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Taking action to improve health for all

Examining the role of digital technologies in supporting managerial processes in healthcare: insights from Belgian public hospitals.

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1. INTRODUCTION

1.1 Introduction & Background

Digital transformation refers to the strategic adoption of digital technologies (DTs) to innovate business models, redesign processes and reshape the organizational structure across a wide range of global sectors (*Vial, 2019; Babar et al., 2024*).

- In recent years, under the pressure of the COVID-19 pandemic, DTs have become increasingly essential in healthcare, potentially revolutionizing patient care and optimizing operational efficiency (*Babar et al., 2024*).

- The integration of digital technologies in healthcare management enhances clinical, managerial, and administrative processes (*Okolo et al., 2024*). Moreover, it supports the management of complex healthcare operations, increases surgical efficiency, and fosters the development of new patient care solutions by transforming the delivery of healthcare services (*Dal Mas et al., 2023*).

- Existing literature predominantly investigates the impact of DTs adoption on improving clinical outcomes, while studies exploring its effects on enhancing managerial processes, and the related drivers and barriers are still lacking (*Mauro et al., 2024*).

1. INTRODUCTION

1.2 Study objectives and Research questions (RQs)

Focusing on the *Belgian public health sector* (Flanders), this study aims to: 1) identify emerging digital technologies supporting managerial processes in healthcare organizations and 2) explore the key drivers and barriers influencing their adoption.

- **RQ1:** *Which digital technologies are emerging to support managerial processes in Belgian public healthcare organizations?*

- **RQ2:** *What are the main drivers and barriers to the adoption of DTs for managerial support processes in Belgian public healthcare organizations?*

1. INTRODUCTION
1.3 Rationale of the study

Why does the Belgian healthcare context represent an interesting area for research on the adoption of DTs in managerial processes?

1. Multi-level Federal Governance & Bismarckian Structure:

- Belgium's Bismarckian health system ensures nearly universal coverage (99%) through income-based social insurance managed by non-profit sickness funds, with full patient choice of provider.

- Its highly decentralized governance—split across federal, regional, and community levels—makes it an ideal case for studying how digital tools can improve coordination, data sharing, and system-wide efficiency.

2. High Public Health Expenditure:

- Health care represents a major component of public spending in Belgium (*European Observatory on Health Systems and Policies - WHO,2024*):
  - **11% of GDP** (among the highest in Europe);
  - **€4,168 per capita (PPP)**;
  - **77.6% publicly funded**, with the remainder covered by **voluntary insurance (4.5%)** and **out-of-pocket payments (17.9%)**.

3. Digital Health Reform as a strategic lever:

- The eHealth Plans (2019–2024) promote secure clinical data exchange across care settings, addressing fragmentation.

- Financial rewards encourage physicians to implement digital tools in routine care.

2. METHOD

2.1 Research design

Building on a previous study by Mauro et al. (2024), which assessed the role of DTs for managerial processes in 11 Italian public hospitals through a *Delphi* method, this research adapts their methodological framework to the Belgian healthcare context.

2.2 Data collection and analysis

- Semi-structured interviews were conducted using a predefined set of open-ended questions designed to elicit in-depth insights.
- The interview protocol, consisting of 22 questions, was developed based on a comprehensive review of the literature on DTs in healthcare, with specific reference to the *Technology–Organization–Environment* (TOE) framework (*Chiu et al., 2017*).
- Interviews were conducted using a mixed-mode approach: a portion took place in person during a visiting PhD research stay in Belgium (from March to June 2024) while the remaining were held remotely via *Microsoft Teams* (from June to September 2024).
- The interview sample consisted of 9 experts from Belgian public hospitals, including General Directors (GD) and Information Technology (IT) managers.

3. RESULTS

3.1 Emerging DTs supporting managerial processes (RQ1)

Table 1. *Emerging DTs for managerial processes support*

DTs	No. of experts
Artificial Intelligence	7
Big data analytics	6
Internet of Things (IoT)	4
Cloud computing	1
Social media	0
Blockchain	0

Source: *Authors' elaboration*

1.Improvements enabled by DTs:
- greater flow of communication of internal data;
- redefinition of the role of personnel;
- improved efficiency in managing health information and financial resources;
- risk/operations management.

2. Application fields:
- decision making;
- risk/operations management;
- strategic planning;
- clinical engineering;
- management control.

3. RESULTS

3.2 Drivers and Barriers to the adoption of DTs for managerial support processes

Table 2. Determinants of DT based on TOE framework

TOE	Determinants	No. of experts
Organization	Skills possessed by the staff	5
	Availability of economic resources to invest in DT	5
	Proactive General Management	3
	Internal Sponsors	2
	Financial Incentives for staff	2
Technology	DT safety limitation	1
	Availability of tools from trusted manufacturers/developers	1
	Time to implement/deploy technology	1
	DT requirement	1
Environment	Incentives from Institutional Entities	4
	External Sponsors	0

Source: Authors' elaboration

Drivers of DT
Organizations:
- Availability of economic resources
- Proactive general management
- Internal sponsors
Technology:
- Availability of tools from developers
Environment:
- Institutional incentives hindered by concerns over data protection

Barriers of DT
Organizations:
- Skills possessed by staff
- Availability of economic resources
-Limitations in DT safety
Technology:
-DT requirement
Environment:
- Institutional incentives hindered by concerns over data protection

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4. Discussion & Conclusions

- Our study contributes to filling a gap in the existing literature, which has mainly focused on the impact of DTs in clinical settings, by examining their role in administrative and managerial processes within healthcare.

- Our findings both align with and differ from those of *Mauro et al. (2024)*. While their study emphasizes the impact of IoT and AI/ML on administrative support processes, our research identifies AI and Big Data Analytics as the most prevalent and well-funded technologies, particularly within managerial contexts. Both studies highlight the central role of AI, albeit in different domains, and neither assigns significant importance to Blockchain, suggesting its limited relevance in ongoing healthcare digital transformation efforts.

- Both studies agree that employee skills are crucial for digital transformation, with a lack of competencies and resources seen as key barriers to adopting new technologies.

- Although the study builds on the Italian one, a full comparison is not possible due to the structural differences between the two healthcare systems—Beveridge in Italy and Bismarck in Belgium.

4. Discussion & Conclusions

4.1 Study limitations & implications for future research

1. Study Limitations

- The study may not cover all emerging DTs used by leading healthcare organizations.

- The small expert panel, limits the generalizability of findings.

- The qualitative, expert-based approach introduces subjectivity and lacks quantitative validation.

- The focus on the Belgian healthcare system offers depth but limits applicability to other systems.

2. Future Implications

- Investigate additional DTs that may emerge beyond current academic discourse, particularly those implemented in early-adopting institutions.

- Assess the measurable impact of DTs on administrative performance and organizational value creation in healthcare settings.

- Incorporate complementary quantitative methodologies, such as Structural Equation Modeling (SEM) or large-scale surveys, to enhance the robustness and validity of findings.

- Extend comparative analyses to diverse healthcare systems internationally to examine how contextual factors influence digital transformation trajectories.

THANK YOU

THANK YOU FOR YOUR ATTENTION!

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