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Investigating the Interplay Between Organizational Change and Digital Transformation Healthcare

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Abstract

This paper explores the intersection of digital transformation and change management in healthcare organizations, emphasizing the critical role of leadership in driving successful digital initiatives. The study combines insights from a focus group with healthcare professionals and a bibliographic analysis of 308 articles retrieved from the Web of Science database, published between 2018 and 2022. The findings highlight that change leadership is a key factor in implementing digital transformation, as technological innovation directly impacts change management processes. The literature review reveals a strong relationship between digital transformation and organizational change, addressing aspects such as technology adoption, change engagement strategies, performance measurement, and resistance to change. Additionally, the focus group results emphasize the importance of inspirational leadership and process innovation in mediating the relationship between leadership capabilities and organizational benefits. Participants recognized digital transformation as an essential component of healthcare strategy, significantly enhancing diagnostic and surgical capabilities while improving overall performance. By shedding light on the dynamic interplay between leadership, technology, and change management, this study provides valuable insights into the evolving landscape of digital transformation in healthcare. The findings serve as a foundation for future research, guiding scholars and practitioners in addressing emerging challenges and opportunities in organizational change and digital transformation on healthcare organizations.

Keywords: Organizational Change; Digital Transformation; Leadership; Information Systems; Healthcare; Challenges.

Introduction

In the last decade, the emergence of a diverse set of novel and powerful digital technologies, digital platforms and digital infra structures have transformed both innovation and entrepreneurship in significant ways with abroad organizational and policy implications (Baiyere et al., 2020);(Nambisan et al., 2019). The investigation of change management and in organizations is one of the most relevant themes in management studies, such as transformation is led by change management integrated within the organizational culture (Irimiás & Mitev, 2020). Many studies and theories emerged throughout time creating several methodologies and models that support organizations change management impacts. Some authors consider that Emotions, Perceptions, and Cognitions not only represents a powerful force to moderate resistance but are also the strategic variables that influences organization change management (Heath & Porter, 2019); (Benitez et al., 2018). According to Ashta et al (2018), classical thinking in strategic management holds that organizations change to maintain a fit between the organization, its strategy, and the environmental landscape in which it competes. Considering, recognition a motivation and in particular, its strategic relevance for organizational change performance and competitive advantage for strategic management (Benitez et al., 2018).

The organizational change performance must adapt and become steadily more global, exerting a clear influence on all the organizational spheres, in the internal context, referring to the state of the organization and the system elements strategy, structure, people, and culture that nourish and affect change system. The external context includes everything outside the boundaries of an organization that directly or indirectly affects the performance and results of that specific organization (Maes & Van Hootegem, 2019); (Arazmjoo & Rahmanseresht, 2019). According to the authors Maes and Hootegem (2019), and Arazmjoo & Rahmanseresht (2019) the external context does not only have a strong influence on the behavior of the change system, but changes in the environments are also often seen as the main reason for the system change. In accordance with the model of Maes and Hootegem (2019), the external environment factors are who most directly affects the changes of the organizations (Figure nº1).

Adapted from: (Maes e Hootegem 2019)
Figure. 1. Generic Systems Model of Organizational Change

