von Treuer, 2021; Csedő & Zavarkó, 2020; Grimes et al., 2022).

The World Health Organization can support the national healthcare systems with crisis management strategies. However, the operations and management process that proceeded from the WHO communications depends on the health management system of every country. The Ministry of Health recommends many health reforms alongside the management in individual hospitals, which can also develop local strategies (Woiceshyn et al., 2022). Nevertheless, healthcare systems operate on a delicate balance, weighted by resource availability, calling for critical change management skills to lead single, especially during crises (Csedő et al., 2022). The same phenomenon is likely in Jordan, where resources used in healthcare are often budgeted for at the beginning of every financial year. While Jordan responded well to the COVID-19 crisis, it also faced healthcare management challenges during the pandemic. Some of these challenges included healthcare capacity and access to healthcare services. Hence, unexpected changes would lead to overstretched resources and efficiency for every healthcare staff.

4.2 Literature review

Hiam and Yates (2021) indicate that healthcare reforms have dotted the history of healthcare leadership and service provision for centuries, and there are several examples where major health reforms instantaneously sprouted after severe plagues, revolutions, and state crises. These reforms align with the theoretical perspective provided by Scheidel (2018), who noted the critical role played by plaques and revolutionary changes in healthcare operations. One of the historically notable healthcare reforms is the development of Universal Health Coverage (UHC), which came up in many countries to help critical health situations brought about by war and calamities (World Health Organization, 2019). Accordingly, Barron and Koonin (2021) have noted the possible rise of significant health reforms during and after COVID-19.

The spontaneous rise of health reforms after the crisis presented by COVID-19 could be speculative; however, the development of micro reforms and managerial strategies are apparent in every healthcare center during COVID-19 (Collins et al., 2020; Leite et al., 2021). In Jordan, for example, healthcare leaders reinforced hospital hygiene practices to reduce the spread of infections alongside the other recommendations proposed by the WHO (Al-Tammemi, 2020; Singh, 2020). Developing policies and strategies and their subsequent uptake in individual healthcare institutions is a key indicator of change receptivity by Jordanian healthcare systems (Al-Tammemi, 2020; Zaid et al., 2020). Healthcare management and leadership play key catalytic roles (Dent et al., 2013). Nevertheless, the exact principles and approaches Jordanian healthcare leaders use to accept and implement significant healthcare changes and reform policies are yet to be explored.

The 2019 crisis in healthcare brought several changes to healthcare operations, which have subsequently affected the nature and quality of healthcare service delivery (Hu & Zhang, 2021; Korneta et al., 2021; Liu et al., 2022). The effect of the crisis on hospital performance and quality

of healthcare service delivery can be traced to the direct impact of the pandemic on health workers and health resources (Ayele et al., 2021; Palinkas et al., 2020). Regarding the effect on health workers, studies indicate that COVID-19 negatively affected the overall psychosocial well-being of healthcare workers (Shreffler et al., 2020; Tan et al., 2020). For instance, Alnazly et al. (2021) in Jordan indicated that participants had displayed extremely severe depression (40%), extremely severe anxiety (60%), and severely distressed behaviour (35%). Health workers with these cases of psychological discomfort are less likely to provide adequate services, and hence, this affects the overall performance of the healthcare institution.

The other negative effect of the pandemic is the overstretched healthcare resources. Al-Qudah et al. (2022) examined how the COVID-19 crisis affected resource allocation and demands in Jordan's healthcare system. They reported a significant "decrease in the demand for health services at the hospital including admissions, emergency department visits, outpatient clinic visits, surgeries, and radiology during the study period" due to the overstretched resource demands (p. 193). Moreover, the effect of the crisis on healthcare operations can also be noted from its overall effect on economic activities. Several studies have reported the impact of the COVID-19 crisis on many economic predictors, such as labour and financial market, as well as agriculture, which collectively contribute to the national Gross Domestic Product (Deshpande, 2020; Mishra et al., 2020; Ramakumar, 2020; Kaye et al., 2021).

Despite the negative implications, there are also chances of eventual positive impacts notable in the quality of healthcare service delivery. For instance, there have been improvements in hospital antiseptic techniques and increased hospital beds to accommodate situational demands (Kokudo & Sugiyama, 2021). Therefore, it can be hypothesized that there have been changes in the hospital performance and quality of healthcare service delivery over COVID-19.

Like any other business setup, healthcare management runs through hierarchical levels whereby the bottom managers receive instructions from the top management structures (Green et al., 2017). Nevertheless, the competencies and behaviours of leaders vary from one healthcare institution to another. Also, it is important to consider that different leadership styles and techniques resonate with varying management practices. For instance, management practices like team motivation and empowerment are part of the transformational leadership approaches (Gabel, 2013; Weberg, 2010). However, the devastating impacts of the COVID-19 crisis could have led to shifts in the leadership principles in healthcare (Csedő et al., 2022).

According to Lobdell et al. (2020), one of the promising ways to deal with the managerial challenges during the 2019 crisis is to improve "prioritizing engaged leadership and emphasize a more team-oriented approach to care delivery and collaboration across institutions" that can establish short-term strategies and long-term plans. The study further recommends implementing regular progress reviews and improving communication, staff empowerment, and training. These changes result from the radiating pressure that the pandemic created beyond the scope of traditional management approaches (Crain et al., 2021).

Fusion cells offer valuable tools and have also been named as promising options for effective leadership in managing pandemic challenges in healthcare systems (Fussell et al., 2009). As such, Lobdell et al. (2020) indicate that healthcare leaders need to decentralize authority, empower their employees, develop avenues that enhance adaptable decision-making, and understand the needs of healthcare stakeholders. Overall, Jordanian healthcare leaders applied diverse management practices before and after the 2019 crisis.

