

How digitalization (un)changes performance management and operations in healthcare organizations: implementation experience in a surgical theatre.

Abstract

Purpose – Healthcare information systems can support both clinical and managerial decisions, enhancing performance and creating value for patients and healthcare professionals. The study explores how digital healthcare information systems influence managerial decision-making, by transforming performance management systems and, in turn, operational activities.

Design/methodology/approach – An action research was conducted to assess the change process undertaken by an Italian public healthcare organization that implemented a digital healthcare information system to replace paper registries and improve the operating theatre's performance. The action research lasted approximately 15 months. Data were collected in close collaboration with clinical and administrative staff. A digital performance dashboard was developed to support performance monitoring. The study builds on Lapsley and Pettigrew's (1994) organizational change model to analyse how performance management and operational activities evolved, and to identify key influencing factors.

Findings – Despite initial enthusiasm, the hospital performance management system remained focused on volume-based metrics, without integrating the dashboard indicators. Operational activities showed limited change, reflecting a decline in healthcare professionals perceived usefulness of the digital tool. Contributing factors to this stagnation were discontinuity in leadership commitment, an unclear change agenda, lack of alignment between strategic and operational levels and an unsupportive organizational culture.

Originality/value – The study highlights that digital healthcare information systems hold significant informational potential to transform managerial decision-making. However, their realization depends on critical factors that, when effectively addressed, can enable the transformation of performance management systems and operational activities. These factors are essential in creating value for all stakeholders involved, including patients.

Keywords – Digital information systems, healthcare, performance management, decision-making, operating theatre

Paper type – Research paper

1. Introduction

In the healthcare sector, digitalization has spread across multiple domains, ranging from service delivery to administrative processes (Dal Mas et al., 2023; Tortorella et al., 2020). In this evolving landscape, a wide array of digital tools has been integrated into healthcare organizations (HOs) to support decision-making. This support involves clinical practices, but also administrative processes such as human resource management, strategic planning, performance management (PM), supply chain management, and procurement (Mauro et al., 2024; Sandunika Ilangakoon et al., 2022). Digital tools have thus the potential to improve clinical outcomes, as well as quality of care, organizational wellbeing, and efficiency, which in turn contribute to enhance value for patients and healthcare providers (Kraus et al., 2021; Massaro, 2023; Spanò et al., 2023).

Specifically, digital healthcare information systems (HISs), understood as integrated technological platforms for collecting, processing, and disseminating data, have reached widespread diffusion (Mishra et al., 2022). These systems include for example electronic health records, computerized physician order entry, and digitally- or AI-enabled platforms for planning and scheduling hospital operations (Cresswell et al., 2017; Petropoulos et al., 2025).

Recent literature has highlighted the potential of these digital HISs to support clinical but also managerial decision-making, by digitizing and automating the collection and analysis of performance-related data. Digital HISs allow the integrated tracking of patient flows, resource utilization, and procedural timelines, providing

both clinical and administrative managers with practicable information to support the definition and monitoring of hospital activity and performance (Karahanna et al., 2019). Accordingly, by converting raw data into real-time and structured dashboards, digital HISs enable data-informed decision-making processes at both strategic (i.e., top management) and operational (i.e., clinical unit) levels (Lega et al., 2013; Walshe and Smith, 2011).

While existing studies have extensively focused on the role of digital HISs in supporting clinical decision-making (Kraus et al., 2021; Mwogosi & Kibusi, 2024), their transformative potential for PM - defined as the bundle of activities quantifying performance, defining a measurement object, formulating strategic goals and indicators, collecting, analysing and reporting data (Cepiku, 2016) - remains an empirical question. This is particularly true regarding their impact on operational activity (Di Falco et al., 2024). Operational activities are understood as the set of actions through which healthcare professionals translate organizational goals, defined at the strategic level, into specific outputs, ensuring the providing of healthcare services, the efficient use of resources, and the delivery of patient care (Bhargava & Nath Mishra, 2014; Langabeer & Helton, 2016). To address this gap, this study aims to empirically explore the influence of digital HISs on managerial decision-making processes, by examining how these systems transform HOs' PM systems and, in turn, operational activities. The study focuses on the surgical context, particularly, operating theatres. These hospital assets are increasingly supported by digital and data-driven tools to enhance performance and inform managerial decisions, making them a valuable setting for investigation (Abdalkareem et al., 2021; Denton et al., 2010).