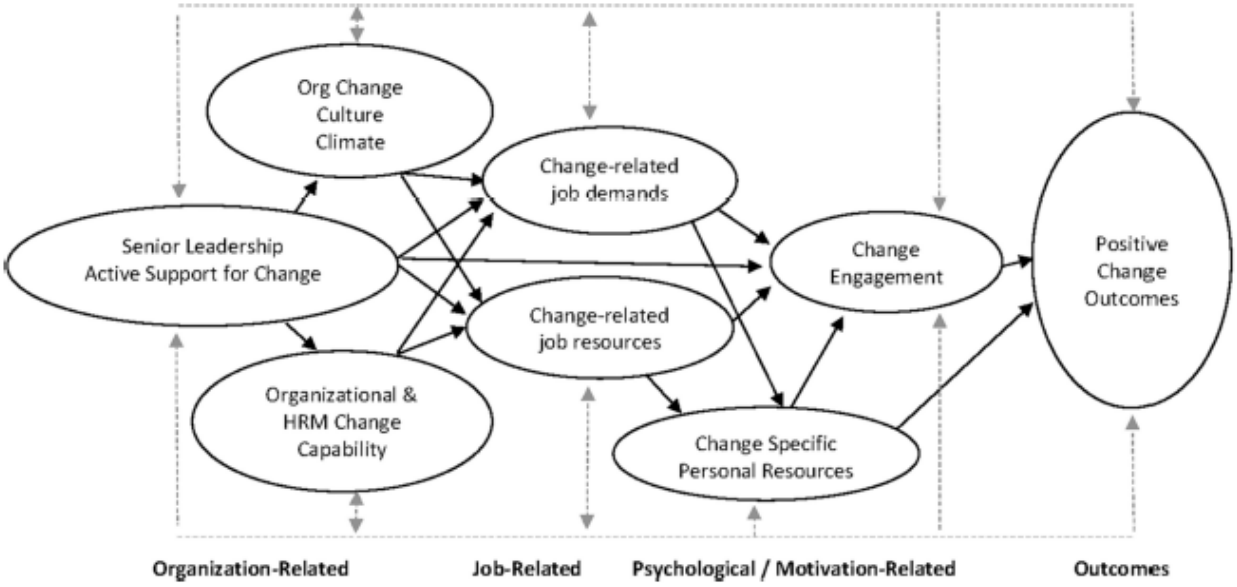


This model links with model Change Engagement (Figure nº2) from Albrecht et al (2020), throw Organization culture and climate that leads to an Empowerment and team orientation with external and customer focus.

That presents a conceptual structure that led to a model (Figure nº2) of change engagement(Albrecht et al., 2020). According to Albrecht et al (2020), the definition is to capture the essential qualities of positive energy, that shows how organizations related change resources, job-related change resources, job related change demands, and personal-related change resources lead to change engagement and subsequently to downstream attitude, behavioral, and performance outcomes.

Adapted from: (Albrecht et al. 2020)

Figure. 2. Change Engagement Model



The dotted lines suggest that all proposed relationships in the model can be direct, indirect, and reciprocal. Dialogical engagement enabled interpretation from a close and a distant perspective. This meant that greater reflexivity was enabled, and a more explicit explanation of the organizational cultural background, and methodological frameworks (Daubner-Siva et al., 2018);(Albrecht et al., 2020).

This paper points to review the scientific change management in digital transformation, identifying the leading trends that have influenced the research, and the prominent themes published using a bibliometric approach. It will analyze the content of articles based on the keywords and citations. The structure and contents of the study are identified by keyword co-occurrence analysis. Additional collaboration linkages are recognized in the form of graphical networks of its bibliographic data offered using VOSviewer software. So, the article is divided essentially in four sections. The first explains the methods. The second presents an in-depth bibliometric overview of the journal. The third part offers network visualizations of bibliographic data, and the last segment ends with a discussion and conclusions. It will analyze the evolution and trend research of the organizational requirements for digital transformation and how they can be carried out in a specific context. So, there was a need to identify new trends that allow maintaining a balance between the exploitation of knowledge to manage this digital transformation (Baiyere et al., 2020);(Albrecht et al., 2020). Digital transformation has come into wide use in contemporary business media to signify the transformational or disruptive implications of digital technologies for some businesses (new business models, new types of products/services, new types of customer experiences). Namely and according to Krishnamurthy (2020), it is no hyperbolization to describe that the pandemic as a "*blackswan*" generation (Krishnamurthy, 2020). Sequentially, COVID-19 has triggered a need for quick change throw the way of digital, to minimize and innovate organizational core business. Broadly, to indicate how certain types of companies, like health services, education (Abad-Segura et al., 2020), and B2B (business to business) organizations, (changing consumer needs, focusing on the importance of data analytics, integrating technology with active support for change throw senior leadership across the business, revamping the way they work to deliver value to customers (Pacheco Pumaleque et al., 2021), may need to radically transform in the emerging digital world (S. H. Chan & Lay, 2018); (K. Chan & Uncles, 2022); (Saarikko et al., 2020); (Pittaway & Montazemi, 2020).