This study aimed to examine and identify the challenges and opportunities that arose alongside the pandemic in Jordanian hospitals to provide current evidence for making managerial adjustments in delivering healthcare services in Jordan.

4.3 Methodology

4.3.1 Research design

This study applied the qualitative research methodology involving semi-structured interviews among the management of selected Jordanian hospitals. Scholars have presented various perspectives on qualitative research methodology and interviews, including the benefits and roles. Interviews have been used in qualitative research as a rich source of data collection. They can be structured, semi-structured, or deeply structured, depending on the researchers' interests. This study used semi-structured interviews to explore the managers' perceptions about the challenges and opportunities in healthcare reforms in pre- and post-COVID-19.

4.3.2 Participants and data collection

The participants involved various managers recruited from various hospitals in Jordan. Eleven managers were selected from three public hospitals in Jordan. These participants were interviewed face-to-face, and each participant was asked questions privately to obtain their perspective on the phenomenon. These participants include two administrative managers, two head nurse managers, three quality department managers, one head of the emergency department, one head of one of the corona departments, one human resource manager, and one infection control director (Table 8). Each interview lasted for between 40 and 60 minutes.

Table 8. Interviewee Demographics and Professional Roles

Participants Coded Names	Administrative Position	Gender	Years of experience
1. PAD1	Administrative Manager	Male	14
2. PAD2	Administrative Manager	Male	10
3. PHN3	Head Nurse Manager	Male	12
4. PHN4	Head Nurse Manager	Male	13
5. PED5	Head of Emergency Department	Male	14
6. PHC6	Head of one of the Corona departments - 2021	Female	18
7. PHR7	Human resource manager	Female	9
8. PHR8	Quality department manager	Female	12
9. PQD9	Quality department manager	Male	15
10. PQD10	Quality department manager	Male	17
11. PIC11	Infection Control Director	Female	17

4.3.3 Interview guide

Semi-structured interviews were guided by specific questions that focused on three main areas. The interview questions include, '*How can the hospital integrate the Jordan healthcare reform into the daily operations?*' '*Have there been changes in your hospital performance and quality of healthcare service delivery over the time of the COVID-19 crisis?*' and '*What management practices do you employ in running the daily operations of this hospital before and after the COVID-19 crisis*?' However, there were further sub-questions under each question to gauge the participants' clarity about the item (Appendix B).

4.3.4 Data coding and analysis

Data were analyzed using a thematic qualitative approach, extracting codes and assembling them as themes. However, the responses from the human resource manager were handled separately from the other leaders' responses. Principally, theme analysis involved encoding qualitative information. However, scholars have further explained that the process goes beyond the generation of codes to identification and reporting of patterns, in which the analysis compares "relative

frequencies of themes or topics within a data set, looking for code co-occurrence, or graphically displaying code relationships" (Guest et al., 2012, p. 219).

Open coding was applied, whereby the interview transcripts were carefully reviewed to identify key phrases, sentences, or sections that are significant or relevant to the research objectives. Each highlighted segment is assigned a short, descriptive label' that gives its meaning to the sentence. In some cases, the researcher applied in vivo coding where the participants' own words were directly quoted when they were powerful and could not be altered. As such, the central focus of coding was to break data into manageable pieces without grouping or categorizing. Subsequently, each code was crafted to clearly reflect the core idea of the corresponding text, forming the foundation for further thematic analysis. These codes were generated after the specific themes were 'inductively' developed.

The process began with transcription, which was done verbatim. The scripts were then read keenly repeatedly while underlining the key phrases and highlighting the crucial sentences related to the research questions. Henceforth, the key phrases generated the codes, which were manually listed in separate columns. These codes were then grouped under specific themes, further reviewed, and defined according to the research questions. Themes were developed using the three principal interview questions.

4.4 Results and Discussion

4.4.1 Integration of reforms

Concerning the integration of reforms, interviewees were asked whether there were ready strategies to change their hospital operations. To this prompt, three thematic outcomes described the sources of healthcare reforms in Jordanian hospitals. These included the Ministry of Health

(MOH) strategies, internal meeting resolutions, and hospital administration. Most respondents explained that they drew their reform policies from the MOH directives before changing hospital operations. For example, PAD2 explained that "…we as administrative managers naturally applied the MOH strategy and quickly responded by preparing the hospital to receive a high number of infected patients." The majority of the respondents expressed similar opinions during the interview. However, some interviewees also explained that they drew their reform guidelines from internal meeting resolutions. For instance, PHN4 indicated that they often hold internal meetings to discuss hospital operational changes. Lastly, as an example, one interviewee noted that they sometimes utilized reform strategies from the hospital administration.

The interviewees were also asked when and how they transformed the reform strategies into practical operations. To this prompt, three themes were noted: immediate application, staff training, and MOH approval. Most interviewees indicated that they readily apply the MOH policies and strategies as they come. Notably, the MOH policies for infection control were naturally used by various hospitals in Jordan. However, some respondents explained that they sometimes have to make policy change recommendations that suit their hospital and seek MOH approval before implementation.

Additionally, the interview established that the MOH reforms were implemented through staff training and education. Various departments conduct training to ensure adequate preparedness among the staff. In some cases, the hospital management first reviews the reform strategies before staff is trained.

The other significant focus area was monitoring and evaluating the policies and policy strategies. This study established four significant evaluation structures from the respondents: hospital

management, quality control department, departmental heads, and infection control department. It was noted that the departmental heads, quality control, and hospital administration monitored and evaluated the policies. However, in some cases, especially those related to the COVID-19 crisis containment, the evaluation and monitoring are done by the infection control department.

