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Lean Six Sigma and quality performance in Italian public and private hospitals: a gender perspective

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Abstract

Purpose – Lean Six Sigma in public and private healthcare organisations has received considerable attention over the last decade. Nevertheless, such process improvement methodologies are not generalizable, and their effective implementation relies on contextual variables. The purpose of this study is to explore the readiness of Italian hospitals for Lean Six Sigma and Quality Performance Improvement (LSS&QPI), with a focus on gender differences.
Design/methodology/approach – A survey comprising 441 healthcare professionals from public and private hospitals was conducted. Multivariate analysis of variance was used to determine the mean scores on the LSS&QPI dimensions based on hospital type, gender and their interaction.
Findings – The results showed that public healthcare professional are more aware of quality performance improvement initiatives than private healthcare professionals. Moreover, gender differences emerged according to the type of hospital, with higher awareness for men than women in public hospitals, whereas for private hospitals the opposite was true.
Research limitations/implications – This study contributes to the Lean Six Sigma literature by focusing on the holistic assessment of LSS&QPI implementation.
Practical implications – This study informs healthcare managers about the revolution within healthcare organisations, especially public ones. Healthcare managers should spend time understanding Lean Six Sigma as a strategic orientation to promote the "lean hospital", improving processes and fostering patient-centredness.
Originality/value – This is a preliminary study focussing on analysing inter-relationship between perceived importance of soft readiness factors such as gender dynamics as a missing jigsaw in the current literature. In addition, the research advances a holistic assessment of LSS&QPI, which sets it apart from the studies on single initiatives that have been documented to date.

Keywords Lean six sigma, Healthcare, Hospitals, Quality management, Gender differences
Paper type Research paper

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1. Introduction

Recent studies in healthcare management have focused on service quality and efficiency in achieving patient commitment and active engagement (Schechter and Wegener, 2022; Vanichchinchai, 2022). Indeed, the transition to a patient-centred healthcare system model has now become an irreversible journey that enhances healthcare evolution worldwide (Ciasullo *et al.*, 2022a). The patient's perspective is a cornerstone of healthcare service providers, and initiatives to improve its effectiveness and efficiency should not fail. Patient-centredness is a complex concept that challenges the passive role of the patient as the recipient of care (Ciasullo *et al.*, 2022b) and, in contrast, promotes its active role as co-creator in a dyadic interaction with healthcare organisations. Moreover, there is little room for mistakes in healthcare ecosystems, and initiatives aimed at reducing error rates should be implemented to improve services.

Evidence in the literature (Trakulsunti *et al.*, 2022) shows that adopting process improvement methods enables healthcare organisations to identify root causes and solve problems in the clinical pathway (Fiorillo *et al.*, 2021). In some countries, this need is greater than in other countries. Reibling *et al.*'s (2019) taxonomy of OECD countries shows significant differences among European healthcare systems. As part of the regulation-oriented public system, the Italian public system is characterized by a lack of financial resources allocated to healthcare, exclusively governmental sources of funding, strong access regulation and limited inclusion and citizens/patients' participation. Conversely, the Italian private healthcare system, being more market-oriented, provides fertile ground and managerial practices for enhancing patient satisfaction, and its financial sustainability also encompasses sources other than the government.

In both cases, the implementation of a proper quality management system, such as Lean Six Sigma (LSS), has proven to be one of the keys to improving health service delivery. It combines both lean management strategies to reduce waste and involve staff within the value chain's activities, and Six Sigma (SS) for continuous process improvement and reduction in errors and variability. To successfully implement LSS, certain conditions must be in place: *inter alia*, the organisation's management must be fully involved and committed to achieving its goals (Dafna, 2008), the human resources involved must work together as a team; team members must be empowered to implement initiatives without the need for constant evaluation and approval; continuous feedback to evaluate improvements cannot be bypassed (Marolla *et al.*, 2022); patient involvement initiatives must be promoted (Trakulsunti *et al.*, 2022).

Scholars are interested in investigating the Italian healthcare system's improvement, particularly through innovative services, quality performance and LSS implementation (Improta *et al.*, 2022) in private and public healthcare settings. Most studies have assessed the impact of LSS on the performance of a single unit or department, neglecting the holistic perspective on overall organisational performance (Henrique and Godinho Filho, 2020). In addition, few studies have attempted to assess how implementing LSS in hospitals impacts outcomes (Antony *et al.*, 2019b). Therefore, LSS should be holistically investigated because, on the one hand, it impacts the working environment, employee motivation, staff cross-fertilization and cross-functional teamwork (Rosa *et al.*, 2021). On the other hand, externally, it impacts the high-quality performance of the organisation, which comprises, among others, cost-saving, error reduction and service quality improvement, thereby putting the patient at the centre.

Moreover, as stated above, healthcare systems can differ according to contextual factors. In fact, in most cases, the implementation of LSS is not unique and does not always move along expected trajectories, so the evaluation of implementation in different contexts, such as the public and private Italian ones, is of great importance (Rosa *et al.*, 2021; Henrique and Godinho Filho, 2020). Furthermore, in both public and private healthcare facilities, different

behaviours may emerge by virtue of different and pluralistic gender orientations (Li *et al.*, 2023) and impact the quality of hospital outcomes. Evidence in the literature has shown that, differing from gender, a variable inclination for risk-taking and goal setting rises (Dafna, 2008), while the motivation to work (Moody and Pesut, 2006) in teams or exhibit emotional intelligence (Deshpande and Joseph, 2009) may improve professionals' experience. The importance of investigating these differences in both private and public healthcare has recently been emphasised in the literature, particularly to better understand healthcare professionals' reactions to repeated stressful events (Carmassi *et al.*, 2022), their different roles (Liu *et al.*, 2019) and their differences in applying LSS within the larger framework of Total Quality Management (TQM) (De Koeijer *et al.*, 2022). Nevertheless, only a few studies have interpreted gender differences in public and private healthcare settings.

By assuming a holistic perspective on LSS grounded on the broader context of TQM, this study aims to shed light on the following research questions:

RQ1. Are there any differences between public and private healthcare organisations in adopting Lean Six Sigma and Quality Performance Initiatives?

RQ2. Is there a relevant impact of organisational behaviour-based gender differences in public and private healthcare hospitals?

The remainder of this paper is organised as follows; section 2 discusses the theoretical background of the study and presents the research hypotheses addressed in the data analysis. Subsequently, both the sample and study methods are presented in section 3. The research findings are presented in section 4, and they are discussed in section 5 that contextualizes the study results with existing scientific knowledge. Section 6 stresses both the theoretical and managerial implications; conclusion, limitations and the main takeaways of the research are presented in section 7.

2. Theoretical background

2.1 Lean Six Sigma in healthcare

Public and private healthcare systems face extremely delicate environmental contingencies. The loss of available resources and increasing demand for qualified services provides a search for solutions aimed at increasing productivity through the reduction of various forms of waste (McDermott *et al.*, 2022). In addition, continuous service improvement is the cornerstone of patient-centred prerogatives of healthcare systems (Ciasullo *et al.*, 2020). Indeed, such a challenge requires rethinking managerial and organisational practices as both a necessity and opportunity to meet patient needs. In this context, various managerial approaches to streamline business processes and improve work operations as well as responsiveness to patient needs have been proposed by both scholars and professionals to improve quality performance (Antony *et al.*, 2019a). In this vein, a distinction between hard and soft factors within the larger TQM framework emerged. Imeri *et al.* (2014) propose a taxonomy based on the association of Statistical Process Control factors with hard TQM, and it includes the ISO 9000 series, HACCP, scatter and matrix diagrams, Pareto Chart and many others. Followed by Aoun *et al.* (2018) and Capolupo *et al.* (2023), Imeri *et al.* (2014) configured soft factors under the lens of Total Employee Involvement, which comprises Teamwork, Continuous Improvement, Democratic Leadership and others. Each of these factors may be employed to address single issues. Nonetheless, to enhance healthcare outcomes in the long term, a quality improvement strategy as a corporate vision is required, thereby calling for more comprehensive and structured approaches able to mix soft and hard factors (Rosa *et al.*, 2021).

Evidence in the recent literature on healthcare management supports the effectiveness of LSS in combining the power of the statistical data analysis of SS with Lean principles

designed to eliminate waste and reduce lead times (De Koeijer *et al.*, 2022; McDermott *et al.*, 2023; Trakulsunti *et al.*, 2022). Previous studies have, in fact, emphasized the urgency to fill the gap in existing research, which fails to combine hard and soft factors (Ershadi *et al.*, 2019; Khalili *et al.*, 2019; Durairatnam *et al.*, 2021), especially in the healthcare service environment, which complex and dynamic nature suggests affording both patient orientation, and collaborative behaviours among and between interprofessional team members (Ali *et al.*, 2023).

LSS is simultaneously culture, method and planning; it is a strongly patient-oriented strategic approach that contributes to the success of the organisation as a whole, whose mission is also to generate quality in service design and delivery. In fact, lean can develop a value-added activity stream based on patient needs, while SS focuses on reducing errors and process variability. Together, they provide a limited cost boost for operational speed and flexibility, enhancing value-added activity. The distinction between value-added and non-value-added activities plays a key role in healthcare systems (Doğan and Unutulmaz, 2016). While the former comprises those that meet patients' needs, the latter constitutes a real cost for the organisation. Accordingly, these non-value-added activities should be identified so they can be targeted for reduction or elimination wherever possible. For example, in Italy, healthcare spending weighs heavily on the budgets of regional and local districts. The main cause of the increase in healthcare spending is the inefficiency of business processes, which should be properly measured, and inefficiencies reduced through the implementation of corrective actions. Defects are not only attributable to medical or clinical processes but can also be associated with administrative, logistical and general operational activities (Rathi *et al.*, 2023). Therefore, reducing the wastefulness of healthcare facilities could generate substantial savings to reinvest in patient-centred activities.

Various healthcare practices are highlighted in literature, nevertheless they focus on hard factors, such as SS, or soft ones, like Lean, and not on their combination. For example, in the sphere of SS, the application of the DMAIC, Value Stream Mapping (VSM) and Visual Management as hard factors has proven effective in improving patient care processes (dos Reis *et al.*, 2022). Conversely, for Lean Management, the emphasis is placed on the impact of incorporating soft and human aspects in fostering hospital performance, such as continuous improvement, effective leadership, collaboration and communication (Waring and Bishop, 2010; Alkhaldi and Abdallah, 2020). Therefore, the integrated approach that combine Lean thinking, able to enhances process speed and value creation, with SS, that reduce process variability, allows to overcome the operational and tactical vision in favour of a strategic perspective, unlocking the full potential of TQM. In other words, by adopting a systematic and strategic approach, LSS leverages hard and soft TQM's factors, such as integrating process management methodologies with organizational behaviour and learning, i.e. continuous improvement, to enhances overall quality outcomes.