According to Albrecht et al (2020) model, in organizational context, the senior leadership has an inspiring positive role in organizational change creating a driving force for involving others to model the path away. Acceptance of change is greater when managers recognize the positive feelings of change (Silva Costa Almino et al., 2021), providing support to a successful change including clear change purpose and vision, clearing communication of information about change, and play an active sponsorship and support for the organizational (Arazmjoo & Rahmanseresht, 2019). The real challenge of leadership in managing change is to control human resources capability, technology and consequently the processes, avoiding the lack of leadership engagement (Bordeleau & Felden, 2019); (Plugge et al., 2020); (da Silva Pontes et al., 2021). Creating support throw digital innovation is understood in the literature as a scientific discovery that enables significant breakthrough in capabilities (S. H. Chan & Lay, 2018); (Delgosha et al., 2020).

According to Saarikko et al, (2020), to provide to digital transformation is one of the key challenges facing contemporary businesses. The need to leverage digital technology to develop and implement new business models, forces organizations to reevaluate existing capabilities, infrastructures, and culture to identify what technologies are relevant and how they will be enacted

in organizational processes and business objectives. So, organizations are using digital technologies to adapt their organizational infrastructures, culture, and the underlying processes of public service delivery. According to Pittaway & Montazemi, (2020) this approach is part of a journey called "Digital Transformation". In the process, the model of Albrecht claims that culture is a change-related organizational resource that influences explicit change-related values, policies, practices and procedures, empowering team orientation. According to Cichosz et al (2020), organizational culture defines how an organization operates and how it introduces changes. Consequently, developing a favorable organizational culture for digital transformation is another key success (Cichosz et al., 2020); (Silva et al., sem data); (Tronvoll et al., 2020); (Pacheco Pumaleque et al., 2021). This means, that an organization must make a variety of major changes across its structure and culture and incorporate "digital" into everyone's job (Mastropetrou & Bithas, 2021). This allows to create an environmental change that is a permanent state, forcing organizations to change their business and maintain a degree of adjustment to the environment to be able to ensure their survival, innovating and gaining sustainability (Bican & Brem, 2020). Sustainability on digital transformation might be an important driver, to achieve the organization goals, (Delgosha et al., 2020);(Abad-Segura et al., 2020); (Thomson et al., 2021). Based on the authors, it is possible to believe that organizations will rise to the occasion and will adopt a leadership as role to increase performance and to make an equilibrium between digital transformation and change management triggered processes.

According to some authors, Leadership is one of the most important and complex variable to ensure that digital transformation is triggered correctly (Miller & HRSA-Funded Preventive Med Residen, 2021); (Saarikko et al., 2020); (Khan et al., 2021); (Hanelt et al., 2021).
Specially and according to Albrecht et al (2020), leadership clears communication about importance and constancy of change; must be active and a visible sponsorship that supports resourcing for ongoing change, clarifying outcomes and behavioral expectations for change: transformational change leadership, it will be an inspiration and it will involve others permitting modelling the path to a successful change. Regarding to digital transformation leadership is a critical factor because it influences the decision making and culture(Batko & Baliga-Nicholson, 2019), which suggested that leadership and employee-motivating factors during organizational change, as they are critical factors of success responsible for ensuring change (Hanelt et al., 2021). Work change engagement and trust in leadership as motivational factors to improve employee behavior during organizational change (Hanelt et al., 2021); (Batko & Baliga-Nicholson, 2019);(Islam et al., 2020). According to Albrecht et al (2020) model, change engagement permits to achieve the enthusiasm for change involved and participating in change, focusing energy for change objectives, and striving for change success. To address this goal, the Donabedian model identifies three core components for evaluating healthcare quality: structure, process, and outcome (see Figure 3). Structure encompasses the organizational resources and requirements for delivering care such as facilities, equipment, technology, financial assets, staff qualifications, and the surrounding social environment. Process refers to the activities and interactions that occur during care delivery, including communication between patients and healthcare providers. Outcome represents the results of care, measured in terms of health status, patient satisfaction, and cost efficiency. As noted by Al-alawy et al. (2021) and Tossaint et al. (2021), the overall quality of healthcare depends on the interplay among these three elements. Donabedian argues that a well-developed structure increases the likelihood of effective processes, which in turn enhances the chances of achieving favourable outcomes. Integrating the Change Engagement Model within the