Participants were also asked about their perceptions of the effects of implementing healthcare strategies on the stakeholders, and four themes emerged, including patient satisfaction, staff distress, staff workload, and hospital reputation. Regarding staff distress, it was indicated that implementing the COVID-19 containment strategies led to stress and anxiety among the staff. Another interviewee indicated that stress and anxiety among staff arise when they are isolated or quarantined and cannot meet their family members.

Patient satisfaction was also noted as a significant theme. Implementing the reform strategies during the crisis improved some aspects of patient care services. For instance, PHR8 said, "…I think it was good since we implemented strict and new infection control and quality strategies that reduced the risk of hospital-acquired infections." Accordingly, patients were safer from hospital-acquired infection than before the COVID-19 crisis. However, some interviewees indicated a decline in patient satisfaction. For example, PAD1 indicated that "non-COVID-19 patients whose elective surgery was canceled or did not receive the routine healthcare services, I believe they did not feel satisfied." At the same time, as an example, PHN3 also indicated that patients had to wait for the services longer than usual, making them feel weary.

Regarding staff workload, it was noted that healthcare workers felt the effect of implementing change strategies within the Jordanian healthcare system.

4.4.2 Changes in hospital performance and quality of healthcare service delivery during COVID-19

Many changes were also reported regarding the quality of healthcare service delivery in Jordanian hospitals during the COVID-19 crisis. Accordingly, three themes were noted: infection control protocol, staff education, and patient management protocols. Infection control mechanisms significantly improved the Jordanian healthcare system following the outbreak of COVID-19. The improvements were due to the policies from MOH. Moreover, there were also changes in staff education and training. The Jordanian hospitals readily trained the staff to comply with the new guidelines regarding COVID-19 management protocols. Lastly, hospitals also changed their patient management and handling procedures to prioritize patient care. For example, PQD10 indicated that their unit prioritized patient care while many elective surgeries were canceled.

The interviewees were also asked about the problems and opportunities from the operational reforms in Jordanian hospitals during the COVID-19 crisis. Accordingly, six themes emerged, which cover three significant problems and two primary opportunities. The thematic issues include workload, stress and fatigue, and staff shortages.

Regarding the problems that emerged, workload was the most frequently mentioned. The interviewees indicated an increased workload with the outbreak of COVID-19 due to an abrupt increase in patients. Moreover, there was a significant staff shortage as some healthcare workers contracted the disease and had to be quarantined. The respondents also mentioned stress and fatigue among staff, which are also linked to the changes in patient handling procedures.

At the same time, Jordanian hospitals had an opportunity for growth during the adjustments to contain the increased number of patients. Three thematic opportunities were noted: more staff, resilience, and training. The interviewees indicated that the management had to hire more health

workers to adjust to the additional workload. However, this was only achieved in some hospitals. Nevertheless, additional staff translated into better healthcare services once the patient surge flattened. The second opportunity that emerged from the interview was resilience. These hospitals developed some form of preparedness for such unforeseen crises. For example, PQD9 indicated that they have gained experience in dealing with such cases should they emerge again. At the same time, there is some preparedness to meet such cases since there is better hospital infrastructure with beds and medical devices. Lastly, the interviewees considered staff training an opportunity. The staff was adequately trained in hospital infection control, which they would apply in general hospital operations to reduce cases of infections.

The sustainability of these opportunities was also examined, and the interviewees gave responses clustered under one thematic outcome – staff training. The interviewees indicated that the opportunities are sustainable in the long run since the staff has been trained in the basic concepts regarding the care for highly infectious diseases such as the COVID-19 crisis. For example, PAD1 indicated that the staff was trained through seminars, and the management made a strong positive relationship with them, which is likely to have a long-lasting impact on the training deliverables. These follow-up efforts ensure the sustainability of the noted opportunities.

4.4.3 Management practices in running the daily operations in Jordanian hospitals before and after the COVID-19 crisis

The last section of the interview examined the management practices and hospital operation procedures at Jordanian hospitals and whether they changed due to the COVID-19 crisis. The interviewees concentrated on the current management practices, which came as a result of crisis management measures. Three themes were noted: staff training, monitoring, and social support.

The management adhered to staff training and education to build a solid foundation of infection control and communication skills within the hospital. For example, PQD10 indicated that they trained the staff after the pandemic's peak to empower them toward daily hospital operations. Regarding staff monitoring, PHN4 indicated that the management improved the monitoring practices to ensure that the staff maintains proper infection control practices. It was also noted that the concept of staff training and education during the pandemic as a critical management practice in Jordan was apparent. Moreover, social support also emerged as a management practice in Jordanian hospitals during COVID-19.

On the same note, for instance, PAD2 indicated that they developed a close relationship with the staff, expressing that they "go to the hospital, talk to all the staff many times… listen to them when they are stressed or complain about the workload." Lastly, monitoring and evaluation of the staff also improved among the hospital management during COVID-19. The monitoring was enhanced to ensure that the staff adhered to the infection control practices.

Regarding the hospital operation procedures, a number of changes were noted in the interviewees' responses. Under this item, four themes emerged, including patient management policy, staff training, staff recruitment, and infection control practices. Staff training was improved to ensure compliance with the infection control requirements of the MOH policies. It was also reported that there were changes in the infection control practices whereby healthcare workers and visitors had to wear PPE, be vaccinated with two doses, and be double-screened before entering hospitals.