Nevertheless, the application of this all-encompassing approach may vary significantly depending on the country, the type of hospital, the professionals involved (i.e. doctors, nursing staff, administrative staff, etc.) and both socio-demographic and psychological traits such as gender differences in LSS perception and implementation.

2.2 A framework to measure lean Six Sigma and Quality Performance Improvement

The literature is consistent in documenting many attempts to address individual LSS applications in hospitals. Considering extant studies as a baseline (Ahmed *et al.*, 2018; Ahmed *et al.*, 2022; Alkhaldi and Abdallah, 2022; Bhat *et al.*, 2022; Juliani and de Oliveira, 2021; Peimbert-García *et al.*, 2019) this research conceptualizes the following framework to test the readiness of healthcare organisations in implementing Lean, Six Sigma and Quality Performance Improvement (LSS&QPI) as a systematic approach, by shaping a six-construct

conceptual model. It comprises Continuous Quality Improvement (CQI), Lean Management initiatives (LM), Six Sigma initiatives (SS), Patient Safety (PS), Teamwork (TW) and Quality Performance Improvement (QPI). Each of these constructs will be explained in the following.

2.2.1 Continuous quality improvement (CQI). The CQI consists of an incremental approach to process improvement and comprises an organisation-wide effort towards achieving strategic quality goals. To Sollecito and Johnson (2013, p. 4), CQI, in healthcare, is *"a structured organisational process for involving people in planning and executing a continuous flow of improvement to provide quality health care that meets or exceeds expectations"*. Accordingly, CQI is a managerial philosophy that encourages all healthcare team members to continuously question the efficacy and efficiency of the process. It requires a culture of improvement for patients, and their continuous care.

2.2.2 Lean management initiatives (LM). LM comprises all lean thinking methodologies and tools to reduce waste and increase the quality and efficiency of the delivered service (Douglas *et al.*, 2015). LM includes a wide range of process practices, such as, *inter alia*, value stream mapping in current and future state forms, root cause analysis and the just-in-time approach. Evidence in the literature shows that those tools can enhance the quality performance of private and public healthcare organisations (Persis *et al.*, 2022).

2.2.3 Six Sigma initiatives (SS). SS is a managerial strategy that was developed and implemented by Motorola in 1987. This approach improves the quality of the process outputs by identifying, reducing and removing the causes of defects and variation over the long term. In healthcare organisations, SS has different approaches to improvement. The commonly employed approach is the DMAIC (Define, Measure, Analyse, Improve and Control) methodology. In healthcare, DMAIC actions aim to improve the procedures of different clinical cases, recover the operations of private and public facilities, increase the speed of processes at all levels, reduce errors and variability in the patient care pathway and monitor and improve the supply cycle of medical equipment (Laureani *et al.*, 2013).

2.2.4 Patient safety (PS). According to the World Health Organisation (WHO, 2017), PS is an important goal of healthcare quality and a necessary condition for both healthcare providers and patients (Limpanyalert, 2018). PS is closely connected to both patient-centredness and the Voice of the Client (VOC) of Six Sigma. The primary need for patients is service delivery as quickly and safely as possible. Therefore, the healthcare organisation must place PS at the heart of its business operations, on par with streamlining and improving the quality of the service as they are interdependent.

2.2.5 Teamwork (TW). TW in healthcare is understood as a dynamic interaction between functional units, employees, managers, suppliers and non-managers. It involves multifunctional and multidisciplinary teams and implies the full involvement of organisational units in project improvement. Effective TW fosters trust and respect in decision making and problem solving (Leong and Teh, 2013).

2.2.6 Quality performance improvement (QPI). QPI is a system that enhances the organisation through employees' support and makes them feel involved and committed to fulfilling patient needs. Dahlgaard *et al.* (2011) state that to measure QPI in the healthcare sector, managers must clearly define the key performance indicators (KPI). According to Harrington (2007), healthcare requires five essential actions to ensure QPI:

(1) defining and setting problems related to healthcare,

(2) promoting a culture of change towards patient safety,

(3) monitoring performance and reporting findings to sustain change,

(4) testing change strategies to enhance performance,

(5) involving key stakeholders in the organisation.

The LSS&QPI framework conceptualised leverages TQM factors. Table 1 illustrates the relationships that actualize hard and/or soft balance of TQM, in a holistic LSS approach in healthcare. In fact, to address the urgent needs emerged from the previous gaps (cfr. par. 2.1), it proposes the evolving patterns and developments in this field of research (Alsharif *et al.*, 2021).

2.3 Hypothesis development

2.3.1 Lean, Six Sigma and quality performance improvement in healthcare. Public and private hospitals are called upon to wisely optimise resources, considering the global and widespread need to do more with less. Continual pressure on healthcare finances, along with the growth of chronic diseases, aging of the population, changing lifestyles and evidence of poor performance, have led healthcare managers to seek methods to improve quality, safety and value in health service delivery (Sloan *et al.*, 2014). Therefore, many public and private hospitals are turning to LSS to eliminate waste and optimise the use of resources, workplaces and production cycles while ensuring high-quality process management and positive

Dimensions	Definition	TQM domain	Authors	Properties
Continuous quality improvement	CQI comprises a step-by-step method for enhancing processes and involves a collective endeavour across the entire organization to accomplish strategic quality objectives	Soft	Waring and Bishop (2010), Alkhaldi and Abdallah (2020)	Strategical
Lean management initiatives	LM encompasses several lean thinking methodologies and tools that aim to minimize waste, enhance the quality and improve the efficiency of the service	Hard	Bhat *et al.* (2020), Antony *et al.* (2019b)	Operational
Six sigma initiatives	SS approach enhances the quality of process outputs through the identification, reduction and elimination of the root causes of defects and variations	Hard	Antony *et al.* (2019a), Laureani *et al.* (2013)	Operational
Patient safety	PS serves as a discipline of healthcare quality, representing an indispensable requirement for both healthcare providers and patients	Soft/ Hard	Limpanyalert (2018), Marolla *et al.* (2022)	Operational/ Strategical
Teamwork	TW consists of dynamic collaboration among functional units, employees, managers, suppliers and non-managers, encompassing multifunctional and multidisciplinary teams	Soft	Leong and Teh (2013), Hung *et al.* (2018)	Strategical
Quality performance improvement	QPI refers to the systematic and ongoing process of enhancing various aspects of organizational performance to achieve higher levels of quality in services and processes	Soft/ Hard	Dahlgaard *et al.* (2011), Harrington (2007)	Operational/ Strategical

Source(s): Authors' elaboration

Table 1. LSS framework leveraging TQM factors

outcomes (McDermott *et al.*, 2022; Antony *et al.*, 2023). In this perspective, it is possible to infer that LSS has emerged as a potential solution to mitigate the effects of critical events, such as the attempt to reorganise operations aimed at reducing hospital costs. Nevertheless, achieving such results through LSS should not be taken for granted, as public and private healthcare hospitals may show different readiness for applying LSS as a holistic approach. These differences between public and private healthcare providers have been of interest to managerial scholars. Early studies tended to focus on differences in performance between for-profit and not-for-profit hospitals. For example, Rosenau and Linder (2003) with their systematic review found that in terms of quality and quantity of care, non-profit hospitals in the US outperformed for-profit hospitals. Moreover, extensive research has compared public and private hospitals employing discrete approaches by focusing just on Lean, SS or single hard and soft TQM factors. For instance, Hussain and Malik (2016) reported that Lean is equally successful in both public and private hospitals. Goldstein and Naor (2005) showed that public ownership and control positively affect quality management practices, and Chiarini and Bracci (2013) argued that public healthcare systems in developed countries are being pushed to adopt quality systems that have improved efficiency and effectiveness.

Accordingly, given the different results emerging from the previous studies and embracing a holistic approach, it is reasonable to expect differences in the application of LSS depending on the type of hospital. Hence, the hypothesis of this study is as follows:

H1. There is a relationship between a holistic approach to Lean, Six Sigma and Quality Performance Improvement and the type of hospital (public or private).

Exploring the different dimensions further, McLaughlin and Kaluzny (2004) stated that the challenges of the implementation and institutionalization of CQI in healthcare were addressed in a variety of healthcare settings, particularly public health departments. Moreover, Gowen *et al.* (2012) found that CQI and LM played a key role in resolving public hospital errors, while Al-Rjoub *et al.* (2023) found that promoting the continuous improvement of health care in private hospitals led to employee involvement and quality of service.

H1a. There is a relationship between the level of adoption of CQI and the type of hospital (public or private).

Kaplan *et al.* (2010) suggested that LM is particularly suitable for public hospitals because its concepts are intuitive, compelling and easy for use. Moreover, lean enhances the ability of both public and private (Davies *et al.*, 2019) hospitals to clarify goals and align unit staff with them. Chiarini and Baccarani (2016) analysed Italian public hospitals and demonstrated how lean initiatives can improve performance, such as time, inventories and productivity, and have a positive effect on organisational performance, such as motivation, communication and team building.

H1b. There is a relationship between the level of adoption of LM and the type of hospital (public or private).

Six Sigma and its associated tools have proven useful for improving the health and safety of nurses, physicians and patients, both in public (Scala *et al.*, 2021) and private hospitals (Davies *et al.*, 2019). Six Sigma initiatives may lead staff to rethink processes and reduce malpractices in hospitals. Regularly measuring, recording and reporting data helped staff continuously monitor processes and deliver safer treatments. Thus, data analysis gives decision-makers confidence in making decisions regarding process improvement (Antony *et al.*, 2017).

H1c. There is a relationship between the level of adoption of SS and the type of hospital (public or private).

Concerning PS initiatives, Marolla *et al.* (2022) stated that since Italian public hospitals have the primary objective of ensuring accessibility, universality and quality of care, they are oriented towards maximizing patient safety. Furthermore, improving the quality of private hospital services and patient safety can lead to a win-win outcome for both doctors and patients, allowing them to embrace a patient-centred approach. Serving patients better and faster leads to a reduction in treatment delays and faster patient recovery (Antony *et al.*, 2017).

H1d. There is a relationship between the level of adoption of PS and the type of hospital (public or private).