In particular, the study builds on an action research (Yin, 1989) conducted in an Italian public HO that introduced a digital HIS to replace paper-based operating registries, used to record and track surgical procedures and resource use, with the aim of enhancing operating theatre performance. The active participation in the change process allowed to examine how the digital HIS and, more specifically, the digital performance dashboard developed with data from the tool, transformed the HO's PM system and then operational activities. In the operating theatre, these activities concern the translation of strategic performance objectives into monthly, weekly, and daily planning and scheduling of surgical practices, as well as their implementation and adherence (Cardoen et al., 2010; Youn et al., 2022). The dashboard supported these activities by providing timely and structured performance data that enabled more effective allocation of surgical slots, enhanced coordination among professionals and resources, and supported continuous monitoring of deviations between planned and actual surgical performance.

The study builds on the organizational change model proposed by Lapsley and Pettigrew (1994), along with its subsequent adoptions in the healthcare context (Guven-Uslu & Conrad, 2011; Shi et al., 2025), complemented by research on the informativeness of performance information (Cepiku et al., 2024; Johnsen et al., 2024; Kroll, 2015).

This theoretical framework provides a lens for analysing how digitalization interacts with organizational structures, leadership, and culture in shaping the transformation of PM systems and operational activities (Shi et al., 2025).

Data were collected through multiple data sources, including participatory meeting, field observations, and both unstructured and structured interviews with key stakeholders, such as top management, administrative managers, Heads of Clinical Unit, and operating theatre staff (e.g., surgeons, anaesthetists and nurses).

The study contributes to highlight that the introduction of digital HISs has a key role in fostering the creation of real-time digital performance dashboards, with great potential to improve PM systems and in turn operational activities. However, it also shows how this transformative potential cannot be taken for granted. Instead, it is influenced by key factors that can undermine such change. The study provides evidence of these key factors, encouraging healthcare managers and policymakers to take action.

The article is structured as follows. Section 2 investigates the literature on digital HISs and their role in organizational change within healthcare. Building on this background, the section 3 presents the research setting and methodology employed. Then, the study's findings are presented in Section 4 and discussed in Section 5. Finally, the last section outlines the study's conclusions, limitations, and directions for future research.

2. Digital HISs and managerial decisions in healthcare

Digital transformation has significantly reshaped the structure and functioning of HOs. Specifically, digital HISs have unprecedented potential to help HOs reconfigure their decision-making processes (Basile et al., 2025; Dal Mas et al., 2020; Vial, 2019). By enabling the systematic collection, processing, and sharing of data across organizational units, these digital systems provide an information base that can support both clinical and managerial practices (Ker et al., 2018; Tortorella et al., 2020).

Through this data integration, digital HISs generate timely and evidence-based information that inform the definition, measurement, and monitoring of performance objectives at multiple organizational levels (Agostino et al., 2022; Bardhan et al., 2025; Massaro, 2023). In doing so, they enable healthcare managers to set, communicate, and monitor performance targets, as well as they allow to translate strategic goals into operational activities (Cerchione et al., 2023; Da Silva et al., 2020). This process establishes a direct connection between data-informed PM and decision-making at operational level, facilitating alignment between strategic priorities and clinical practice (Guvén-Uslu & Conrad, 2011).

Moreover, the data generated through these systems enhance the informational potential available for performance measurement, enabling the development of indicators that go beyond traditional output-based metrics and include process-oriented dimensions, such as resource utilization efficiency (Aceto et al., 2018; Di Falco et al., 2024). These indicators enrich the informational depth of performance data, providing actionable insights to support both strategic and operational decision-making (Cifalinò et al., 2023; Fanelli et al., 2023).

Realizing the full potential of digital HISs, however, requires changing the PM systems of HOs in order to effectively translate digital data into decision-useful information (Cannavacciuolo et al., 2023). Moreover, the effectiveness of digital HIS-enabled PM systems themselves depends on their ability to generate information that is perceived as meaningful and useful by clinical professionals and administrative staff (Abernethy & Vagnoni, 2004; Da Silva et al., 2020). When performance indicators built through data retrieved from digital HISs are aligned with professionals' priorities and perceived as enhancing decision quality, healthcare providers are more likely to engage with them constructively (Oppi et al., 2019; Prenestini & Noto, 2023). Without such alignment, these systems risk being underused or resisted in practice (Cifalinò et al., 2023; Kerpershoek et al., 2016; Lapsley, 2007).

Within this perspective, the informativeness of performance data (namely, its relevance, timeliness, and actionability) is central to how digital information supports behavioural change and performance improvement (Cepiku et al., 2024; Johnsen et al., 2024; Kroll, 2015).

2.1 Digital HISs and PM change in healthcare: a conceptual model

The information generated through digital HISs must be effectively interpreted and used at both strategic and operational levels, informing decision-making and guiding organizational activities. Ensuring that these two levels are aligned is essential for transforming the information potential of digital systems into effective organizational improvements (Mwogosi et al., 2024; Mwogosi & Kibusi, 2024a).