Moreover, there were changes regarding patient discharge policies to accommodate more patients. For example, PAD1 indicated that "we needed space, so we discharged patients who did not need an urgent operation. We closed the external clinics." In another example, PAD2 expressed that they

changed patient handling approaches, whereby many patients who needed an unnecessary surgical or elective operation were canceled. These practices were opted to reduce the number of patients due to the strained healthcare resources. On the same note, staff recruitment improved to provide care to more patients. For instance, PAD2 cited hiring more specialized physicians from the army hospital. Staff training was also noted as a significant theme, which emerged from the regular seminars and training that the management delivered to the staff to keep abreast with the MOH policies.

Overall, the COVID-19 crisis entirely affected the regular operations of hospitals. The effect was apparent during the peak when the Jordanian hospitals had an overwhelming patient influx. The healthcare system, notably the leadership, had to develop strategies to contain the changes. Nevertheless, unexpected operational changes have always characterized the healthcare environment, and some scholars have suggested the application of Artificial Intelligence (AI) to help "focus on risk identification, management, and mitigation" (Chen & Decary, 2020; Dixit et al., 2021). This study noted three significant concepts related to crisis and leadership practices in managing the pandemic in Jordan – the integration of healthcare reforms, adjusting to COVID-19, and implementing new leadership practices.

4.4.4 Integration of healthcare reform into the daily operations of Jordanian hospitals

Systematically, the Jordanian hospital leaders regularly apply the policies and recommendations or strategies from the MOH. However, this study also established that there are instances when health leaders depend on internal meetings to develop institution-specific strategies, which often rely on leadership contributions. The resolutions from hospital management frequently shape the daily operations, adjusting to the dynamic demands of healthcare services. Nevertheless, Jordanian healthcare leaders regularly monitor the policies and strategies from external bodies, such as

WHO, before implementing them. Hospital management, the quality control department, departmental heads, and the infection control department perform the monitoring.

For the COVID-19 crisis policies communicated by the WHO and MOH, the Jordanian healthcare leaders adopted and implemented various significant changes, which spanned diverse areas, such as surgery and patient admission, as well as infection control practices. For example, in Jordan, elective surgical plans were canceled. In the same way, Smallwood et al. (2023) reflect on the effect of COVID-19 and report canceling elective practices. The same fashion of prioritizing some healthcare practices while canceling others during the pandemic is apparent (Basu et al., 2020; COVIDSurg Collaborative, 2020). Other significant changes include hospital bed expansion, introduction of infection control protocols, and increased working hours.

However, some aspects of the reforms lead to adverse outcomes for healthcare workers. For instance, there were consequences of burnout, fatigue, stress, and anxiety among the staff due to the increased workload and the fear of contracting the infection. The psychosocial effects and even burnout are apparent in the literature (Nayyar et al., 2020; Talat et al., 2020; Fatima et al., 2020). There was a significant increase in workload, which called for additional effort from the healthcare workers to address the pressing needs of patients. At the same time, positive outcomes are noted from the reform changes, including quality improvements (infection control) and patient satisfaction.

4.4.5 Effect of COVID-19 on hospital performance and quality of healthcare service delivery

From the interviews, this study noted that the outbreak of the pandemic and its immediate effects on healthcare systems can be described from two opposite directions that capture the benefits and challenges. There were a few notable challenges, especially among the staff, including staff

shortages, increased stress, and burnout. These problems span the managerial and staff challenges. The management has to deal with staff shortages while staff have the burden of increased workload, stress, burnout, and even anxiety. Indeed, studies have equally acknowledged the same phenomenon of increased distress among health workers during a crisis in many regions (Cai et al., 2021; Sriharan et al., 2020). These, therefore, call for appropriate leadership considerations to care for such challenges.

However, some notable benefits and opportunities came alongside the pandemic, including increased infection control practices, staff training and education on infection control, and increased patients' bed capacity. The need to accommodate more patients bears the opportunities for growth and expansion of care facilities in Jordan. There were increased staff, staff resilience, and training for sustainable change. Still, healthcare leaders have a significant role in maintaining hospital performance and practical leadership skills. According to Fahlevi et al. (2022), strategic leadership style has a considerable positive impact on the performance of hospitals.

Effective leadership strategies, such as effective communication, appreciating workers, enhancing teamwork, innovation, and providing moral support during distress, significantly help to address challenges and capitalize on opportunities in the healthcare settings (Csedő et al., 2022; Fahlevi et al., 2022; Brown, 2020). With such strategies, employees feel included in the operations and smoothly integrate the proposed changes, such as adherence to infection control protocols. In fact, there were significant improvements in patients' management approaches. Other researchers have also noted significant improvements in patient management following the COVID-19 outbreak. For example, the Royal National Orthopaedic Hospital "set a target to deliver 80% of clinics virtually in response to the crisis, to be achieved by March 16, 2020." According to Gilbert et al.

(2021, p. 188), the inclusion of virtual consultation systems helped the hospital to care for even more patients.

While the COVID-19 crisis presented devastating challenges to hospitals, there are still some opportunities to seize through functional leadership approaches. Literature acknowledges a significant milestone in hospital technological systems during the crisis (Billingsley, 2020; Jiménez-Rodríguez et al., 2020). Such improvement correlates with the improvements in hospital operations and quality of service delivery and nurturing them would yield promising outcomes for the future management of unforeseen events in the Jordanian healthcare system.

4.4.6 Adoption of new management practices by Jordanian healthcare system in running the daily operations before and after the COVID-19 crisis

The thematic outcomes from the participants identified three leading management practices by Jordanian healthcare systems in running the daily operations before and after the COVID-19 crisis. The practices involved staff training, staff monitoring, and social support. The management improved the training practices to provide more practical knowledge of handling the challenges presented by the pandemic. However, the respondents did not provide detailed insights about the training. The training ensured resilience and emotional support while operating in the dangerous environments presented by the crisis. Previous studies have also reported the positive impacts of training programs in improving workers' efficiency. According to Bonazza et al. (2021, p. 272), "healthcare leadership program tailored to medical trainees was effective in improving their competency in various leadership domains, and emotional intelligence and teamwork were the most relevant components of the program." Hence, there is a significant benefit to rolling out tailored training programs during the health pandemic.