Additional studies on healthcare suggested that combining TW and LM is effective in improving outcomes in private hospitals (Robertson *et al.*, 2015) and patient care in public ones (Ulhassan *et al.*, 2013). According to Hung *et al.* (2018), high levels of teamwork and engagement are particularly effective in facilitating improvements and combating fatigue. Continuous involvement and team membership from frontline staff, surgeons and anaesthesiologists helped to design and implement improvement strategies also establishing a high level of engagement.

H1e. There is a relationship between the level of adoption of TW and the type of hospital (public or private).

Eventually, according to Marolla *et al.* (2022), public hospitals, to reduce barriers related to employee and top management commitment, focus on the working environment by implementing QPI initiatives. Instead, private hospitals remove barriers in achieving lean healthcare performance through the standardization of services, risk processes, timing and quality of treatments. Hence, healthcare systems seem to embrace, in different ways and to differing extents, current challenges in revisiting their internal models and processes, improving service and procedural efficiency and managing the tension between safety needs and the unexpected priority of redesigning and reengineering the delivery of care processes.

H1f. There is a relationship between the level of adoption of QPI and the type of hospital (public or private).

2.3.2 LSS&QPI: does gender-based organisational behaviours matter?. Gender-based organisational behaviour differences are gaining much attention in management literature. Studies have investigated gender differences in technology acceptance (Alraja, 2022), entrepreneurial intention (Avnimelech and Zelekha, 2023), how men and women process information to make decisions under uncertain conditions (Karmarkar, 2023) and risk attitudes (Crosetto and Filippin, 2023). Although different studies have shown that gender differences do not affect LSS because male hospital staff usually display readiness like that of female staff in managing the processes of quality improvement (Ahmed *et al.*, 2018; Abu Salim *et al.*, 2018), it is still well known that men and women play different roles in society, which may affect their behaviour because of different cultural and social expectations. Nursing, for example, is a profession mainly chosen by women in numerous countries, and attention to safety and professional commitment to patients is a cultural background inherited by women. In fact, Al-Hamdan *et al.* (2018) reported that female nurses in private hospitals are more willing to perform various nursing duties than male nurses. In particular, the professional commitment of female positively influences job performance also affecting positive patient outcomes.

Furthermore, different social roles are likely to lead to different behaviours and perceptions between men and women in different work environments. Wang *et al.* (2019) highlighted, for example, that in private hospital, probably due to fewer cases of gender discrimination or to an overall improvement in working conditions, innovative behaviour, job

engagement and employee engagement are found to be better in female than male head nurses.

However, focusing on public healthcare, Gumus *et al.* (2009) found that female managers were less likely to pursue professional development to achieve continuous improvement activities than their male counterparts, even when the outcome was associated with career advancement and salary increases. Furthermore, men were more likely than women to attend continuing education and training programmes.

Moreover, according to Antony *et al.* (2019a), female employees are not involved in implementing improvement methodologies in Norwegian public hospitals.

The limited number of studies investigating whether gender can influence LSS implementation within healthcare organisations led this study to explore whether this sociodemographic variable is able to differentiate service healthcare providers' perceptions of LSS implementation. Hence, the hypothesis is:

H2. There is a gender effect on the implementation of LSS&QPI depending on the type of hospital (public or private).

3. Data and methodology

To test the hypotheses presented above, an adapted questionnaire composed of 29 multiple-choice items divided into six subsections was employed in this study. Respondents were asked to indicate their levels of agreement or disagreement with 29 statements using a 7-point Likert Scale where 1 = totally disagree, 2 = mostly disagree, 3 = slightly disagree, 4 = neither agree nor disagree, 5 = slightly agree, 6 = mostly agree and 7 = totally agree. The 29 items are presented in Table 2. To adapt to the Italian context, the chosen items and associated questions were translated and subjected to a pilot test with 10 respondents, including doctors, nurses and hospital pharmacists. Accordingly, amendments were made based on the criteria of clarity and syntactic congruence. However, no items from the various scales were discarded. Then, a back translation was applied to the items. A multivariate analysis of variance (MANOVA) was performed on the collected data to assess the mean differences in LSS&QPI dimensions across the type of hospital, gender and their interaction (i.e. type of hospital*gender). MANOVA is recommended in situations in which there is more than one dependent variable, and these are correlated (Weinfurkt, 1995), such as in the present research with several dimensions as part of a general construct: LSS. The LSS&QPI framework was measured using the six different dimensions that were the dependent variables in this study. The 29 items making up the dimensions were distributed as follows: five items referred to CQI, four items to LM, five items related to SS, five items to PS, five items referring to TW and the last five items for QPI. The independent variables in this study were hospital type and gender.

3.1 Study setting and sample selection

The survey was administered to public and private hospitals in the major cities of Campania, Italy. Campania was selected for several reasons. First, there is a solid tradition of healthcare in the region (Schiavone *et al.*, 2020). Second, because of the relevance and urgency of healthcare research (Ciasullo *et al.*, 2022b), and last, because of the widespread interest of scholars in the implementation of LSS within healthcare systems (Latessa *et al.*, 2021).

A random-sampling technique was employed. Researchers use this sampling strategy to randomly choose an appropriate sample size from the entire population. The sampling methodology was chosen because it ensures that the study findings are reflective of what would have been achieved if the whole sample population had been examined. The random

Dependent factor	Item code	Items	Measure	Adapted from
Continuous quality improvement *(CQI)*	CQI1	The hospital rewards employees who contribute to the quality improvement process	7-point Likert scale	Ahmed *et al.* (2018), Alkhaldi and Abdallah (2022)
	CQI2	The hospital measures patient satisfaction through surveys, focus groups etc.	7-point Likert scale	Ahmed *et al.* (2018), Alkhaldi and Abdallah (2022)
	CQI3	The hospital promotes a culture of Continuous Quality Improvement	7-point Likert scale	Ahmed *et al.* (2018), Alkhaldi and Abdallah (2022)
	CQI4	The hospital integrates Continuous Quality Improvement activities with interdisciplinary teams at all levels	7-point Likert scale	Ahmed *et al.* (2018), Alkhaldi and Abdallah (2022)
	CQI5	The hospital's managers foster positive leadership in continuous improvement processes at all levels	7-point Likert scale	Ahmed *et al.* (2018), Alkhaldi and Abdallah (2022)
Lean management initiatives *(LM)*	LM1	The hospital implements the "5S" model to generate a more efficient work environment	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019)
	LM2	The hospital implements Value Stream Map (VSM) to detect waste and defects (Length of stay; cycle time; resources use, medication)	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019), (2021)
	LM3	The hospital implements kaizen methods to improve processes	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022) Peimbert-García *et al.* (2019)
	LM4	The hospital implements Just-in-time methods to improve work processes	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022) Peimbert-García *et al.* (2019)
Six sigma initiatives *(SS)*	SS1	The hospital implements tools to measure process improvement (Measurement system analysis GR&R; FMEA; Cause-effect matrix)	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019)
	SS2	The hospital regularly reviews improvement projects	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019)
	SS3	The hospital adopts a structured scientific approach to managing quality improvement activities, that involves all the unit members	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019)
	SS4	The hospital adopts a formal planning process to decide on the major quality improvement projects	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019)
	SS5	The hospital regularly reviews, all improvement projects	7-point Likert scale	Ahmed *et al.* (2018), Bhat *et al.* (2022), Peimbert-García *et al.* (2019)

(*continued*)

Table 2.
Dimension description

Dependent factor	Item code	Items	Measure	Adapted from
Patient safety *(PS)*	PS1	The hospital focuses on the reduction in the frequency of errors to ensure patient safety	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022)
	PS2	The hospital focuses on critical processes to improve patient safety	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022)
	PS3	The hospital increases awareness of errors among employees to ensure patient safety	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022)
	PS4	The hospital reduced the impact of errors in the medical services	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022)
	PS5	The hospital provides a positive work climate that promotes patient safety	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022)
Teamwork *(TW)*	TW1	When a lot of work needs to be done, we collaborate as a team to finish the job	7-point Likert scale	Ahmed *et al.* (2018)
	TW2	In the hospital, people treat each other with respect	7-point Likert scale	Ahmed *et al.* (2018)
	TW3	When some members of our unit are busy, the others help	7-point Likert scale	Ahmed *et al.* (2018)
	TW4	The hospital units work well together to provide the best care for patients	7-point Likert scale	Ahmed *et al.* (2018)
	TW5	Team leaders encourage employees to work as a team	7-point Likert scale	Ahmed *et al.* (2018)
Quality performance improvement (*QPI*)	QPI1	The cost of medical services has been reduced over the past years	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022), Alkhaldi and Abdallah (2022)
	QPI2	The severity of errors in medical services has been reduced over the past years	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022), Alkhaldi and Abdallah (2022)
	QPI3	The patient waiting time has been reduced over the past years	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022), Alkhaldi and Abdallah (2022)
	QPI4	The waste in hospital processes has been reduced over the past years	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022), Alkhaldi and Abdallah (2022)
	QPI5	The number of patient complaints has decreased over the past years	7-point Likert scale	Ahmed *et al.* (2018), Ahmed *et al.* (2022), Alkhaldi and Abdallah (2022)

Table 2.

Source(s): Authors' elaboration

selection method provides equal selection possibilities to all members of the population, reducing research bias in sample selection.

The survey was sent to a sample of 679 hospital employees across several private and public hospitals in Campania. A total of 441 responses were received. This resulted in a response rate of 64.9%. The respondents included physicians, nurses, pharmacists, paramedics and support staff.

The descriptive analysis revealed that most respondents, 270 (61.2%), were from public hospitals, and 171 (38.7%) were from private hospitals. In this study, 252 (57.1%) respondents were male and 189 (42.9%) were female. Regarding work experience, most of the respondents had been working for more than 10 years (76.4%), whereas 23.5% of the respondents had been working for between 1- and 10 years (Table 3).

3.2 Data collection and analysis

The questionnaire was administered between April and July 2022. The administration took place online using Google Forms. To mitigate the risk of social desirability bias, the confidentiality and anonymity of the surveys were made explicit. None of the questionnaires were excluded, and all the answers were suitable for analysis.

3.2.1 Scale reliability. To apply the proposed LSS framework in the Italian healthcare context, this study carried out factor analysis and reliability tests. Data analysis was performed using SPSS 23 software and involved different steps.

Factor analysis (FA) is used to explicate a concept structure and explain the higher part of the covariance using a few possible variables (dimensions or factors). Confirmatory Factor Analysis was employed to verify the factor structure of the set of observed variables. Principal component analysis (PCA) with varimax rotation was performed.