To explore how digital HISs influence managerial decision-making, particularly in relation to changes in PM and, in turn, operational activities, this study builds on the organizational change model developed by Lapsley and Pettigrew (1994), subsequently adapted for healthcare contexts (Guvén-Uslu & Conrad, 2011; Shi et al., 2025). The model has been used to investigate how digital tools foster or hinder PM change within public sector and healthcare organizations (Padovani et al., 2014).

In this paper, the model is applied to analyse the change process fostered by the introduction of digital HIS, specifically exploring the influence on decision-making processes in terms of transformations in the operating theatre's PM system and operational activities. In particular, the model allows to explore the organizational

factors that shape such transformations. In line with Lapsley and Pettigrew (1994), eight key dimensions are considered:

1. *Environmental Pressure*: the presence of external institutional pressure asking for a broad span of real-time and transparent performance information about operational activities can drive the development of new PM systems based on data generated by digital HISs.
2. *Supportive Organisation Culture*: a culture that encourages data use can significantly influence change processes in HOs driven by the integration of information produced by digital HISs into decision-making processes, legitimizing the adoption of digital indicators to manage PM systems and enhance operational activities.
3. *The Quality and Coherence of Policy*: clear and coherent policies defining data standards and rules for the use of digital HIS-generated indicators shape how professionals understand and engage with performance information.
4. *The Change Agenda and its Locale*: the success of a digital HIS depends on an explicit change agenda that links the system's introduction to specific outcomes (e.g., redesigning performance objectives). Misalignment may result in symbolic adoption of the digital tools without meaningful transformation of operational activities.
5. *Key People Leading Change*: the presence of key people leading the change (e.g., top management and clinical managers) is essential to legitimize the introduction of the digital HIS, promote engagement and foster the adoption of digital information to improve planning and scheduling of surgical practices.
6. *Managerial-Clinical Relations*: a strong relationship between administrative and clinical staff is important to ensure that digital HISs-generated performance data are perceived as meaningful and constructive from all the actors, both in terms of accountability and clinical outcomes' improvement.
7. *Simplicity and Clarity of Goals*: clear and well-communicated performance objectives should be mapped and drawn into digital HIS-generated key performance indicators. This clarity enhances the usability of digital data, aligning PM systems with decision-making.
8. *Co-operative Inter-Organisation Networks*: collaborative networks within HO support knowledge sharing and mutual learning. Such cooperation facilitates the effective implementation of digital HIS-enabled PM systems and their translation in operational activities.

3. Research design

This study adopts an action research approach (Kaplan, 1998; Coughlan & Coughlan, 2002; Casey et al., 2023) to assess the change process undertaken by an Italian public HO that implemented a digital HIS to replace paper-based registries and enhance the overall performance of its operating theatre.

The public HO under analysis serves a population of 1.5 million inhabitants across three hospital sites, with a total capacity of 544 beds. The organization adopts a department-based model and delivers extensive healthcare services, including about 17,000 inpatient admissions per year, 6,000-day hospital treatments, 109,000 emergency room accesses, and 915,000 outpatient visits across 27 medical specialties. The operating theatre under analysis comprises seven operating rooms used by approximately 18 surgical operating units, performing about 2,600 surgical procedures annually.

In particular, the digital tool was introduced to digitize the planning and scheduling of surgical practices, with the goal of reducing data entry errors and delays in time recording. The system allows entering time slots and expected durations of surgical practices, increasing the number of time-stamped events per surgery (e.g., patient entry into the operating room), and enabling real-time tracking of room occupancy and deviations from the planned schedule. By structuring these data, the digital HIS supports timely performance analysis, facilitating continuous improvement in operating theatre management.

Action research is a form of field study that “examines a contemporary phenomenon within its real-world context, especially when the boundaries between the phenomenon and context are not clearly evident and

multiple sources of evidence are used” (Yin, 1989, p. 23). It allows to build scientific knowledge through the direct analysis of a phenomenon (Casey et al., 2023; Coughlan & Coughlan, 2002). Specifically, it enables to analyze change processes within organizational settings, by actively collaborating with individuals directly engaged in the change effort (Lewin, 1946).

The action research approach was applied through active participation to the implementation of the digital HIS and the digital performance dashboard, interacting with top management, administrative staff, and healthcare professionals. This approach allowed the analysis of how the digital HIS and the digital performance dashboard influenced decision-making at both strategic and operational levels.

The research followed two cycles, each consisting in four key stages: *diagnosis*, *action planning*, *action taking*, *evaluation and learning* (Coughlan & Coughlan, 2002).