Donabedian framework enables healthcare organizations to manage leadership effectively and assess change processes systematically. This integrated model provides a structured approach for engaging stakeholders, overseeing implementation, and achieving desired outcomes. It underscores the importance of aligning change initiatives with organizational structures to ensure efficient processes, ultimately leading to improvements in care quality, patient satisfaction, and overall performance (Al-alawy et al., 2021; Schwarzmuller et al., 2018; Tossaint et al., 2021)

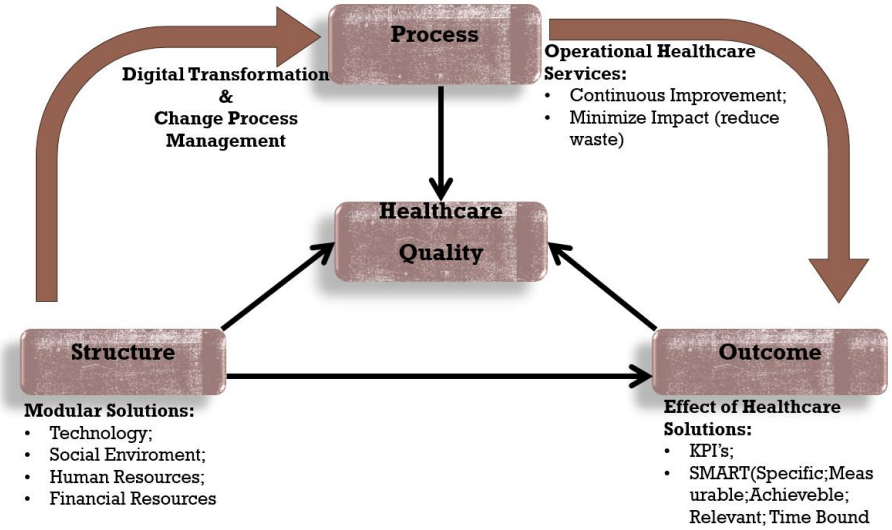


Figure 3: Donabedian Framework for Healthcare Quality Supported by Digital Transformation

For successful implementation, healthcare organizations must be well-prepared to navigate digital transformation. This preparation involves not only the adoption of new technologies but also the reengineering of processes, with a strong emphasis on leadership and change management (Figueroa et al., 2019; Le-Dao et al., 2020; Patri, Suresh, and Prasad, 2021). Critical issues include the relationship between digital transformation and leadership, the interplay between technological innovation and change management, the strategic importance of digital transformation in healthcare, and the impact of leadership on change processes during digital transformation initiatives (Albrecht et al., 2020; Irimiás & Mitev, 2020; Le-Dao et al., 2020; Pantielieieva et al., 2019; Tronvoll et al., 2020). Building on the understanding of digital transformation's profound impact on healthcare, it becomes essential to adopt practical methods to examine its implementation. For example, conducting focus groups with healthcare professionals provides firsthand insights into the implications and experiences associated with digital transformation in their specific areas of expertise. This qualitative approach bridges the gap between theory and practice, yielding valuable insights into key factors such as leadership, technological innovation, change management, and the strategic role of digital transformation (Albrecht et al., 2020; Boutcher et al., 2022; Philip, 2021). Digital transformation in healthcare differs markedly from other industries. Healthcare organizations confront unique challenges such as regulatory constraints, patient privacy concerns, interoperability issues, and resistance to technology-driven changes among professionals and patients (Albrecht et al., 2020; Maes & Van Hootegem, 2019). So, digital transformation in this sector is often influenced by governmental policies, patient care standards, and public health priorities (Arazmjoo & Rahmanseresht, 2019). Patient privacy concerns and the need to comply with data protection regulations (e.g., GDPR, HIPAA) further shape digital strategies, making the context more complex than in other industries (Hanelt et al.,

2021). Advanced technologies such as electronic health records (EHR), telemedicine, artificial intelligence (AI) in diagnostics, and automated administrative systems serve as catalysts for organizational change. In healthcare, technology adoption must strike a balance between efficiency gains and the imperatives of patient safety, confidentiality, and accessibility (Heath & Porter, 2019; Krishnamurthy, 2020). Success in technology integration depends on addressing challenges like cybersecurity, digital literacy among healthcare staff, and ongoing training programs (Silva Costa Almino et al., 2021). Effective leadership is crucial for managing digital transformation. Albrecht et al. (2020) argue that transparent communication, staff empowerment, and structured training programs are vital for successful change engagement. Healthcare-specific models further emphasize the need for cross-functional collaboration among clinicians, IT specialists, and administrative leaders to ensure that digital initiatives align with patient care objectives (Cichosz et al., 2020). Adaptive leadership styles and participatory decision-making have been shown to improve digital transformation outcomes in healthcare (Bican & Brem, 2020).