Moreover, the Jordanian leaders also exhibited vital aspects of employee monitoring. A close look at employees is a critical feature of success in change (Bankar & Gankar, 2013). Jordanian health leaders ensured a close monitoring of their employees. Monitoring is a universally important leadership practice that helps prepare staff for future changes (Noreen et al., 2021). Nevertheless, leaders still need to practice other core components of healthcare leadership, including "commitment to quality improvement and patient safety, ongoing training and education, effective data collection and analytics, and stakeholder communication, engagement, and collaboration" (Doherty et al., 2022, p. 263). These management practices would thus help the management of Jordanian hospitals deal with healthcare reforms smoothly.

Social support was another conspicuous managerial practice noted among Jordanian healthcare management. Due to the negative psychosocial implications of the COVID-19 crisis among healthcare workers, the management came up with programs to encourage hospital staff to face the challenges. According to Smallwood et al. (2023), leaders need to exhibit authentic leadership skills, act timely, and provide their subjects with reliable information and empathy in various situations. As such, management must involve workers in making major hospital decisions. Post et al. (2022) express that healthcare leaders must incorporate participative leadership when dealing with teams with situations that employees are aware of.

Strudsholm and Vollman (2021) also express the concept of engaging employees in successfully managing change by leveraging communication technologies and creating effective teams. Having teams that easily flow with the organizational policies and regulations improves organizational productivity. According to Vanichchinchai (2023, p. 430), "Leadership and culture have a significant indirect positive impact on process improvement through human resources." On the same note, Santra and Alat (2022) express that healthcare leaders need to exhibit "adaptive

leadership competencies such as regulating distress, providing direction, maintaining disciplined action, fostering collaboration, empowering, understanding organizational linkages, strategic vision, and communication skills" (p. 246). Therefore, managing the changes brought about by COVID-19 requires considering diverse aspects of leadership practices for an effective outcome.

4.5 Conclusion

This study examined the challenges and opportunities that arose alongside the COVID-19 crisis in Jordanian hospitals. Accordingly, the analyzed data identified various opportunities and challenges that emerged alongside the effect of the crisis on Jordanian hospitals. For instance, there were improvements in infection control protocol, staff education, and patient management. At the same time, there were challenges regarding employee work overload, stress and fatigue, and staff shortages. Moreover, it was also noted that there were improvements and effective application of staff training, staff monitoring, and social support as the core aspects of healthcare leadership features.

Based on these observations, there is a need for Jordanian hospital leaders to inculcate adaptive and flexible leadership skills that readily adopt new strategies for effective organizational change. At the same time, there is a need for regular staff training to have adequate preparations in dealing with unforeseen calamities. Nevertheless, there is also still a need to examine the various factors surrounding healthcare reforms during crises through quantitative approaches.

This study suffers from one limitation regarding access to data. Data were collected after some of the critical challenges presented by the COVID-19 pandemic had been solved in the named hospitals. As such, the interviewees could overlook some of them. Nevertheless, the applied

leadership strategies to address such challenges still existed within the same leadership structures at the time of data collection.

5 Overview and Theoretical Contributions

In response to the growing demands caused by, for example, demographic changes, the Jordanian healthcare system administration is still left with a chunk of issues that affect its smooth progress and transition and changes in service delivery. Rawabdeh and Khassawneh (2018) explore these issues, and they include a large percentage of uninsured populations, reaching 32% of the national population. These individuals have to pay for the healthcare services from their own pockets, which is relatively expensive and unreliable, especially in cases of emergency medical care. The second concern is the preference for private healthcare facilities over public ones due to the quality of services and waiting time. Lastly, there is a growing challenge over the implementation of means tests for public healthcare services. These concerns can be viewed inclusively as the tip of the iceberg in the Jordanian healthcare system. Hence, flexible, robust, and effective leadership with an awareness of possible future changes is vital.

Moreover, this dissertation argues that the already witnessed series of healthcare reforms and transformations in Jordan could be used as a picture to foretell the future radical changes, which may be endless owing to the unpredictable changes in care demands. Nevertheless, changes are often inevitable, and the possibility of future adjustments in the healthcare system is not a matter of probability owing to the number of issues that remain unsettled in Jordanian healthcare. Therefore, the interest in leadership competencies for effective change management with concerns over sustainability is paramount and is addressed in the three research articles in the last three chapters:

5.1.1 Theoretical contributions

Chapter II: Analysis of leadership competencies based on organizational change: Case of education hospitals in Jordan

Even though these outcomes were obtained by using a self-declared questionnaire, which may have distortions from the respondents' end, they helped provide significant steps towards addressing some notable research gaps in leadership characteristics in the Jordanian healthcare system. Hence, this section identified specific features among the healthcare leaders in Jordan in regard to organizational change management. These include emphatic and innovative leadership skills and the ability to integrate healthcare changes. These features are promising in terms of addressing the future changes in healthcare in various ways when examined from divergent perspectives. Polychroniou (2009, p. 345) indicates that "empathy and social skills involve one's ability to perceive others' emotions, feelings, and needs and help others to regulate their emotions to achieve desirable goals''. Even though some scholars, such as Karnes (2009) argue that organizations often neglect to instill a strong sense of empathy among the employees, the ingrained quality in leadership traits makes some leaders exhibit it better.