Each extracted factor was explained by each item on the scale by factor loading values of >6. Cumulative variance explained 84.878% of the variance. Table 4 illustrates Cronbach's alpha for each research variable. To check the scale's reliability, its internal consistency – that is "the degree of different items that are homogeneous in measuring the same underlying construct" (Cooper *et al.*, 2003, p. 436) – must be evaluated using Cronbach's alpha. When the value of Cronbach's alpha is greater than 0.7 the item scales are regarded as reliable. The alpha values ranged from 0.851 to 0.971, exceeding the minimum requirement of 0.70 (Hair *et al.*, 2006). Thus, the instruments were deemed reliable for this study.

Furthermore, the scale model was confirmed by testing Convergent Validity, also known as Average Variance Extracted (AVE). Hair *et al.* (2006) recommended that the AVE value should be above 0.50, to illustrate that the loaded items exhibit higher variance in the respective construct than the error term. This study showed AVE values ranging from 0.61 to 0.80. Moreover, the Composite Reliability (CR) for all the factors is within the range 0.88–0.95, higher than the recommended value of 0.70, which indicates that the constructs possess acceptable reliability.

Variable	Modalities	n	%
Gender	Male	252	57.14
	Female	189	42.86
Type of hospital	Public	270	61.22
	Private	171	38.78
Working experience	1–10 years	104	23.58
	Above 10 years	337	76.42

Source(s): Authors' elaboration

Table 3.
Sample description

Variables Code	Factor loading	CR	AVE	Cronbach's alpha
Continuous quality improvement *(CQI)*		0.94	0.78	0.967
CQI1	0.861			
CQI2	0.958			
CQI3	0.787			
CQI4	0.901			
CQI5	0.914			
Lean management initiatives *(LM)*		0.90	0.71	0.937
LM1	0.820			
LM2	0.884			
LM3	0.872			
LM4	0.794			
Six Sigma initiatives *(SS)*		0.95	0.80	0.971
SS1	0.852			
SS2	0.950			
SS3	0.898			
SS4	0.888			
SS5	0.899			
Patient safety *(PS)*		0.92	0.69	0.949
PS1	0.850			
PS2	0.854			
PS3	0.910			
PS4	0.804			
PS5	0.751			
Teamwork *(TW)*		0.88	0.61	0.929
TW1	0.737			
TW2	0.692			
TW3	0.755			
TW4	0.882			
TW5	0.844			
Quality performance improvement (*QPI*)		0.95	0.65	0.857
QPI1	0.680			
QPI2	0.880			
QPI3	0.848			
QPI4	0.895			
QPI5	0.731			

Note(s): Cumulative Variance 84.878%
Source(s): Authors' elaboration

Table 4.
Confirmatory factorial analysis

4. Findings

To achieve the research aims presented above, a multivariate analysis of variance (MANOVA) was conducted to test, first, whether the different types of hospitals, as well as hospital professionals, diverge in their average perceptions of LSS&QPI initiatives, and then whether the type of hospital shows a combined effect with gender on the different variables measured by the survey. The MANOVA showed the type of hospital had a statistically significant effect on each dimension of the LSS&QPI framework, as shown in Table 5. This significance was supported by the observed Eta^2 values. Post hoc analysis performed pair-wise comparisons to determine which type of hospital had the greatest mean on the six dimensions of LSS&QPI framework, and the results showed that public hospitals have the higher means in each group. Thus, public hospitals are significantly related to quality management initiatives, given that respondents working in public hospitals assessed all dependent variables (i.e. CQI, LM, SS, TW, PS and QPI) more positively than those workers in private hospitals.

Dependent variable	Type of hospital	Mean	SD	F-value	Eta^2
CQI	Public	0.350**	0.050	164.696	0.274
	Private	−0.665**	0.061		
LM	Public	0.371**	0.054	130.659	0.230
	Private	−0.611**	0.067		
SS	Public	0.308**	0.055	98.302	0.184
	Private	−0.547**	0.067		
PS	Public	0.306**	0.055	92.835	0.175
	Private	−0.532**	0.067		
TW	Public	0.279**	0.056	78.298	0.152
	Private	−0.507**	0.069		
QPI	Public	0.212**	0.060	34.081	0.072
	Private	−0.343**	0.074		

Note(s): * if sig. is less than 0.05; ** if sig. is less than 0.01; *** sig. is less than 0.005
Source(s): Authors' elaboration

Table 5.
MANOVA results by hospital type

Results from the MANOVA for the first dimension (CQI) showed that public hospitals have a significantly higher mean on CQI ($F(1.437) = 164.696$; $p < 0.001$; $\eta 2 = 0.274$), thus showing their attention to the continuous quality improvement of business processes and better personal attitudes of the individuals transferred to the working environment. Results for the second dimension (LM) were similar with the public hospitals having a significantly higher mean ($F(1.437) = 130.659$, $p << 0.001$; $\eta 2 = 0.230$) than the private hospitals. Therefore, it emerges that it is mostly public hospitals that introduce LM to emphasize patient needs, reduce costs and increase the efficiency and speed of medical service delivery. For the third dimension (SS) ($F(1.437) = 98.302$; $p << 0.001$; $\eta 2 = 0.184$) and for the fourth dimension (PS) ($F(1.437) = 92.835$; $p << 0.001$; $\eta 2 = 0.175$), the means are higher for the public hospitals, thus indicating that in public hospitals there is a higher orientation towards improvement initiatives, which consists of all practices aimed at error reduction (SS). Moreover, the same emerges for the prevention and improvement of adverse outcomes or injuries resulting from the healthcare process to achieve (PS). For the fifth dimension (TW) results ($F(1.437) = 78.298$; $p << 0.001$; $\eta 2 = 0.152$) suggested that in public hospitals, as shown by the higher mean, there is a greater predisposition in team working. In addition, for the sixth dimension (QPI) the results ($F(1.437) = 34.081$; $p << 0.001$; $\eta 2 = 0.072$) showed a significantly higher mean score in public hospitals. Accordingly, more attention is perceived to policies and practices that improve workforce management to achieve organisational objectives, and many employees recognize their contribution in improving quality performance to satisfy patients' needs. Generally, the results show that public hospitals are considered more open to quality management initiatives than private ones.

The results did not show any gender effect on the LSS&QPI framework dimensions except for TW (Wilks' Lamba $= 0.756$, $p < 0.01$). Specifically, male healthcare service providers have a higher perception of group dynamics ($M = 0.083$; SD $= 0.060$) than female healthcare providers ($M = -0.311$; SD $= 0.066$).

To understand whether the effect of gender on the dependent variables was due to the type of hospital, the interaction between the two independent variables (i.e. type of hospital*gender) was tested.

The MANOVA showed that the type of organisation and gender can influence perception towards LSS. The findings showed that there were only four out of six significant interactions between the type of hospital and gender (Table 6). Given these results, the differences between the types of hospitals for male and female healthcare service providers were examined separately. Concerning CQI, it emerged that for the public hospitals, there is a

Dependent variable	Type of hospital	Gender	Mean	SD	F-value	Eta^2
CQI	Public	Male	0.680***	0.062	43.441	0.090
		Female	0.020*	0.078		
	Private	Male	−0.866***	0.086	10.781	0.024
		Female	−0.464**	0.087		
LM	Public	Male	0.446	0.068	1.895	0.004
		Female	0.297	0.085		
	Private	Male	−0.738	0.093	3.654	0.008
		Female	−0.483	0.095		
SS	Public	Male	0.492**	0.068	11.385	0.025
		Female	0.124*	0.085		
	Private	Male	−0.823***	0.094	17.161	0.038
		Female	−0.270**	0.095		
PS	Public	Male	0.457**	0.069	7.507	0.017
		Female	0.156*	0.086		
	Private	Male	−0.821***	0.094	18.428	0.040
		Female	−0.242**	0.096		
TW	Public	Male	0.459**	0.070	10.342	0.023
		Female	0.098*	0.088		
	Private	Male	−0.294**	0.096	9.595	0.021
		Female	−0.720***	0.098		
QPI	Public	Male	0.232	0.075	0.103	0.000
		Female	0.193	0.094		
	Private	Male	−0.277	0.103	0.821	0.002
		Female	−0.410	0.105		

Note(s): * if sig. is less than 0.05; ** if sig. is less than 0.01; *** sig. is less than 0.005
Wilks Lamba test: Public Hospital: 0.835 $f = 14.209$ Sig.: 0.00** Eta^2: 0.165 - Private Hospital: 0.619 $f = 44.269$ Sig.: 0.00** Eta^2: 0.381
Source(s): Authors' elaboration

Table 6. MANOVA results by hospital type and gender

greater awareness among male workers ($M = 0.680$) of practices that improve operations, outcomes, systems processes, work environment and regulatory compliance, compared to female ($M = 0.020$). Conversely, in private hospitals, women showed significantly higher scores ($M = -0.464$) than their male counterparts ($M = -0.866$) and are therefore more aware of operations improvement practices.

Concerning SS in public hospitals, men scored higher ($M = 0.492$) than women ($M = 0.124$), thus displaying their better perception of SS initiatives, while for private hospitals, the reverse was found, with higher scores for women ($M = -0.270$) than for men ($M = -0.823$).

The results for PS disclosed that men ($M = 0.457$) scored higher than women ($M = 0.156$) showing that men were more aware than women of initiatives to improve patient safety in public hospitals, while in private hospitals, men ($M = -0.821$) scored significantly lower than women ($M = -0.242$) indicating the opposite was true. The last significant dimension was TW, the results for which showed that for both public [M(man) = 0.459; M(woman) = 0.098] and private [M(man) = −0.294; M(woman) = −0.720] hospitals, men scored higher than women, indicating that men showed a greater perception of teamwork initiatives than women. This result is consistent with the previous finding of the main effect of gender on the dependent variable TW. Generally, the results showed that in public hospitals, men have a greater awareness of LSS&QPI initiatives than their female colleagues. However, in private hospitals, the opposite occurs, with women more aware of initiatives such as CQI, SS and PS.

5. Discussion

Regarding readiness to employ LSS, the results confirming H1 showed that public hospitals are more likely to adopt LSS than private ones. These results can be justified by combining specific internal features and contextual dynamics, emphasizing the importance of contextual factors as triggers for LSS implementation. Therefore, the study results can be understood as a proxy for two important levers: public hospitals' resilience (Burke *et al.*, 2021) and patient-centredness (Wong *et al.*, 2020). In particular, incremental approaches for continuous quality improvement (CQI), the use of statistical analysis (SS), teamwork that promotes mutual trust and respect (TW) and an interconnected set of policies and practices that improve workforce management to achieve organisational goals (QPI) seems to be applied in public hospitals to better manage resources, support staff in redesigning processes and break down hierarchical barriers to build proactive capabilities towards resilience (Leite *et al.*, 2020). Thus, considering the environment in which public hospitals operate, LSS seems to be proactively implemented to build organisational resilience through risk mitigation and preparedness. The progressive reduction in funds for Italian public healthcare has led to a shortage of resources. Hence, it is important to valorise available resources (i.e. employees, hospital supplies and hospital assets) effectively and efficiently and to identify risks through systematic processes of monitoring and control to reduce instability, uncertainty and lack of reliability due to excessive processes variation (Hundal *et al.*, 2021). In sum, LSS improves public hospitals by stimulating continuous learning (Andersson and Pardillo-Baez, 2020).