The aims of the phases of both action research cycles are illustrated in Figure 1.

Figure 1. Action research aims. Source: Authors' own work

[INSERT FIGURE 1]

First cycle. During the *diagnosis phase* (about 5 weeks), the initial organizational needs driving the HO's decision to adopt the digital HIS, as well as the emerging challenges during its implementation, particularly concerning staffing, workflow, and logistics, were identified. The diagnostic work included one field observation within the surgical theatre and a participatory meeting with the Medical Director and operating theatre staff, including surgeons, anesthetists (particularly the surgical block coordinator), and nurses. During the meeting, goals and expectations of research were aligned, and the roles within the collaboration of researchers and hospital staff were clearly defined.

The *action planning stage* (about 5 weeks) involved the reconstruction of the pre-digital HIS “as-is” situation to understand the organizational context, including infrastructure, logistics, information flows, and existing planning and performance monitoring processes. This analysis covered surgical planning procedures, patient logistics (operating rooms opening and closing times, protocols for urgent and emergency cases), and related services (transportation, turnover and surgical instrument sterilization). Data were collected from the HO's databases and validated during a participatory meeting with HO's top management (General Director, Medical Director and Site Medical Director) administrative staff (Healthcare Information Flow Management and Care Process Analysis, Information and Communication Systems and Technologies, Procurement, Risk Management, Management Control, Clinical Engineering), healthcare professionals including Directors of Operating Units (Gastroenterology, General Surgery, Urology, Oncology, Vascular, Maxillofacial, Week Surgery), surgeons, the operating theatre coordinator and anesthetists, the nursing coordinator and nurses, and representatives of the company providing the digital HIS.

At this point, the HO formally introduced the digital HIS to manage operating theatre activities. Subsequently, the *action taking phase* (about 15 weeks) involved analyzing the data extracted from the system to identify a set of indicators for assessing the operating theatre performance. These indicators were drawn from the National guidelines¹ for managing the surgical pathway, supplemented with additional context-specific measures.

The digital performance dashboard was designed in collaboration between the hospital staff and the researchers. Data processing (including text cleaning, missing-value handling, and data standardization) enabled structured analysis and visualization, by using R software to automate report generation and produce visual outputs to support interpretation.

¹ In 2020 the Italian Ministry of Health introduced the Guidelines for the Management of the Elective Surgical Patient Pathway with the aim of improving efficiency in surgical workflows. These guidelines place particular emphasis on the measurement of surgical pathway performance by HOs, promoting the use of effective and standardized indicators, such as raw utilization, start-time tardiness or over-time. Some of these indicators are mandatorily calculated by HOs and shared with regional and national authorities.

To capture user perspectives on the digital HIS and its performance dashboard, a first round (T0) of structured interviews was conducted with administrative staff and healthcare professionals. Specifically, 173 structured interviews were collected at T0, comprising 164 with healthcare professionals and 9 with the administrative staff. Interviews first collected demographic information and assessed system usability (Lewis, 1995). Then, drawing on Abernethy and Vagnoni (2004), questions explored the informativeness of performance data for decision-making, examining whether the type and quantity of available metrics were considered appropriate to support decisions in operational activities.

Finally, participants were asked whether data collected through the digital HIS and the dashboard could be used to inform both strategic and operational decision-making in the planning and scheduling of surgical activities.

The cycle concluded with the *evaluation and learning* phase (about 1 week), during which the digital performance dashboard and key findings from the first round of interviews were presented in a participatory restricted meeting with HO's top management (General Director, Medical Director and Site Medical Director), laying the base for the next cycle of analysis and refinement.

Second cycle. The first cycle led to the identification of the organization's emerging need, namely to determine which performance indicators were most relevant for continuous monitoring and improvement. Consequently, during the *diagnosis phase* (about 2 weeks) of the second cycle a subset of high-priority indicators was identified through a participatory meeting with the HO's top management to support corrective actions and enhance the performance of the operating theatre. Based on this shared selection, the research team and the top management agreed that the chosen indicators would be systematically monitored through periodic reporting, to be developed in the following phase.

In the *action planning* (about 15 weeks) phase, the calculated indicators were extracted monthly from the digital performance dashboard and incorporated into reports that presented their absolute values, trends since the implementation of the digital HIS, and percentage deviations over the entire observation period, highlighting whether each trend was desirable or not. The reports included data for all elective surgical procedures performed in the operating theatre and each indicator provided both an overall view of the entire operating theatre and a disaggregated view by individual operating rooms. A second follow-up participatory meeting was held with managerial, administrative, and healthcare professionals, with the same composition as the meeting during the action planning phase of the first cycle, to review and discuss performance trends emerging from these reports.