Regarding the qualities of innovation and empathy, this chapter demonstrates that empathic healthcare leaders can ethically connect with the emotional needs of the organization members, thereby rippling a wave of change throughout the organization. At the same time, innovativeness is a trait that leaders can acquire from instinctive qualities or develop from training or influence of the organization's culture (Vaccaro et al., 2012). This chapter has noted that this quality imbues healthcare leaders with the advantage of resiliently springing over hurdles by creating new ideas to overcome technical challenges (Agbor, 2008). In the process, Jordanian leaders with this attribute can effectively overcome barriers to the implementation of healthcare reforms by

innovating new ideas for change management and sustainability. Overall, this chapter uses quantitative approaches to show how healthcare leadership qualities may help guide resilience among leaders for better management output.

Chapter III: Energy efficiency in healthcare institutions

The theoretical contribution of this chapter can be explained well through the lens of sustainable practice and change management practices, which offer ideologies about effective management of healthcare transitions towards more reliable and sustainable energy utilization. This has been critically missing information in the Jordanian healthcare system; hence, the outcomes of this article provide some evidence for understanding and sustaining energy utilization in healthcare through competent leadership practices.

Energy is the core driver in every operation of healthcare organizations, such as equipment usage and machinery operations (Olatomiwa et al., 2018). Regarding sustainable practices, this chapter discusses that the healthcare system, through the use of renewable energy sources, reduces its environmental footprint and strives towards more reliable energy sources. Again, through the efficient utilization of efficient energy sources, this chapter expresses that optimizing energy usage can significantly help to address the concurrent shortages by minimizing wastage. This idea is well understood from the theoretical perspectives of circular economy, which encompasses the optimal use of organizational resources.

From the angle of change management, this chapter discusses the need and efficiency of healthcare systems to shift their focus from the fundamental consideration of reducing quantity utilization to the quality of energy consumed. As such, the healthcare system is challenged to exhibit efficient transitioning to safer and more reliable energy utilization practices, changing focus from traditional

sources to more efficient technology-driven sources. A number of efficient energy utilization practices and techniques are also discussed in this chapter, which are both beneficial to healthcare organizations and national policies on energy usage (Bawaneh et al., 2019). Other concepts, such as site-specific implementation and technological usage, are also outlaid and call for a tailored approach to healthcare systems management for a smooth transition towards sustainable organization practices.

Chapter IV: Challenges and opportunities in healthcare reforms in pre-and post-COVID-19 crisis: A case of Jordan

This chapter presented the empirical evidence regarding challenges and opportunities in healthcare reforms before and after the outbreak of COVID-19, with more focus on leadership influence. Little has been done to examine the environmental factors that influence healthcare leadership's decision to implement sustainable service delivery in Jordan. Nevertheless, leadership is considered a central theme in this section as the study examined the healthcare leaders' approach to managing crises, such as the outbreak of a pandemic. The paper profoundly examines how unexpected crises in healthcare can catalyze reforms that would turn out to be even more sustainable than the traditional proactive reform approaches.

Some of the subthemes beneficial to healthcare systems and hospitals include leadership competency during crisis and sustainability approaches, such as learning from challenges and developing resilient attitudes. The ability to quickly adjust routine operations to accommodate the alterations in healthcare services is an indication of future sustainable change management capacity (Harrison et al., 2022; Sturmberg & Gainsford, 2024). For example, in the qualitative study about challenges and opportunities, healthcare systems can learn about the essence of being

ever-prepared, i.e., being flexible in routine operations and able to adapt to new norms in the environment of care. The need to develop a strong spirit of resilience among healthcare leaders is another significant deliverable from this chapter, a concept that Sturmberg (2018) directly relates to the organization's adaptability and toward sustainable delivery of healthcare services. Adaptable and resilient attributes intently imbue healthcare leaders with the capability to withstand expected and unexpected changes and reforms for sustainable and undisrupted service delivery. A summary of the articles is presented in Table 9.

Table 9. Articles' summary; research gaps, questions theory, findings and limitations

The aspects of research	**Quantitative study: Analysis of leadership competencies based on organizational change**	**Narrative review: energy efficiency in healthcare institutions**	**Qualitative study: Challenges and opportunities in healthcare reforms in pre-and post-COVID-19 crisis**
Research gap	Healthcare leadership characteristics and practices in managing organizational change.	Energy optimization techniques in healthcare for sustainable operations.	Healthcare leadership competencies in crisis management.
Research questions	**RQ1**: What are the clinical leadership characteristics in Educational Hospitals of Jordan? **RQ2:** What demographic variables impact clinical leadership characteristics in Educational Hospitals of Jordan?	**RQ1:** What is the status of energy efficiency and utilization in healthcare institutions? **RQ2:** What are the energy management, conservation strategies, and techniques used in hospitals?	**RQ1:** Which challenges and opportunities arose in the Jordanian healthcare systems due to the outbreak of COVID-19?
Theory applied	Resource-based view	Resource-based view; sustainability theory; circular economy theory	Resource-based view; Penrose theory of firm growth; organizational ambidexterity; evolutionary economics
Main findings	Healthcare leaders exhibit four main leadership characteristics, including (1)	The amount of energy utilized in the healthcare facilities depends on their design and nature, i.e., the	Outcomes were noted under four areas – sources of healthcare reforms, challenges presented by COVID-