Empirical studies indicate that healthcare institutions successfully implementing digital transformation strategies often see improvements in operational efficiency, cost reduction, and patient satisfaction. However, misalignment between technology investments and organizational culture can lead to implementation failures (Hanelt et al., 2021). Structured frameworks such as the Change Engagement Model (Albrecht et al., 2020) and the Systems Model of Organizational Change (Maes & Van Hootegem, 2019) are increasingly being adapted to address these challenges. Additionally, patient-centered care models that integrate AI-driven diagnostics and remote monitoring are becoming more prevalent, underscoring the need to balance technological innovation with ethical and regulatory demands (Delgosha et al., 2020).

Methods

To increase the levels of knowledge regarding digital transformation, a bibliometric analysis was initiated. Therefore, and to assertively analyze, key variables were defined. This study considers the number of publications and citations. The number of publications measures productivity, where the number of citations reflects popularity and influence (Mas-Tur et al., 2020).
Several bibliometric indicators are used to identify the publication trends of a journal over different periods, including the citation structure, the most influential articles, the most prolific authors and their affiliated institutions and countries, and source of influence. Consequently, two bibliometric techniques are presented: co-citation analysis and bibliographic coupling. A co-citation occurs when two documents receive a citation from the same third document. Bibliographic coupling refers to situations where two studies cite the same third document. Co-citation analysis applies to authors, and bibliographic coupling applies to authors, institutions, and countries.

- **Data collection and search strategy**

In this study, two strategies for collecting data were used, one was bibliometric analysis, and the other was a focus group.

A focus group was performed with five health professionals working in various fields. The focus group was conducted in a calm and informal setting via video conference, allowing all members to openly share their opinions and perspectives on the proposed theme. The session was captured using the Zoom collaboration tool and later transcribed for qualitative analysis. The focus group was designed to elicit participants' perceptions about the impact of digital transformation on the performance of healthcare organizations. The session lasted 1 hour and 30 minutes. The focus group was audio and video recorded for later study. Five professionals with different backgrounds and perspectives on digital transformation in healthcare organizations participated in the focus group, that had a duration of an hour and thirty minutes. The composition of the group was as follows:

- Assistant Graduated Doctor (Neurologist).
- Nurse, specialist in rehabilitation healthcare.
- Podologist, specializing in feet pathology, diabetic foot, and sports Podology.
- Superior technician in Diagnosis and Therapy - Neurophysiologist.
- Member of the hospital administration board.

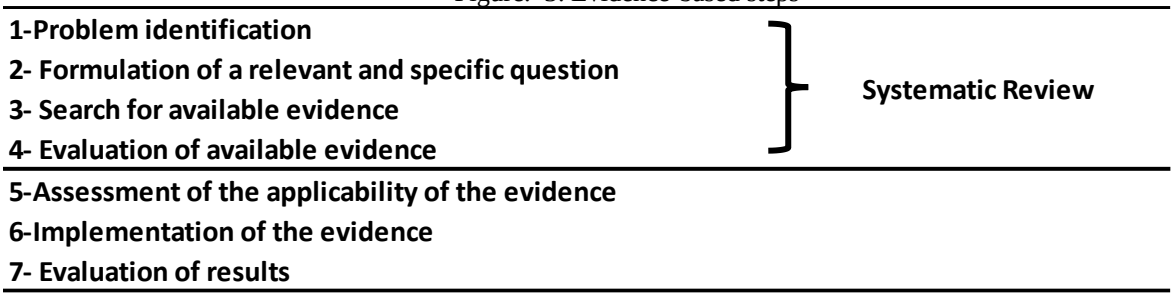
Each of the participants brought to the discussion their experience and knowledge in the health area, allowing a broader and more diversified view of the subject in question. So, the coding strategy was based on qualitative research, following an inductive approach rather than a deductive one. Unlike deductive research that emphasizes causality and theory testing, inductive research aims to generate theories based on the analysis of collected data (Schwarzmuller et al., 2018); (Al-alawy et al., 2021). The results were analyzed qualitatively, highlighting the participants' main perceptions and opinions about the theme in question. The results were organized into thematic categories and presented objectively in the article, based on the analysis of the data collected in the focus group, the inductive content analysis coding strategy was used to analyze the answers (Schwarzmuller et al., 2018).
In case of Bibliographic data, it was extracted from the Web of Science (WOS) repository. The Web of Science (formerly known as Web of Knowledge) is a website macro database that provides subscription-based access to various databases that provide comprehensive citation data for many different academic disciplines. It was originally produced by the Institute for Scientific Information (ISI) and is currently maintained by Clarivate Analytics (formerly the Intellectual Property and Science business of Thomson Reuters). So, the data collection was retrieved and carried out in November of 2022. Based on the filtering search throw the engine provided by WOS, TS=(Organizational change* Digital Transformation), indexing in all databases of WOS collection. The research strategy methodology has a restriction defined of a range of dates, from 2018 to 2022. The data were exported to *.txt, *.xlsx and *. RIS files, including all bibliographic info, abstracts, keywords, and cited references numbers.