At the same time, by adopting LSS, hospitals may enhance the process of serving patients (Bhat *et al.*, 2020; Antony *et al.*, 2019b), creating value from the customer's perspective. In fact, the higher mean of public hospitals on LM and PS led to the assumption that the implementation of LSS could be due to a focus that emphasize patient needs while reducing costs and increasing the efficiency of the speed of medical service delivery, as well as patient safety. This is mainly because Italian public hospitals aim to ensure accessibility, universality and quality of care, thereby enhancing the value for the patient (Marolla *et al.*, 2022). Accordingly, LM and PS seem to set the conditions to overcome the provider-centred approach to healthcare, placing the patient at the centre of healthcare service design and provision. Findings regarding private hospitals may be traced back to their focus on quick results and gains, which can undermine the long-term impacts of a culture of quality continuous improvement (Henrique and Godinho Filho, 2020). Private hospitals need to cope with strict timelines to achieve excellence and quality in highly specialized processes, likely undermining the implementation of a corporate culture based on LSS&QPI, mostly oriented towards long-term gains. Accordingly, improvements are usually implemented in specific departments and rarely at the organisational level (Brandao de Souza, 2009), and practitioners still focus on small-scale improvements without attempting to bring them together into a more comprehensive culture of change.

Regarding the second aim of the study, about researching gender differences towards LSS implementation, it is possible to assert that gender alone did not significantly affect the perception of LSS&QPI (except for TW). In contrast, supporting H2, gender differences emerged according to the type of hospital. Specifically, four dimensions were significant (i.e. CQI, SS, PS and TW), highlighting that for CQI, SS and PS, men in public hospitals had significantly higher scores than women, whereas in private hospitals, women showed higher scores than men. For the last dimension (TW), the results were quite different, showing higher scores for men in both types of hospitals, highlighting that women seem to be less inclined to work in teams. These findings are consistent with characteristics and conditions pertaining to the national healthcare system in Italy, which foster the rise of different organisational behaviour among its professionals. Indeed, the literature underlines the differences between the over-bureaucratized approach of public hospitals and the managerial approach of private ones (Rojas *et al.*, 2014). The rigidity of public

systems, and the institutional arrangements tend to marginalize women's interests and make it difficult to change the current situation (Fryer *et al.*, 2007). Reality suggests that women work much longer hours than men (United Nations, 2015, p. 87) and are exposed to lower pay and a significantly higher risk of unemployment (Truss *et al.*, 2013). This could lead to lower levels of engagement in the public sector, which may result in less willingness to embrace LSS&QPI initiatives.

In contrast, the managerial approach embraced in private hospitals, enhances the careers of healthcare professionals and their empowerment. Accordingly, women are encouraged to deploy quality improvement initiatives (Muntlin *et al.*, 2006) because they can grow more, learn more and focus on their careers and private lives, which also affects their willingness to embrace LSS&QPI initiatives. Also, the managerial approach sustains continuous improvement stimulating innovations by engaging them in exploratory innovative projects (Ciasullo *et al.*, 2022c) such as LSS. As stated by El Chaarani and Raimi (2022), women involved in the private healthcare improve their level of entrepreneurial innovation and idea generation. Their commitment has been beneficial, leading to improvements in the delivery of medical services, procedures and logistics. The findings related to men's scores in public hospitals could be intended as a stronger orientation towards viewing healthcare as a public service and related to the "face risk"/"uncertainty" (Wang and Feeney, 2016) trade-off that strongly fosters avoiding mistakes. The more risk taken, the more decision-making uncertainty regarding work processes decreases. In public hospitals, for instance, doctors can take responsibility for making professional decisions regarding a process, and the level of insecurity is correspondingly lowered. This could increase professional maturity, confidence and knowledge. This is in line with the study of Fryer *et al.* (2007) on continuous improvement in the public sector, where quality results from increasing certainty and eliminating anything that prevents regularity. Hence, men's results seem to be oriented towards public hospitals' stability, predictability and smooth operations to improve PS. Even though in private hospitals, the managerial approach stimulates discretionary decision-making, the lower score of men could be justified by their lower emotional intelligence level (Asiamah, 2017). Empathy, emotional engagement and helping others are typical female psychosocial traits that stimulate patient-centred care. Moreover, as stated above, men seem to be more task-oriented (Senge, 2006) and tend to focus more on PS than on patients' emotional status. According to Hall *et al.* (2014) male healthcare workers are more likely to display an emotionally disconnected and task-oriented manner. Eventually, regarding the TW dimension, in both types of hospitals a better perception of men compared to women is highlighted. This is consistent with other studies, according to which female physicians cooperate less with nurses than male physicians (Al-Hamdan *et al.*, 2018). Etherington *et al.* (2021) also reported that male nurses highlighted a better camaraderie with male physicians than with female nurses and physicians. Thus, women seem to expect less support overall, since they are treated with less respect and confidence and receive less assistance than their male counterparts. The results of this study can serve as a proxy according to which gender is frequently used to categorize others, perhaps even over professional roles (Elfenbein, 2016).

6. Theoretical and practical implications

This study contributes to the LSS literature by proposing a holistic framework that integrates hard and soft factors of TQM, and several theoretical and managerial implications arise.

First, findings regarding the relationship between the type of hospitals and LSS&QPI initiatives are quite surprising, given the presence of contextual barriers (Chanturidze and Saltman, 2020) and the stream of literature that highlights the superior engagement of private hospitals with LSS (Bhat *et al.*, 2020).

Second, LSS initiatives in public hospitals result from the business environment in which they operate, where the constant pressures on costs, the growing demand for care and assistance and the high variability of operational performance have led healthcare system to seek methods to increase the quality of service and value for internal and external stakeholders (Rosa *et al.*, 2021). Thus, LSS has emerged as a solution to improve the efficiency and effectiveness of healthcare providers and is becoming increasingly important for the successful of public hospitals. By adopting LSS, healthcare systems can improve the processes to serve patients better (Bhat *et al.*, 2020; Antony *et al.*, 2019b), maintain the continuity of hospital operations and recover from disruptions. The application of LSS in public hospitals seems to be a manifestation of the resilience capabilities (Leite *et al.*, 2020) and patient-centredness (Daly *et al.*, 2021). Lower scores in private hospitals seem to be a clear consequence of their attention to economic value and quick results that do not suit a long-term strategy such as LSS.

Third, the research allows the advancement of the LSS&QPI framework, which has been enriched with gender dynamics associated with specific behaviours at organisational level that can foster or prevent readiness towards LSS initiatives within public and private hospitals.

In private hospitals, a more positive evaluation of LSS&QPI initiatives from women than their male counterparts could be associated with the higher levels of compassion and empathy required (Zeidner *et al.*, 2013) by a corporate vision more oriented towards professional growth and innovation. On the other hand, in public hospitals, an organisational culture that is more goal-oriented than emphatically driven (Prenestini and Lega, 2013; Calciolari *et al.*, 2018) may explain the underestimation of women's experiences and emotional heritage, who, in contrast, find the private hospitals the ideal setting for the highest expression of their mindset. Conversely, for men, a more positive evaluation in public hospitals could be linked to an approach oriented towards stability, standardisation and smooth operations. Finally, this study revealed that gender affects perceptions of LSS&CQI initiatives in both contexts. In this regard, a very interesting implication is that even if women are more humanistic, emotional and caring, they show a lower willingness to work in team, which may negatively affect teamwork performance and the related organisational climate. This could represent an issue, since it has been recognized that, organisational behaviours such as teamwork, motivation and the ability to leverage emotions to solve everyday problems provide healthcare professionals with the opportunity to counteract feelings of dissatisfaction, enhance their self-esteem (Năstasă and Fărcaș, 2015) and improve organisational performance.

Finally, from a managerial point of view, this study sheds light on the silent revolution that, over the past two decades, has swept through public health and related outcome. The compelling need for a radical transformation towards a model that enhances patient value, reorganises processes, reduces or eliminates waste and shortens the time for service delivery is emerging. Thus, healthcare managers should spend time understanding LSS as a strategic orientation to promote the "lean hospital", improving processes and fostering patient-centredness.

Moreover, the research raises the demand for in-depth investigations of organisational behaviours from a gender perspective. More specifically, healthcare systems are called to build and train pluralistic teams (Nyein *et al.*, 2020), where there is contamination between goals, risk and empathy; between performance and emotional intelligence and between results and patient care. On the one hand, corporate training, empowerment initiatives and team building (Thomas and Suresh, 2023) could strengthen the cohesion of its members and raise their awareness of LSS&QPI; on the other hand, collaborative and cooperative behaviours among interprofessional team members open to enhancing gender-based cultural heritage could, in both public and private hospitals, valorise LSS&QPI initiatives by combining the two different but complementary approaches.

7. Conclusions, limitations and further research directions

This study examined LSS&QPI initiatives in public and private Italian hospitals to identify differences in their implementation and to investigate the effects of gender differences on healthcare professionals' behaviour. Previous studies have investigated LSS in public or private healthcare settings by focusing on specific processes (dos Reis *et al.*, 2022; Marin-Garcia *et al.*, 2021). However, this study provides a more holistic analysis, comparing Italian public and private hospitals and assessing the different perceptions of implementing LSS&QPI initiatives hospital-wide. The findings revealed that the healthcare staff of public hospitals are more engaged with quality management initiatives then private ones. Moreover, regarding gender differences, the results indicated that the type of hospital affected the LSS assessment. In fact, when introducing these practices within hospital settings, special attention should be paid to the specific context and organizational behaviour which denote gender heritages. This study has some limitations that should be considered. In addition to the type of hospital or gender differences, other elements that may affect the evaluation of LSS&QPI initiatives, such as the professional values and culture, were not included in this study. Further research could investigate if and how these psychological traits impact LSS initiatives within the healthcare service environment. Furthermore, quantitative research has limitations that constrain a deeper exploration and understanding of the constructs addressed. Mixed-method approaches should be employed to compensate for these limitations. Moreover, further qualitative studies could investigate the effectiveness of an emotional intelligence orientation in public hospitals to address the benefits that could be achieved for continuous service quality improvement. In addition, the investigation was limited to Italian public and private hospitals, making it difficult to generalize the findings to other countries. To better generalize the findings of this study, future studies should choose samples from different countries.