The *action taking* (about 20 weeks) phase involved compiling a comprehensive final performance report using data from the digital performance dashboard and conducting a second round (T1) of structured interviews with administrative staff and healthcare professionals. At T1, 123 structured interviews were collected, comprising 117 with healthcare professionals and 6 with administrative staff. This stage aimed to assess changes in perceptions compared with T0 and to evaluate whether the information provided in the summary reports was considered useful for informing decision-making. Moreover, researchers investigated with HO's top management whether the use of the digital performance dashboard had prompted a transformation in the HO's PM system or in daily operational activities within the surgical theatre.

Finally, the *evaluation and learning* phase (about 3 weeks) presented the results of the second cycle in a participatory meeting with all stakeholders (managerial, administrative, and healthcare professionals, along with representatives of the company providing the digital HIS). Particular attention was given to assessing whether and how operational activities had evolved based on the insights generated through the digital HIS and performance indicators.

The structure of action research is presented in Table I.

Table I. Action research structure. Source: Authors' own work

[INSERT TABLE I]

4. Findings

4.1 *The influence of the digital HIS on the operating theatre's performance*

The primary goal of the HO was to implement a digital HIS for improving the operating theatre performance. To support the monitoring of operating theatre performance, the hospital developed a digital performance dashboard, counting 21 indicators derived from the data collected through the digital HIS. These indicators provide a comprehensive view of the operating rooms by monitoring different performance dimensions: some track the patient flow within the surgical pathway (e.g., anesthesia duration, surgical procedure time), others measure surgical volumes (e.g., production volume, case mix by type), resource utilization efficiency (e.g., operating rooms' use and underuse), or time management (e.g., delays in the start of scheduled activities). To facilitate periodical monitoring and reporting, the HO's top management prioritized a set of indicators. The annual trends and value of these selected indicators are presented in Table 2.

Table II. Indicators included in monthly reports. Source: Authors' own work
[INSERT TABLE II]

Over the study period, the volume of surgical procedures remained unchanged. Similarly, the utilization rate of the operating theatre showed only a slight decrease (-3%). The time between the opening of the operating room and the induction of anesthesia for the first procedure of the day improved moderately (+11% for all surgeries) and more markedly for elective procedures (+46%). Initial delays in elective surgeries decreased by 30%. Turnover time remained stable for elective surgeries (-1%) but increased overall when considering all procedures (+30%). Lastly, the underutilization time remained stable for elective procedures (-3%), though a slight increase of 11% when all procedures were considered.

4.2 *The influence of the digital HIS on managerial decision-making*

The study aimed to explore how the digital HIS and the digital performance dashboard influenced decision-making processes by analyzing changes in the operating theater's PM system and, in turn, in operational activities, namely planning and scheduling of surgical practices, as well as their implementation and adherence. Findings revealed a strong initial enthusiasm for the digital HIS upon its introduction in the HO, reflecting the perceived opportunities it offered in terms of data retrieval, performance monitoring, and surgical scheduling. Accordingly, the operating theatre staff described the digital HIS as "*a significant step forward*", "*an excellent idea*" and "*a highly valuable tool*". Both clinical and administrative staff acknowledged the necessity of digitization for improving performance, organizational wellbeing and patient value creation. Structured interviews at the time of the digital HIS introduction (T0) confirmed this perception: over 55% of the operating theatre staff considered the indicators derived from the system data as highly useful for developing a performance evaluation system and for supporting decision-making related to surgical planning and scheduling.

The digital performance dashboard was equally valued by top management. The General Director of the HO highlighted its significance during the first participatory meeting by stating:

"It is important that these results are disseminated, as they provide a comprehensive picture and clearly document what is happening in the operating theatre".

Similarly, the HO's Medical Director emphasized:

“Seeing the trend of these indicators makes us realize where we can improve”, adding that “digitalization of the operating rooms is merely a tool and its value depends on the strategy within which it is embedded”.

Despite this shared enthusiasm, the study revealed that PM systems associated with the activity of the operating theatre and the surgical pathway remained focused on volume-based metrics, without integrating the dashboard’s indicators. As the General Director noted in the last meeting:

“The performance management system has continued to focus primarily on volume, that is, the total count of surgical procedures performed in the operating theatre”.

Similarly, the operating theatre coordinator confirmed:

“The output that is monitored and prioritized is productivity, measured in terms of number of surgical procedures. For the hospital, it is important that this number remains stable, as it is interpreted as an indication that operations are continuing at the same level as before”.

This misalignment left many expectations among operating theatre staff unmet. The operating room coordinator stated:

“For us practitioners, if something is done well and seriously, everyone benefits. But if we are not collaborative, nothing will change, and no one will benefit,” adding that “introducing change without measuring it means that we don’t know if it’s effective or not: this is how informed decisions are made”.