Systematic literature reviews identify, from a set of published studies on a specific topic, those of superior methodological quality whose results can be reproduced in practice. So, it was used in the PICOS methodology. PICOS question contains the description of the research problem, the population, the context, the intervention, and the results. To build a path for constructing the research question the following stages were used:

1. Evidence-based steps.
2. Strategy description.

Regarding the *Evidence-Based Steps*, and observing Figure 3, it is possible to see that steps 1, 2, 3 and 4 represent the development of studies called systematic reviews, which consists of the fundamental research model. The systematic review represents the use of standard methodologies to synthesize data from multiple primary studies.

Figure. 3. Evidence-based steps



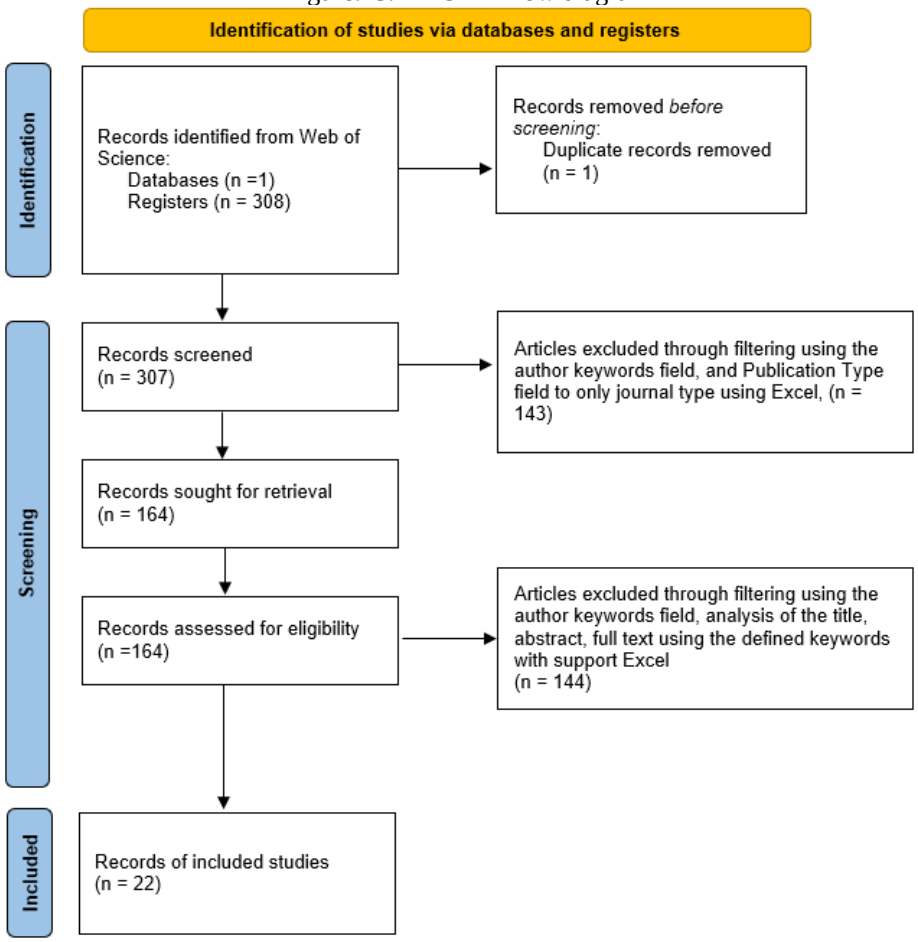
So, the PICOS strategy that was used to construct the starting question (with support for its components), using queries or appropriate search queries that enable the correct definition of the common thread in the scope of the information (evidence) necessary for the resolution of the research question. In Figure 4 it is possible to observe the five components that describe the PICOS strategy that contribute to the construction of the final question of this study based on the entire strategy, which allowed the formulation of the following research question, in the PICOS format consists of: " *Do the results of digital transformation depend on the leadership and the change process*?"