References

Abu Salim, S.S., Msallam, A.A., Al-Hila, A.A., Abu Naser, S.S. and Al Shobaki, M.J. (2018), "The dimensions of the lean management of Jawwal between theory and practice", *International Journal of Academic Management Science Research (IJAMSR)*, Vol. 2 No. 10, pp. 52-65.

Ahmed, S., Abd Manaf, N.H. and Islam, R. (2018), "Measuring Lean Six Sigma and quality performance for healthcare organisations", *International Journal of Quality and Service Sciences*, Vol. 10 No. 3, pp. 267-278, doi: 10.1108/IJQSS-09-2017-0076.

Ahmed, S., Hawarna, S., Alqasmi, I., Mohiuddin, M., Rahman, M.K. and Ashrafi, D.M. (2022), "Role of Lean Six Sigma approach for enhancing the patient safety and quality improvement in the hospitals", *International Journal of Healthcare Management*, pp. 1-11, doi: 10.1080/20479700.2022.2149082.

Al-Hamdan, Z., Dalky, H. and Al-Ramadneh, J. (2018), "Nurses' professional commitment and its effect on patient safety", *Global Journal of Health Science*, Vol. 10 No. 1, pp. 111-118, doi: 10.5539/gjhs.v10n1p111.

Al-Rjoub, S.R., Aldiabat, B.F. and Yassine, F.L.Y.A. (2023), "The impact of employee empowerment on continuous improvement of health care: an empirical and comparative study between hospitals", *Business: Theory and Practice*, Vol. 24 No. 1, pp. 13-23, doi: 10.3846/btp.2023.16667.

Ali, J., Jusoh, A., Idris, N., Nor, K.M., Wan, Y., Abbas, A.F. and Alsharif, A.H. (2023), "Applicability of healthcare service quality models and dimensions: future research directions", *The TQM Journal*, Vol. 35 No. 6, pp. 1378-1393, doi: 10.1108/TQM-12-2021-0358.

Alkhaldi, R.Z. and Abdallah, A.B. (2020), "Lean management and operational performance in health care: implications for business performance in private hospitals", *International Journal of Productivity and Performance Management*, Vol. 69 No. 1, pp. 1-21, doi: 10.1108/IJPPM-09-2018-0342.

Alkhaldi, R.Z. and Abdallah, A.B. (2022), "The influence of soft and hard TQM on quality performance and patient satisfaction in health care: investigating direct and indirect effects", *Journal of Health Organisation and Management*, Vol. 36 No. 3, pp. 368-387, doi: 10.1108/JHOM-10-2020-0416.

Alraja, M. (2022), "Frontline healthcare providers' behavioural intention to Internet of Things (IoT)-enabled healthcare applications: a gender-based, cross-generational study", *Technological Forecasting and Social Change*, Vol. 174, 121256, doi: 10.1016/j.techfore.2021.121256.

Alsharif, A.H., Salleh, N.Z.M., Baharun, R., Hashem, E.A.R., Mansor, A.A., Ali, J. and Abbas, A.F. (2021), "Neuroimaging techniques in advertising research: main applications, development, and brain regions and processes", *Sustainability*, Vol. 13 No. 11, p. 6488, doi: 10.3390/su13116488.

Andersson, R. and Pardillo-Baez, Y. (2020), "The Six Sigma framework improves the awareness and management of supply-chain risk", *The TQM Journal*, Vol. 32 No. 5, pp. 1021-1037, doi: 10.1108/TQM-04-2019-0120.

Antony, J., Rodgers, B. and Cudney, E.A. (2017), "Lean Six Sigma for public sector organisations: is it a myth or reality?", *International Journal of Quality and Reliability Management*, Vol. 34 No. 9, pp. 1402-1411, doi: 10.1108/IJQRM-08-2016-0127.

Antony, J., Forthun, S.C., Trakulsunti, Y., Farrington, T., McFarlane, J., Brennan, A. and Dempsey, M. (2019a), "An exploratory study into the use of Lean Six Sigma to reduce medication errors in the Norwegian public healthcare context", *Leadership in Health Services*, Vol. 32 No. 4, pp. 509-524, doi: 10.1108/LHS-12-2018-0065.

Antony, J., Sunder, M.V., Sreedharan, R., Chakraborty, A. and Gunasekaran, A. (2019b), "A systematic review of Lean in healthcare: a global prospective", *International Journal of Quality and Reliability Management*, Vol. 36 No. 8, pp. 1370-1391, doi: 10.1108/IJQRM-12-2018-0346.

Antony, J., Sony, M., McDermott, O., Jayaraman, R. and Flynn, D. (2023), "An exploration of organisational readiness factors for Quality 4.0: an intercontinental study and future research directions", *International Journal of Quality and Reliability Management*, Vol. 40 No. 2, pp. 582-606, doi: 10.1108/IJQRM-10-2021-0357.

Aoun, M., Hasnan, N. and Al-Aaraj, H. (2018), "Relationship between lean practices, soft total quality management and innovation skills in Lebanese hospitals", *Eastern Mediterranean Health Journal*, Vol. 24 No. 3, doi: 10.26719/2018.24.3.269.

Asiamah, N. (2017), "The nexus between health workers' emotional intelligence and job performance: controlling for gender, education, tenure and in-service training", *Journal of Global Responsibility*, Vol. 8 No. 1, pp. 10-33, doi: 10.1108/JGR-08-2016-0024.

Avnimelech, G. and Zelekha, Y. (2023), "Religion and the gender gap in entrepreneurship", *International Entrepreneurship and Management Journal*, Vol. 1 No. 37, doi: 10.1007/s11365-023-00855-4.

Bhat, S., Antony, J., Gijo, E.V. and Cudney, E.A. (2020), "Lean Six Sigma for the healthcare sector: a multiple case study analysis from the Indian context", *International Journal of Quality and Reliability Management*, Vol. 37 No. 1, pp. 90-111, doi: 10.1108/IJQRM-07-2018-0193.

Bhat, S., Gijo, E.V., Antony, J. and Cross, J. (2022), "Strategies for successful deployment and sustainment of Lean Six Sigma in healthcare sector in India: a multi-level perspective", *The TQM Journal*, Vol. 35 No. 2, pp. 414-445, doi: 10.1108/TQM-10-2021-0302.

Brandao de Souza, L. (2009), "Trends and approaches in lean healthcare", *Leadership in Health Services*, Vol. 22 No. 2, pp. 121-139, doi: 10.1108/17511870910953788.

Burke, S., Parker, S., Fleming, P., Barry, S. and Thomas, S. (2021), "Building health system resilience through policy development in response to COVID-19 in Ireland: from shock to reform", *The Lancet Regional Health-Europe*, Vol. 9 No. 100223, doi: 10.1016/j.lanepe.2021.100223.

Calciolari, S., Prenestini, A. and Lega, F. (2018), "An organisational culture for all seasons? How cultural type dominance and strength influence different performance goals", *Public Management Review*, Vol. 20 No. 9, pp. 1400-1422, doi: 10.1080/14719037.2017.1383784.

Capolupo, N., Virglerová, Z. and Adinolfi, P. (2023), "Managing TQM's soft side: an explorative study of social care multiservice organisations", *The TQM Journal*, Vol. ahead-of-print No. ahead-of-print doi: 10.1108/TQM-01-2022-0037.

Carmassi, C., Dell'Oste, V., Bertelloni, C.A., Pedrinelli, V., Barberi, F.M., Malacarne, P. and Dell'Osso, L. (2022), "Gender and occupational role differences in work-related post-traumatic stress symptoms, burnout and global functioning in emergency healthcare workers", *Intensive and Critical Care Nursing*, Vol. 69, 103154, doi: 10.1016/j.iccn.2021.103154.

Chanturidze, T. and Saltman, R.B. (2020), "Hospitals in different environments: a messy reality", in *Understanding Hospitals in Changing Health Systems*, Palgrave Macmillan, Cham, pp. 139-165, doi: 10.1007/978-3-030-28172-4_7.

Chiarini, A. and Baccarani, C. (2016), "TQM and lean strategy deployment in Italian hospitals: benefits related to patient satisfaction and encountered pitfalls", *Leadership in Health Services*, Vol. 29 No. 4, pp. 377-391, doi: 10.1108/LHS-07-2015-0019.

Chiarini, A. and Bracci, E. (2013), "Implementing lean six sigma in healthcare: issues from Italy", *Public Money and Management*, Vol. 3 No. 5, pp. 361-368, doi: 10.1080/09540962.2013.817126.

Ciasullo, M.V., Manna, R., Cavallone, M. and Palumbo, R. (2020), "Envisioning the future of health systems: exploratory insights from European countries", *Futures*, Vol. 121, 102585, doi: 10.1016/j.futures.2020.102585.

Ciasullo, M.V., Lim, W.M., Manesh, M.F. and Palumbo, R. (2022a), "The patient as a prosumer of healthcare: insights from a bibliometric-interpretive review", *Journal of Health Organisation and Management*, Vol. 36 No. 9, pp. 133-157, doi: 10.1108/JHOM-11-2021-0401.

Ciasullo, M.V., Orciuoli, F., Douglas, A. and Palumbo, R. (2022b), "Putting Health 4.0 at the service of Society 5.0: exploratory insights from a pilot study", *Socio-Economic Planning Sciences*, Vol. 80, 101163, doi: 10.1016/j.seps.2021.101163.

Ciasullo, M.V., Montera, R. and Douglas, A. (2022c), "Environmental sustainability orientation and ambidextrous green innovation: do the roles of women on corporate boards matter?", *Sinergie Italian Journal of Management*, Vol. 40 No. 2, pp. 209-231, doi: 10.7433/s118.2022.10.

Cooper, D.R., Schindler, P.S. and Sun, J. (2003), *Business Research Methods*, 8th ed., McGraw-Hill, Irwin, Boston, p. 15.

Crosetto, P. and Filippin, A. (2023), "Safe options and gender differences in risk attitudes", *Journal of Risk and Uncertainty*, Vol. 1 No. 28, doi: 10.1007/s11166-022-09400-0.

Dafna, K. (2008), "Managerial performance and business success: gender differences in Canadian and Israeli entrepreneurs", *Journal of Enterprising Communities: People and Places in the Global Economy*, Vol. 2 No. 4, pp. 300-331, doi: 10.1108/17506200810913890.