Although healthcare professionals recognized the dashboard’s ability to extract meaningful data, they did not perceive a clear pathway for integrating these insights into daily decision-making or organizational routines. One surgeon observed:

“The digital platform is useful for clinical governance and setting performance goals, but we don’t have guidance on how to integrate it into our day-to-day clinical work”.

A decline was observed in the perception of the informativeness of performance information: while at the first round of structured interviews (T0), the percentage of respondents expressing at least partial agreement was already moderate (37%), by the time the staff had access to monthly reports on performance indicators selected in collaboration with the HO’s top management (T1), it had declined further to 25%. Similarly, the perceived usefulness of the indicators for developing a new PM system and informing decision-making related to operating theatre activities also declined from T0 (55%) to T1 (40%).

Several interrelated factors may have contributed to the lack of transformation in PM systems and operational activities.

Although the project leadership (HO’s top management) remained largely committed to the implementation process and performance monitoring through the digital HIS, governance continuity was disrupted by changes in key roles, namely the turnover of both the HO’s Medical Director, who played an important role in bridging clinical staff and hospital top management during the transition from the paper registry to the digital HIS, and the Director of ICT and digital transformation.

Moreover, external institutional pressures, including ministerial and regional directives, emphasized the need for monitoring the surgical pathway in order to enhance surgical capacity and ensure appropriate bed utilization. A regional report was published to support efforts, reduce waiting lists and improve on-time surgical rates. The project leadership primarily utilized the digital HIS and the performance dashboard to fulfill institutional data-reporting obligations, rather than to drive changes in PM systems. As the HO’s Medical Director later revealed: *“we implemented the technological tool, focusing on making the ‘technical’ side work, without accompanying it with a review of the managerial side of the processes”.*

Additionally, the study highlighted a lack of goal clarity and a comprehensive change strategy: while the initial aim of the digital HIS implementation was to improve operating theatre performance, there was no clear

definition of measurable targets or indicator thresholds able to support decision-making and guiding staff behavior. In other words, there was no shared understanding of how the digital HIS and dashboard would be used to shape future PM and operational activities.

Aligned with this, there was no formal integration between digital HIS-generated data and the organization's performance evaluation or reward mechanisms. Staff were neither assessed on behavioral improvements, such as punctuality in starting surgical sessions, nor given structured feedback linked to dashboard metrics. The operating room coordinator remarked that *"everyone tends to be very self-referential in the operating theatre,"* and noted that *"it is often impossible to foster communication among surgeons, who come from environments where such collaboration is not the norm. The operating theatre requires full sharing of information; otherwise, it harms other specialties. This should also be supported by measures such as sanctions for uncooperative behavior"*.

Lastly, although the HO's top management was committed to monitor indicators and discuss results with the Heads of Clinical Units, the organization's culture remained largely focused on productivity volumes. Although a culture of change was present, as evidenced by the top management's willingness to engage with researchers through the implementation of the digital HIS, a culture oriented toward PM was lacking. Consequently, the innovative digital indicators were used primarily for monitoring during the action research period, without being integrated into a broader transformation of PM practices, as emerged in the final participatory meeting.

Nonetheless, this weakening of the collaborative climate did not reduce staff willingness to engage in goal setting. Operating theatre professionals continued to view the digital HIS as a powerful enabler of a more objective and transparent PM system. Notably, the level of desired involvement in the definition of PM objectives increased over time. In particular, the proportion of operating theatre staff expressing the highest level of agreement with the importance of being involved in setting performance targets rose from 25% at T0 to 30% at T1, indicating a growing awareness of the need to link performance monitoring with operating theatre goals.

5. Discussion

The study aimed to explore the influence of digital HISs on managerial decision-making, by examining how these technologies shape HOs' PM systems and, in turn, operational activities. An action research methodology was employed to explore how the implementation of a digital HIS, introduced to replace paper-based operating registries and improve the operating theatre's performance, affected PM and operational activities.