	integration, (2) empathy, (3) innovativeness, and (4) adaptive clinical leadership attributes. These characteristics vary among healthcare leaders based on their age and gender, whereby older and male clinical leaders exhibited more desirable leadership qualities than their counterparts.	range of services offered and capacity as well as the location of the hospital (for different climatic zones) Hospitals strategize diverse techniques and management conservation strategies for their energy utilization, including (1) control algorithms, actuators, and sensors (2) technology-driven tools like Hybrid Automatic Voltage Control (HAVC) and green building, and (3) renewable sources (green hospital). Healthcare managers apply different sustainable development strategies to minimize the expenses that go to energy utilization.	19 crisis, opportunities that arose from the crisis, and managerial practices in managing the crisis. The main sources of reforms were MOH and healthcare managerial decisions. Opportunities for hospital development were noted in terms of infection control, staff education, and patient management strategies. Challenges were noted in terms of heavy workload, stress and fatigue among the staff, and staff shortages. The management applied a mixture of approaches to handle a crisis, including continuous staff professional development through training, effective monitoring to ensure compliance with the regulations and protocols, and provision of close social support to deal with the distress and increased service demands.
Limitations	The applied questionnaire did not present a cut-off point to quantify the level of leadership characteristics.	The subjective nature of narrative reviews could lead to bias in interpretations and article selection.	Some of the data used in this study were collected after some of the critical challenges presented by the crisis had been solved, thereby presenting a potential recall bias.

5.1.2 Recommendations for future research

Healthcare leadership and management is not a new phenomenon in healthcare organizations. However, compared with non-healthcare organizations, there seems to be a relatively lower volume of research exploring concepts of leadership, change management, and sustainable practices. The incomprehensive exploration arises despite the series of transformations and reforms that come voluntarily or involuntarily from unexpected crises, such as the COVID-19 outbreak. In the previous decades, the Jordanian healthcare system had been characterized by a series of healthcare transformations and changes that can only foretell high possibilities of endless transformations and adjustments in the future. The likelihood of more radical changes and reforms in healthcare systems operations calls for strategic management approaches and an understanding of the leaders' preparedness and perspectives. While this study explored some of the features that can inform the level of preparedness among these leaders in managing organizational change, there are still gaps in the required preparedness in terms of resource allocation and policy integration. These concepts need to be studied.

Therefore, based on the observations and persistent gaps noticeable in this study, two areas of recommendation have been coined for future researchers who would be interested in healthcare leadership and systems management. These recommendations would seal some of the limitations noticeable in the principal studies used in this dissertation. The recommendations focus on three main areas: (1) healthcare leaders' perceptions about change management, policy integration, and resource allocation, (2) healthcare leaders' competencies at different levels within their organizations, (3) a deeper examination of the relationship between leadership competencies, practices, and sustainability. The recommendations are outlined in the summary Table 10.

Table 8. Recommendations and directions for future research

Areas of recommendations	Research recommendations
Healthcare leaders' perceptions about change management preparedness, policy integration, and resource allocation	• Healthcare leaders' perceptions about change management. • Opinions of healthcare leaders and healthcare systems management competency in resource utilization and policy integration. • Healthcare leaders' understanding of change management in relation to staff receptivity.
Healthcare leaders' competencies at different levels within their organizations	• Health leaders' competencies at different levels. • Health leaders' competencies in reform implementations during the crisis.
Relationship between leadership competencies, practices, and sustainability	• The role of leadership practices in promoting sustainable practices in healthcare systems. • Leadership competencies for sustainable healthcare delivery through the lens of organizational efficiency.

These recommendations would help to understand the perceptions of the leaders and staff in respective healthcare facilities about the implementation and integration of healthcare to set a blueprint approach for managing significant changes in healthcare through strategic management. Therefore, these research areas could be explored using different research methodologies and designs, including mixed research approaches, to yield reliable outcomes of high levels of evidence that can be applied in practice.

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Appendices

Appendix A: Interview Questions

1. What management practices do you employ in running the daily operations of this hospital before and after covid-19?
    a) Have these practices changed during covid-19?

    If yes:

    b) How did they change?
    c) Were there changes in hospital policies operation procedures?
    d) How did they change?
2. Have there been changes in the in your hospital performance and quality of healthcare service delivery over the time of covid-19?

If yes:

a) What were the changes?
b) How did these changes affect the staff and other stakeholders?
c) What problems or opportunities emerged?
d) If there are positive changes, are they sustainable in the long run?

If no:

a) Why do you think so?
b) How did you deal with the extra healthcare demands brought about by covid-19?

Appendix B: Leadership questionnaire

Dear Participant,

The researcher is currently conducting a scientific study intended to identify the: "**Clinical leadership Behavior in Educational Hospitals in Jordan".**

In selecting each response, please be realistic about the extent to which you *actually* engage in the behavior. Do *not* answer in terms of how you would like to see yourself or in terms of what you should be doing. Answer in terms of how you *typically* behave - on most days, on most projects, and with most people.

For each statement, decide on a rating and record it in the blank to the left of the statement.

Your assistance to answer the study questionnaire means a lot to us, and will add value to our study. It will be used only for academic purpose and will not be used outside the scope of this scientific research.

The questionnaire consists of two sections; the first one about demographic variables, and the second one is the questionnaire items that contains 56 questions which researchers would like to study.