Dahlgaard, J.J., Pettersen, J. and Dahlgaard-Park, S.M. (2011), "Quality and lean health care: a system for assessing and improving the health of healthcare organisations", *Total Quality Management and Business Excellence*, Vol. 22 No. 6, pp. 673-689, doi: 10.1080/14783363.2011.580651.

Daly, A., Wolfe, N., Teeling, S.P., Ward, M. and McNamara, M. (2021), "Redesigning the process for scheduling elective orthopaedic surgery: a combined lean six sigma and person-centred approach", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 22, 11946, doi: 10.3390/ijerph182211946.

Davies, C., Lyons, C. and Whyte, R. (2019), "Optimizing nursing time in a day care unit: quality improvement using Lean Six Sigma methodology", *International Journal for Quality in Health Care*, Vol. 31 No. Supplement_1, pp. 22-28, doi: 10.1093/intqhc/mzz087.

De Koeijer, R., Strating, M., Paauwe, J. and Huijsman, R. (2022), "A balanced approach involving hard and soft factors for internalizing Lean Management and Six Sigma in hospitals", *The TQM Journal*, Vol. ahead-of-print No. ahead-of-print, doi: 10.1108/TQM-01-2022-0031.

Deshpande, S.P. and Joseph, J. (2009), "Impact of emotional intelligence, ethical climate, and behavior of peers on ethical behavior of nurses", *Journal of Business Ethics*, Vol. 85, pp. 403-410, doi: 10.1007/s10551-008-9779-z.

Doğan, N.Ö. and Unutulmaz, O. (2016), "Lean production in healthcare: a simulation-based value stream mapping in the physical therapy and rehabilitation department of a public hospital", *Total Quality Management and Business Excellence*, Vol. 27 Nos 1-2, pp. 64-80, doi: 10.1080/14783363.2014.945312.

dos Reis, M.E.D.M., de Abreu, M.F., Neto, O.D.O.B., Viera, L.E.V., Torres, L.F. and Calado, R.D. (2022), "DMAIC in improving patient care processes: replication and Lessons learned in context of healthcare", *IFAC-PapersOnLine*, Vol. 55 No. 10, pp. 549-554, doi: 10.1016/j.ifacol.2022.09.451.

Douglas, J., Antony, J. and Douglas, A. (2015), "Waste identification and elimination in HEIs: the role of Lean thinking", *International Journal of Quality and Reliability Management*, Vol. 32 No. 9, pp. 970-981, doi: 10.1108/IJQRM-10-2014-0160.

Durairatnam, S., Chong, S., Jusoh, M. and Dharmaratne, I. (2021), "Does people-related total quality management 'work' for people? An empirical study of the Sri Lankan apparel industry", *The TQM Journal*, Vol. 33 No. 6, pp. 1183-1200, doi: 10.1108/TQM-06-2020-0140.

El Chaarani, H. and Raimi, L. (2022), "Diversity, entrepreneurial innovation, and performance of healthcare sector in the COVID-19 pandemic period", *Journal of Public Affairs*, Vol. 22, e2808, doi: 10.1002/pa.2808.

Elfenbein, D.M. (2016), "Confidence crisis among general surgery residents: a systematic review and qualitative discourse analysis", *JAMA Surgery*, Vol. 151 No. 12, pp. 1166-1175, doi: 10.1001/jamasurg.2016.2792.

Ershadi, M.J., Najafi, N. and Soleimani, P. (2019), "Measuring the impact of soft and hard total quality management factors on customer behavior based on the role of innovation and continuous improvement", *The TQM Journal*, Vol. 31 No. 6, pp. 1093-1115, doi: 10.1108/TQM-11-2018-0182.

Etherington, C., Kitto, S., Burns, J.K., Adams, T.L., Birze, A., Britton, M., Singh, S. and Boet, S. (2021), "How gender shapes interprofessional teamwork in the operating room: a qualitative secondary analysis", *BMC Health Services Research*, Vol. 21 No. 1, pp. 1-16, doi: 10.1186/s12913-021-07403-2.

Fiorillo, A., Sorrentino, A., Scala, A., Abbate, V. and Dell'aversana Orabona, G. (2021), "Improving performance of the hospitalization process by applying the principles of Lean Thinking", *The TQM Journal*, Vol. 33 No. 7, pp. 253-271, doi: 10.1108/TQM-09-2020-0207.

Fryer, K.J., Antony, J. and Douglas, A. (2007), "Critical success factors of continuous improvement in the public sector: a literature review and some key findings", *The TQM Magazine*, Vol. 19 No. 5, pp. 497-517, doi: 10.1108/09544780710817900.

Goldstein, S.M. and Naor, M. (2005), "Linking publicness to operations management practices: a study of quality management practices in hospitals", *Journal of Operations Management*, Vol. 23 No. 2, pp. 209-228, doi: 10.1016/j.jom.2004.07.007.

Gowen, C., III, McFadden, K. and Settaluri, S. (2012), "Contrasting continuous quality management, Six Sigma, and lean management for enhanced outcomes in US hospitals", *American Journalof Business*, Vol. 27 No. 2, pp. 133-153, doi: 10.1108/19355181211274442.

Gumus, G., Borkowski, N., Deckard, G.J. and Martel, K.J. (2009), "Gender differences in professional development of healthcare managers", *Leadership in Health Services*, Vol. 22 No. 4, pp. 329-339, doi: 10.1108/17511870910996123.

Hair, J.F., Tatham, R.L., Anderson, R.E. and Black, W. (2006), *Multivariate Data Analysis*, Vol. 6, Pearson Prentice Hall, Upper Saddle River, NJ.

Hall, J.A., Gulbrandsen, P. and Dahl, F.A. (2014), "Physician gender, physician patient-centered behavior, and patient satisfaction: a study in three practice settings within a hospital", *Patient Education and Counseling*, Vol. 95 No. 3, pp. 313-318, doi: 10.1016/j.pec.2014.03.015.

Harrington, L. (2007), "Quality improvement, research, and the institutional review board", *Journal for Healthcare Quality*, Vol. 29 No. 3, pp. 4-9, doi: 10.1111/j.1945-1474.2007.tb00187.x.

Henrique, D.B. and Godinho Filho, M. (2020), "A systematic literature review of empirical research in Lean and Six Sigma in healthcare", *Total Quality Management and Business Excellence*, Vol. 31 Nos 3-4, pp. 429-449, doi: 10.1080/14783363.2018.1429259.

Hundal, G.S., Thiyagarajan, S., Alduraibi, M., Laux, C.M., Furterer, S.L., Cudney, E.A. and Antony, J. (2021), "Lean Six Sigma as an organisational resilience mechanism in health care during the era of COVID-19", *International Journal of Lean Six Sigma*, Vol. 12 No. 4, pp. 762-783, doi: 10.1108/IJLSS-11-2020-0204.

Hung, D.Y., Harrison, M.I., Truong, Q. and Du, X. (2018), "Experiences of primary care physicians and staff following lean workflow redesign", *BMC Health Services Research*, Vol. 18 No. 1, pp. 1-8, doi: 10.1186/s12913-018-3062-5.

Hussain, M. and Malik, M. (2016), "Prioritizing lean management practices in public and private hospitals", *Journal of Health Organisation and Management*, Vol. 30 No. 3, pp. 457-474, doi: 10.1108/JHOM-08-2014-0135.

Imeri, S., Kekäle, T., Takala, J. and Liu, Y. (2014), "Understanding the impact of 'hard'and 'soft'elements of TQM in south-east European firms", *Management and Production Engineering Review*, Vol. 5 No. 3, pp. 9-13, doi: 10.1515/mper-2015-0022.

Improta, G., Borrelli, A. and Triassi, M. (2022), "Machine learning and lean six sigma to assess how COVID-19 has changed the patient management of the complex operative unit of neurology and stroke unit: a single center study", *International Journal of Environmental Research and Public Health*, Vol. 19 No. 9, p. 5215, doi: 10.3390/ijerph19095215.

Juliani, F. and de Oliveira, O.J. (2021), "Linking practices to results: an analysis toward Lean Six Sigma deployment in the public sector", *International Journal of Lean Six Sigma*, Vol. 12 No. 2, pp. 293-317, doi: 10.1108/IJLSS-02-2020-0017.

Kaplan, H.C., Brady, P.W., Dritz, M.C., Hooper, D.K., Linam, W.M., Froehle, C.M. and Margolis, P. (2010), "The influence of context on quality improvement success in health care: a systematic review of the literature", *The Milbank Quarterly*, Vol. 88 No. 4, pp. 500-559, doi: 10.1111/j.1468-0009.2010.00611.x.

Karmarkar, U.R. (2023), "Gender differences in "optimistic" information processing in uncertain decisions", *Cognitive, Affective, and Behavioral Neuroscience*, Vol. 1 No. 11, doi: 10.3758/s13415-023-01075-7.

Khalili, A., Ismail, Md.Y., Karim, A.N.M. and Daud, M.R.C. (2019), "Quality management practices and sustainable performance: examining the role of soft TQM as mediator", *International Journal of Industrial and Systems Engineering*, Vol. 31 No. 2, pp. 250-277, doi: 10.1504/IJISE.2019.097739.

Latessa, I., Fiorillo, A., Picone, I., Balato, G., Trunfio, T.A., Scala, A. and Triassi, M. (2021), "Implementing fast track surgery in hip and knee arthroplasty using the lean Six Sigma methodology", *The TQM Journal*, Vol. 33 No. 7, pp. 131-147, doi: 10.1108/TQM-12-2020-0308.

Laureani, A., Brady, M. and Antony, J. (2013), "Applications of lean six sigma in an Irish hospital", *Leadership in Health Services*, Vol. 26 No. 4, pp. 322-337, doi: 10.1108/LHS-01-2012-0002.

Leite, H., Lindsay, C. and Kumar, M. (2020), "COVID-19 outbreak: implications on healthcare operations", *The TQM Journal*, Vol. 33 No. 1, pp. 247-256, doi: 10.1108/TQM-05-2020-0111.

Leong, T.W. and Teh, P.L. (2013), "Critical success factors of Six Sigma in original equipment manufacturer company in Malaysia", *International Journal of Synergy and Research*, Vol. 1 No. 1, pp. 7-21.

Li, Z., Liu, J., Li, H., Huang, Y. and Xi, X. (2023), "Primary healthcare pharmacists' perceived organisational support and turnover intention: do gender differences exist?", *Psychology Research and Behavior Management*, Vol. 16, pp. 1181-1193, doi: 10.2147/PRBM.S406942.