The active participation in the implementation process contributed to the design of a digital performance dashboard, built using data extracted from the system. This dashboard was developed to capture and display key performance indicators for the operating theatre. Such engagement facilitated an in-depth exploration of how digital HISs in operating theatres generate data that can produce valuable information for supporting top management in enhancing performance monitoring. This information also assists healthcare professionals in informing the planning and scheduling of surgical practices, as well as their daily work. By showing the development and use of the digital performance dashboard, this study first contributes to the literature on digital HIS (Bardhan et al., 2025; Mauro et al., 2024; Mwogosi et al., 2024) empirically showing how, beyond their clinical applications, these systems can generate meaningful data to support managerial decision-making and improve PM systems and operational activities in healthcare organizations. Despite the introduction of the digital HIS and the performance dashboard, the hospital PM system remained anchored to traditional productivity-based indicators for monitoring and planning in the operating theatre, providing only an aggregated view of outputs and failing to capture process-oriented improvements. The study thus enabled to analyse a failure in the transformation of HO's PM system and operational activities. The conservative approach aligns with previous studies (e.g., Basile et al., 2024; Cannavacciuolo et al., 2023) that highlight how the introduction of digital tools in HO does not automatically produce a rethinking of underlying organizational

mechanisms. From a change management perspective, this may reflect a form of organizational inertia (Zhang et al., 2024), understood as the tendency of individuals and organizations to rely on pre-existing knowledge and routines, even when compared with innovations. As highlighted by the study's findings, the PM "un-change" then negatively affected clinicians' perception of the informativeness of data provided by the digital HIS, contributing to limit their willingness to change operational activities, particularly regarding planning and scheduling of surgical practices, as well as their implementation.

Furthermore, the study allowed to shed light on the organizational factors that influenced the lack of change. Collectively, these factors hindered the integration of digital HIS data into PM systems and prevented their translation into concrete improvements of operational activities.

Primarily, the findings underscore the importance of *leadership commitment*, emphasizing that leaders should not only support the introduction of a digital HIS in HOs but also leverage its potential to reshape PM and operational activities. As Thanh Hoai and Nguyen (2023) argued, leadership plays a fundamental role in transforming digital adoption into organizational change by actively steering the reconfiguration of processes, aligning strategic priorities and ensuring that digital tools such as digital HISs are fully integrated into daily activities.

Although *key people leading the change* were involved into the construction of the digital performance dashboard, the lack of continuity in leadership weakened the broader organizational transformation. The transition in the Medical Director role, which had previously facilitated communication between clinical and administrative teams, affected the collaborative environment that had supported the digital HIS implementation. This deterioration in relations meant that performance data generated by the digital HIS were increasingly perceived by clinicians as an administrative burden rather than a tool for clinical improvement. Without strong collaboration *between managerial and clinical staff*, the dashboard indicators were perceived as having limited relevance or practical value for guiding operational change. This discontinuity had also an influence on the way *external institutional pressures* were exploited: instead of being seen as an opportunity to promote the use of standardized and effective indicators to drive change in PM, they were interpreted as a mere accountability demand. Specifically, the HO's top management failed to benefit from these pressures to revise and align PM systems. Rather, the digital HIS was mainly used to produce the required reports, without embedding the generated data into mechanisms for organizational change. As Cavicchi and Vagnoni (2024) argued, external institutional pressures should not be treated solely as compliance requirements, but rather as catalysts for rethinking PM systems and enhancing decision-making processes.

Similarly, without a clearly defined *change agenda*, the introduction of the digital HIS remained a technological implementation rather than an organizational transformation. The HO failed to fully achieve the potential of the digital HIS and of the digital performance dashboard as tools to support decision-making. Instead, the dashboard was primarily used for monitoring purposes. This limitation became even more significant considering that clinicians initially showed strong interest and expressed a clear willingness to collaborate in using the tool to review surgical scheduling practices. However, their original enthusiasm gradually faded due to the lack of alignment between strategic and operational levels, which prevented changes to PM systems and, in turn, hindered the effective use of the dashboard. This finding aligns with previous research, which suggests that professionals are more likely to engage when digital HISs are aligned with their information needs and effectively support their operational activities (Hellman et al., 2015).

The absence of *clear goals* compromised these expectations and diminished the perceived value of the system. This sense of "un-change" was reinforced by a broader *incoherence* between the initial emphasis on fostering a data-driven culture and the lack of effective strategic action by the leadership. In this regard, the failure to cultivate an organizational culture supportive of data use appears to have further hindered the digital potential into changes of operational activities. As noted in previous research, the successful integration of digital HISs into HOs requires not only technological readiness, but also the development of shared values and practical activities aligned with the logic of PM and data-informed decision-making (Spanò & Ginesti, 2022).

The absence of a shared and sustained *change agenda* made this cultural gap even more visible, generating disillusionment among professionals and undermining both the transformative potential of the digital system

and the initial enthusiasm of clinical staff, who, as is widely documented, often show resistance toward both PM systems and organizational change in healthcare settings (McDonald & Roland, 2009). Lastly, the study did not identify a significant influence of *co-operative inter-organizational networks* on the change process analysed.