Figure. 4. Components that describe the PICOS strategy

Acrónimo	Definição	Descrição
P	Problem	Difficulty in controlling the Change Management processes triggered by the digital transformation
I	Intervention	Preventive methodologies for the control of critical factors
C	Control	Define standard management methodologies within the processes in order to control critical factors
O	*Outcomes*	Expected Outcome
S	Study Type	Data analysis

Therefore, the objective is to identify the impact of leadership on change processes when applying digital transformation in healthcare organizations, this will lead to a model proposal to manage change processes when implementing digital transformation. So, a PRISMA approach to concept analysis, selection and inclusion was also applied (Figure 5).
The steps included: identifying the information or concept; determining the objectives of the analysis.

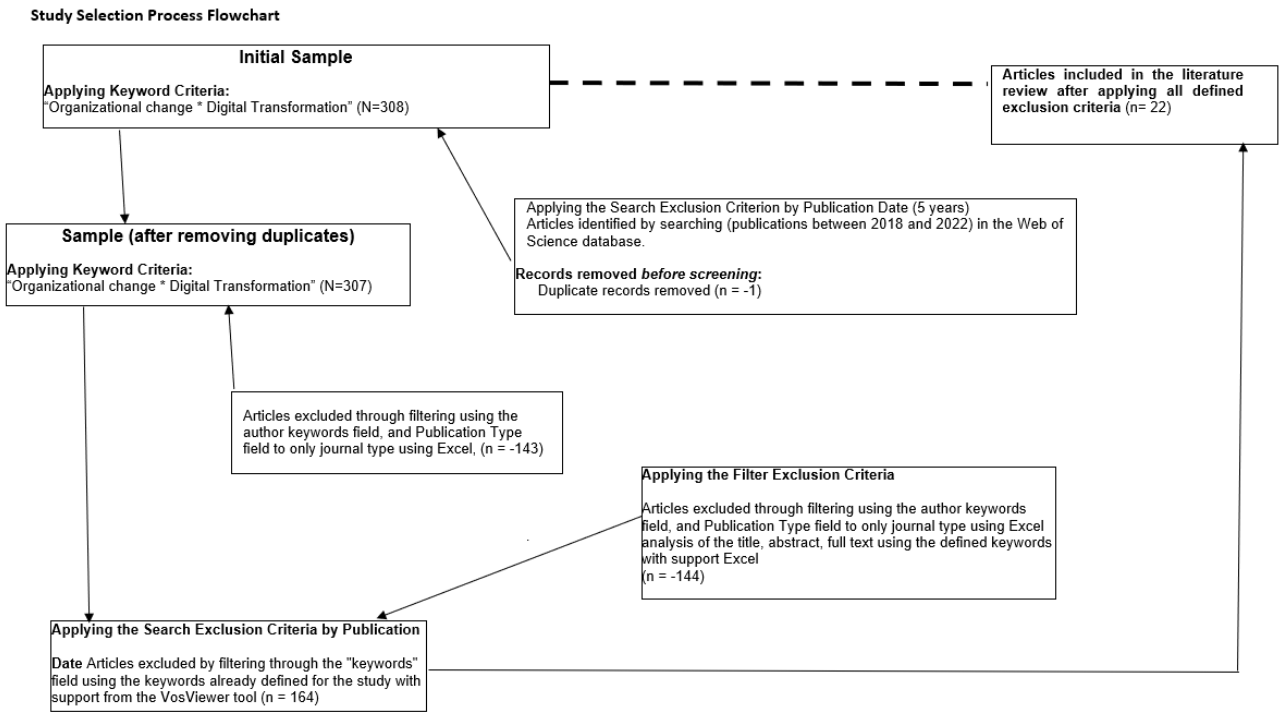
Figure. 5. PRISMA flow diagram[1]



It is relevant to infer that this strategy (Figure 5) was always supported by the procedural flow of study selection (Figure 6).