Limpanyalert, P. (2018), "Patient safety in Thailand", in *Global Patient Safety: Law, Policy and Practice*, Taylor & Francis, pp. 175-189.

Liu, N.Y., Hsu, W.Y., Hung, C.A., Wu, P.L. and Pai, H.C. (2019), "The effect of gender role orientation on student nurses' caring behaviour and critical thinking", *International Journal of Nursing Studies*, Vol. 89, pp. 18-23, doi: 10.1016/j.ijnurstu.2018.09.005.

Marin-Garcia, J.A., Vidal-Carreras, P.I. and Garcia-Sabater, J.J. (2021), "The role of value stream mapping in healthcare services: a scoping review", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 3, p. 951, doi: 10.3390/ijerph18030951.

Marolla, G., Rosa, A. and Giuliani, F. (2022), "Addressing critical failure factors and barriers in implementing Lean Six Sigma in Italian public hospitals", *International Journal of Lean Six Sigma*, Vol. 13 No. 3, pp. 733-764, doi: 10.1108/IJLSS-01-2021-0018.

McDermott, O., Antony, J., Bhat, S., Jayaraman, R., Rosa, A., Marolla, G. and Parida, R. (2022), "Lean Six Sigma in healthcare: a systematic literature review on challenges, organisational readiness and critical success factors", *Processes*, Vol. 10 No. 10, 1945 doi: 10.3390/pr10101945.

McDermott, O., Antony, J., Sony, M., Rosa, A., Hickey, M. and Grant, T.A. (2023), "A study on Ishikawa's original basic tools of quality control in healthcare", *The TQM Journal*, Vol. 35 No. 7, pp. 1686-1705, doi: 10.1108/TQM-06-2022-0187.

McLaughlin, C.P. and Kaluzny, A.D. (2004), *Continuous Quality Improvement in Health Care: Theory, Implementation, and Applications*, Jones & Bartlett Learning.

Moody, R.C. and Pesut, D.J. (2006), "The motivation to care: application and extension of motivation theory to professional nursing work", *Journal of Health Organisation and Management*, Vol. 20 No. 1, pp. 15-48, doi: 10.1108/14777260610656543.

Muntlin, Å., Gunningberg, L. and Carlsson, M. (2006), "Patients' perceptions of quality of care at an emergency department and identification of areas for quality improvement", *Journal of Clinical Nursing*, Vol. 15 No. 8, pp. 1045-1056, doi: 10.1111/j.1365-2702.2006.01368.x.

Năstasă, L.E. and Fărcaş, A.D. (2015), "The effect of emotional intelligence on burnout in healthcare professionals", *Procedia-Social and Behavioral Sciences*, Vol. 187, pp. 78-82, doi: 10.1016/j.sbspro.2015.03.015.

Nyein, K.P., Caylor, J.R., Duong, N.S., Fry, T.N. and Wildman, J.L. (2020), "Beyond positivism: toward a pluralistic approach to studying "real" teams", *Organisational Psychology Review*, Vol. 10 No. 2, pp. 87-112, doi: 10.1177/2041386620915593.

Peimbert-García, R.E., Matis, T., Beltran-Godoy, J.H., Garay-Rondero, C.L., Vicencio-Ortiz, J.C. and López-Soto, D. (2019), "Assessing the state of lean and six sigma practices in healthcare in Mexico", *Leadership in Health Services*, Vol. 32 No. 4, pp. 644-662, doi: 10.1108/LHS-02-2019-0011.

Persis, D.J., Sunder, M.V., Sreedharan, V.R. and Saikouk, T. (2022), "Improving patient care at a multi-speciality hospital using lean six sigma", *Production Planning and Control*, Vol. 33 No. 12, pp. 1135-1154, doi: 10.1080/09537287.2020.1852623.

Prenestini, A. and Lega, F. (2013), "Do senior management cultures affect performance? Evidence from Italian public healthcare organisations", *Journal of Healthcare Management*, Vol. 58 No. 5, pp. 336-351.

Rathi, R., Kaswan, M.S., Antony, J., Cross, J., Garza-Reyes, J.A. and Furterer, S.L. (2023), "Success factors for the adoption of green lean six sigma in healthcare facility: an ISM-MICMAC study", *International Journal of Lean Six Sigma*, Vol. 14 No. 4, pp. 864-897.

Reibling, N., Ariaans, M. and Wendt, C. (2019), "Worlds of healthcare: a healthcare system typology of OECD countries", *Health Policy*, Vol. 123 No. 7, pp. 611-620, doi: 10.1016/j.healthpol.2019.05.001.

Robertson, E., Morgan, L., New, S., Pickering, S., Hadi, M., Collins, G., Rivero Arias, O., Griffin, D. and McCulloch, P. (2015), "Quality improvement in surgery combining lean improvement methods with teamwork training: a controlled before-after study", *Plos One*, Vol. 10 No. 9, p. e0138490, doi: 10.1371/journal.pone.0138490.

Rojas, D., Seghieri, C. and Nuti, S. (2014), "Organisational climate: comparing private and public hospitals within professional roles", *Suma De Negocios*, Vol. 5 No. SPE11, pp. 10-14, doi: 10.1016/S2215-910X(14)70015-1.

Rosa, A., Marolla, G., Lega, F. and Manfredi, F. (2021), "Lean adoption in hospitals: the role of contextual factors and introduction strategy", *BMC Health Services Research*, Vol. 21, pp. 1-18, doi: 10.1186/s12913-021-06885-4.

Rosenau, P.V. and Linder, S.H. (2003), "Two decades of research comparing for-profit and non-profit health provider performance in the United States", *Social Science Quarterly*, Vol. 84 No. 2, pp. 219-241, doi: 10.1111/1540-6237.8402001.

Scala, A., Ponsiglione, A.M., Loperto, I., Della Vecchia, A., Borrelli, A., Russo, G., Triassi, M. and Improta, G. (2021), "Lean six sigma approach for reducing length of hospital stay for patients with femur fracture in a university hospital", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 6, p. 2843, doi: 10.3390/ijerph18062843.

Schechter, N.E. and Wegener, S.T. (2022), "The Johns Hopkins patient engagement program: improving patient engagement, improving patient outcomes", *Quality Management in Healthcare*, Vol. 31 No. 2, pp. 105-106.

Schiavone, F., Leone, D., Sorrentino, A. and Scaletti, A. (2020), "Re-designing the service experience in the value co-creation process: an exploratory study of a healthcare network", *Business Process Management Journal*, Vol. 26 No. 4, pp. 889-908, doi: 10.1108/BPMJ-11-2019-0475.

Senge, P.M. (2006), *The Fifth Discipline: The Art and Practice of the Learning Organisation*, 2nd ed., Random House, London.

Sloan, T., Fitzgerald, A., Hayes, K.J., Radnor, Z., Robinson, S. and Sohal, A. (2014), "Lean in healthcare–history and recent developments", *Journal of Health Organisation and Management*, Vol. 28 No. 2, doi: 10.1108/JHOM-04-2014-0064.

Sollecito, W.A. and Johnson, J.K. (Eds) (2013), "The global evolution of continuous quality improvement: from Japanese manufacturing to global health services", in *McLaughlin and Kaluzny's Continuous Quality Improvement in Health Care*, Jones & Bartlett Learning, Burlington, MA, pp. 3-47.

Thomas, A. and Suresh, M. (2023), "Readiness for sustainable-resilience in healthcare organisations during Covid-19 era", *International Journal of Organisational Analysis*, Vol. 31 No. 1, pp. 91-123, doi: 10.1108/IJOA-09-2021-2960.

Trakulsunti, Y., Antony, J., Edgeman, R., Cudney, B., Dempsey, M. and Brennan, A. (2022), "Reducing pharmacy medication errors using Lean Six Sigma: a Thai hospital case study", *Total Quality Management and Business Excellence*, Vol. 33 Nos 5-6, pp. 664-682, doi: 10.1080/14783363.2021.1885292.

Truss, C., Delbridge, R., Alfes, K., Shantz, A. and Soane, E. (Eds) (2013), *Employee Engagement in Theory and Practice*, Routledge, London.

Ulhassan, W., Sandahl, C., Westerlund, H., Henriksson, P., Bennermo, M., von Thiele Schwarz, U. and Thor, J. (2013), "Antecedents and characteristics of lean thinking implementation in a Swedish hospital: a case study", *Quality Management in Healthcare*, Vol. 22 No. 1, pp. 48-61, doi: 10.1097/QMH.0b013e31827dec5a.

United Nations (2015), *The Worlds Women 2015 Trends and Statistics*, United Nations, New York.

Vanichchinchai, A. (2022), "Relationships among lean, service quality expectation and performance in hospitals", *International Journal of Lean Six Sigma*, Vol. 13 No. 2, pp. 457-473, doi: 10.1108/IJLSS-11-2020-0210.

Wang, S. and Feeney, M.K. (2016), "Determinants of information and communication technology adoption in municipalities", *The American Review of Public Administration*, Vol. 46 No. 3, pp. 292-313, doi: 10.1177/0275074014553462.

Wang, Y.X., Yang, Y.J., Wang, Y., Su, D., Li, S.W., Zhang, T. and Li, H.P. (2019), "The mediating role of inclusive leadership: work engagement and innovative behaviour among Chinese head nurses", *Journal of Nursing Management*, Vol. 27 No. 4, pp. 688-696, doi: 10.1111/jonm.12754.

Waring, J.J. and Bishop, S. (2010), "Lean healthcare: rhetoric, ritual and resistance", *Social Science and Medicine*, Vol. 71 No. 7, pp. 1332-1340, doi: 10.1016/j.socscimed.2010.06.028.

Weinfurkt, P. (1995), "Multivariate analysis of variance", in Grimm, L.G. and Yarnold, P.R. (Eds), *Reading and Understanding Multivariate Statistics*, American Psychological Association, Washington, DC.

WHO (2017), *Patient Safety: Making Health Care Safer*, World Health Organization, Geneva.

Wong, E., Mavondo, F. and Fisher, J. (2020), "Patient feedback to improve quality of patient-centred care in public hospitals: a systematic review of the evidence", *BMC Health Services Research*, Vol. 20 No. 1, pp. 1-17, doi: 10.1186/s12913-020-05383-3.

Zeidner, M., Hadar, D., Matthews, G. and Roberts, R.D. (2013), "Personal factors related to compassion fatigue in health professionals", *Anxiety, Stress and Coping*, Vol. 26 No. 6, pp. 595-609, doi: 10.1080/10615806.2013.777045.

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