6. Conclusion

This study employed an action research approach to explore how the implementation of a digital HIS, built to generate performance-related data and enhance performance in a hospital operating theatre context, influenced decision-making in terms of PM and operational activities change.

By providing empirical evidence, this study highlights the informational potential of digital HISs to support managerial decisions, improve performance monitoring, and strengthen the link between strategic and operational levels. However, it also demonstrates that the introduction of a digital tool alone is not sufficient to generate meaningful transformation.

Drawing on the organizational change model developed by Lapsley and Pettigrew (1994), and engaging with research on the informativeness of performance information and its role in supporting managerial decision-making (Cepiku et al., 2024; Johnsen et al., 2024; Kroll, 2015), the study revealed that the absence or fragmentation of key enabling factors may result in a condition of “un-change” in PM systems and operational activities, despite the implementation of a digital HIS. The findings show that, while the introduction of the digital HIS and its digital performance dashboard improved the HO’s ability to collect, analyse and report surgical performance data, the information generated by the dashboard wasn’t used to support meaningful changes in PM systems, nor to guide transformations in operational activities. This highlights that the implementation of digital technologies alone is not sufficient to produce change. Long-term change can be enabled through the activation of key factors: continuity in leadership commitment, strong managerial-clinical relations, a clear change agenda, alignment between strategic and operational levels, coherent policies defining data standards and usage protocols, clarity of goals, and a supportive organizational culture. When these factors are absent or fragmented (as observed with discontinuity in leadership commitment, weakened managerial-clinical relations, an unclear change agenda, lack of alignment between strategic and operational levels, incoherent data policies, and an unsupportive organizational culture), the implementation of digital HIS risks remaining a mere technological upgrade rather than a driver of organizational transformation.

The study’s findings also point to several practical implications for HOs seeking to leverage digital HISs to improve performance management and decision-making.

First, introducing a new technological system, such as a digital HIS, must be accompanied by a broader reconfiguration of managerial and operational activities, supported by an organizational culture that encourages the use of data. Without this organizational rethinking, even sophisticated digital infrastructures risk becoming passive reporting tools rather than active levers for change.

Second, the study emphasizes the importance of the continuity of leadership commitment and of key people leading change. While early champions often drive initial engagement and support among clinical staff, their influence needs to be maintained over time and embedded within a stable governance background. When leadership support is inconsistent or short-lived, it can invalidate the digital HIS’s capacity in producing changes in PM systems and be used for modifying operational activities. It’s important for HOs to assure the presence of key individuals who can effectively bridge administrative and clinical domains for ensuring that performance data are perceived as meaningful by all stakeholders. These relations should be institutionalized rather than dependent on specific individuals, so that turnover in leadership positions does not disrupt the collaborative climate necessary for successful PM system change.

As a result, the implementation of digital technologies risks to remain superficial, without fostering the deeper organizational transformation they are expected to enable (Longenecker & Longenecker, 2014).

Third, organizations must articulate a clear change agenda defining concrete operational and strategic goals, linking them explicitly to the digital tools, and ensuring they are understood and embraced across organizational levels (Cannavacciuolo et al., 2023; Cifalinò et al., 2023).

Fourth, external pressures, such as regional mandates or institutional demands for transparency, should not be treated as mere compliance requirements. When such pressures are addressed only through symbolic and bureaucratic fulfilments, HOs risk missing their transformative potential (Cavicchi et al., 2024).

Fifth, clinicians have demonstrated a clear willingness to engage with digital performance tool, particularly when they perceive them as useful and aligned with their work. However, it is the responsibility of top management to harness this enthusiasm to drive organizational change, otherwise the risk of disillusionment and passive resistance may materialize (Oppi et al., 2019).

Some limitations should be acknowledged. First, the research is based on a single public hospital, which may affect the generalizability of results. Future studies could investigate the use of digital HISs and their effects on PM systems and decision-making processes in different HOs, such as hospitals operating in diverse institutional contexts or adopting other types of digital technologies. Second, the study followed an action research approach over a specific timeframe, approximately 15 months. Longitudinal research would be valuable to assess how the impact of digital HISs unfolds over time and under which conditions digital tools contribute to structural changes in PM systems.

Moreover, the study did not observe a significant influence of co-operative inter-organisational networks on the change process. This suggests the need for further research to investigate how inter-organizational collaborations may shape or support PM change starting from digital HISs in healthcare.

Finally, while this study focused on one specific digital tool, future research could also examine how other technologies aimed at supporting managerial and operational activities are embedded into HOs, and what organizational configurations support their effective use. Broader comparative investigations across multiple hospitals would not only enrich the theoretical understanding of digital transformation but also offer practical guidance to healthcare managers and policymakers seeking to implement sustainable, technology-driven improvements in performance management.

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