Thank you for your cooperation with us

Rana Al- Otaiby

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Questionnaire				
Section I: Demographic Characteristics				
1- Gender:	□ Male		□ Female	
2- Age:	□ Less than 30	□ 31- less than 40	□ 41- 50	□ above 50
3- Education:	□ Bachelor	□ Higher diploma	□ graduated Studies	
4-Experience:	□ Less than 5 years	□ 6-10 years	□11-15 years	□ above 15
5- Functional	□ doctor	□ nurse	□ others	
6-Management Level:	□Top Management	□ Middle Management	□ Operational Management	

Section II: Questionnaire Items

Please make sure answering every questions, and encircle the correct question based on your opinion based on the reality not the optimum situation of each item as follows: (1=Strongly Disagree (SD) , 2=Disagree, 3=Neutral, 4=Agree, 5= Strongly Agree (SA))

No.	Item	SD	Disagree	Neutral	Agree	SA
		1	**2**	**3**	**4**	**5**
The Adaptive Clinical Leadership						
1.	I had ability to adapt to new and different situations.	1	2	3	4	5
2.	I respects employees' opinions whatever their opinions are.	1	2	3	4	5
3.	I had ability to know employees' feelings, even if they try to hide them.	1	2	3	4	5
4.	I had ability to know Patients feelings.					
5.	I had ability to determine the underlying reasons of any problem.	1	2	3	4	5
6.	I ask questions that stimulate staff members to consider ways to improve their work performance.	1	2	3	4	5
7.	I takes appropriate personal risks in order to improve the program.	1	2	3	4	5
8.	I takes personal chances in pursuing program goals.	1	2	3	4	5
Empathy in Clinical Leadership						
9.	enthusiastic, able to make colleagues feel confident, supported and encouraged	1	2	3	4	5
10.	empowering people to perform better, Letting others take the lead.	1	2	3	4	5
11.	Recognition of the emotions in other people	1	2	3	4	5
12.	Maintenance of the relationships with others.	1	2	3	4	5
13.	Knowledge of one's own emotions;	1	2	3	4	5

14.	Create the spirit of cooperation in the Clinical sector	1	2	3	4	5
NO.	**Item**	**SD**	**Disagree**	**Neutral**	**Agree**	**SA**
15.	Gain trust from employees	1	2	3	4	5
16.	Create emotional resonance.	1	2	3	4	5
17.	Contribute to better emotional relations in between the members of the work team;	1	2	3	4	5
18.	Have a good relations to themselves, high self-acceptance	1	2	3	4	5
19.	Have higher level of self-motivation	1	2	3	4	5
Clinical Leadership Inventory						
20.	I use my knowledge and skills to work toward achievable goals and concrete plans for safe and high quality patient care.	1	2	3	4	5
21.	1 ask "What could I have done differently?" when things do not go as expected?	1	2	3	4	5
22.	1 continually search for new learning opportunities offered outside my organization that will help me to improve care for patients and their families	1	2	3	4	5
23.	I am enthusiastic and engaged when communicating with patients to achieve patient-centered goals.	1	2	3	4	5
24.	1 engage in meaningful conversations with patients for the purpose of getting to know them and understanding their individual needs.	1	2	3	4	5
25.	1 engage in meaningful conversations with colleagues to foster our ability to provide patient-centered care.	1	2	3	4	5
26.	I publicly acknowledge my colleagues who exemplify commitment to professional values.	1	2	3	4	5
27.	I find ways to celebrate patients' accomplishments.	1	2	3	4	5
28.	Patients in my care know lam confident in their ability to meet their health related goals.	1	2	3	4	5

29.	I find ways to celebrate colleagues' accomplishments	1	2	3	4	5
Integrating in Clinical Leadership						
30.	A focus on the health of the entire population served by the entity	1	2	3	4	5
NO.	**Item**	**SD**	**Disagree**	**Neutral**	**Agree**	**SA**
31.	An awareness of, and agreement to, a common mission, vision and values	1	2	3	4	5
32.	Mutual understanding of and respect for each other, despite different training and perspectives	1	2	3	4	5
33.	A focus on the individual patient's care over time and across the continuum	1	2	3	4	5
34.	A sense of common ownership of the entity and its reputation	1	2	3	4	5
35.	A joint commitment to performance measurement and improvement	1	2	3	4	5
36.	I Integrated leadership at all levels and participation in key management decisions	1	2	3	4	5
37.	I share with interdisciplinary structure that supports collaboration in decision-making, preserving clinical autonomy	1	2	3	4	5
Innovation						
38.	Accomplishes tasks in a different manner from most other people.	1	2	3	4	5
39.	Tries ways of doing things that are different from the norm.	1	2	3	4	5
40.	Seeks new opportunities within the program for achieving organizational objectives.	1	2	3	4	5

41.	Identifies limitations that may hinder organizational improvement.	1	2	3	4	5
42.	Challenges staff members to reconsider how they do things.	1	2	3	4	5
NO.	**Item**	**SD**	**Disagree**	**Neutral**	**Agree**	**SA**
43.	Takes bold actions in order to achieve program objectives.	1	2	3	4	5
44.	Searches outside the program for ways to facilitate organizational improvement.	1	2	3	4	5
	Clinical leader Services					
45	I use feedback from patients, service users and colleagues when developing plans	1	2	3	4	5
46	I assess the available options in terms of benefits and risks	1	2	3	4	5
47	I deliver safe and effective services within the allocated resource	1	2	3	4	5
48	I take action when resources are not being used efficiently and effectively	1	2	3	4	5

49	I analyze information from a range of sources about performance	1	2	3	4	5
50	I take action to improve performance	1	2	3	4	5
IMPROVING SERVICES LEDERSHIP						
51	I take action when I notice shortfalls in patient safety	1	2	3	4	5
NO.	**Item**	**SD**	**Disagree**	**Neutral**	**Agree**	**SA**
52	I review practice to improve patient safety and minimize risk	1	2	3	4	5
53	I use feedback from patients, colleagues and service users to contribute to improvements in service delivery	1	2	3	4	5
54	I work with others to constructively evaluate our services	1	2	3	4	5
55	I put forward ideas to improve the quality of services transformation	1	2	3	4	5