Figure. 6. Study Selection Process Flowchart

[1] *From:* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71



- **Data analysis**

To process the data, avoiding possible duplicates, where dynamic tables and cleaned the data with MS Excel. For the visualization of the networks and clusters was used the software VOSviewer. Transcripts were subjected to content software analysis utilizing MAXQDA and QDA Miner Lite to find themes and repeat patterns in respondent's responses.

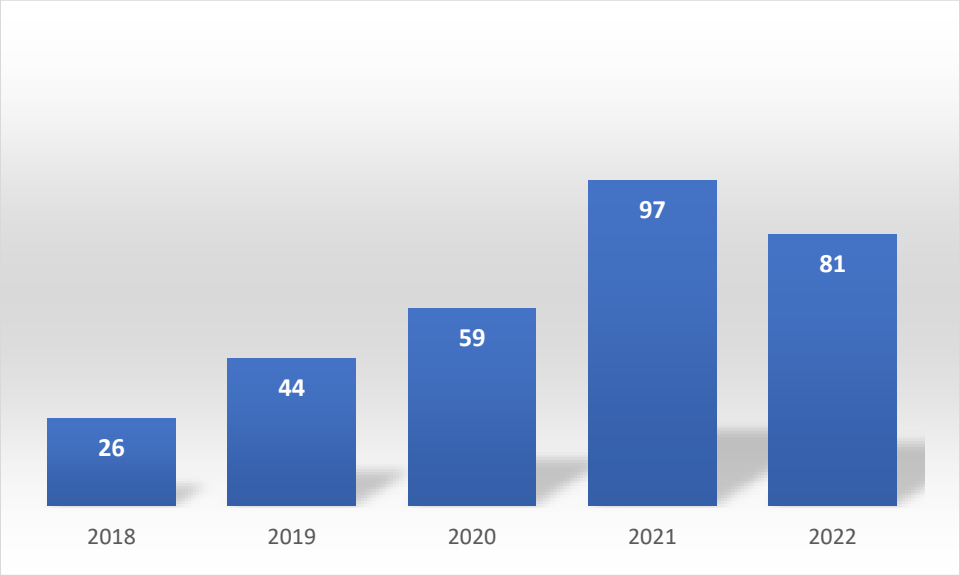
Results

Bibliometric Analysis:

The results obtained from the query executed in WOS database which resulted in the identification of 308 articles using the descriptors "organizational change" and "digital transformation", and applying a date range of 2018 to 2022, of which, after a more assertive filtering and respective eligibility check, 184 articles were segregated through a sub-descriptors like change *management, Digital Transformation; Strategic change, Technological change; Resistance to change; Organizational Change; Theory of change; Performance measurement; Leadership* and 143 articles were excluded. In a second wave of filtering and analysis were also excluded more 144 articles through filtering using the and *Publication Type* field to only journal type, *author keywords* field, analysis of the title, abstract, full text using the defined keywords with the analysis tool, the Excel. It is relevant that from the 308 articles, 8.47% were published in 2018, 14,33% in 2019, 19,22% in 2020, 31,60% in 2021 and 26,38% in 2022. One duplicate article was found. These articles were then reviewed to assess whether they were potentially eligible for inclusion. Twenty-two articles were identified that met the inclusion criteria for inclusion in this study. There was an average of publications per annum growth of total of 17,75 articles a percentage of 5,78%, this

refers to a year range from 2018 to 2021, in the case of year 2022, the data is the opposite, it is possible to verify a decrease of 16 articles from 2021 to 2022 corresponding to a percentage of 94,11%. It is possible according to data to mention that the year of the highest number of publications is 2021, with a total of 97 articles, that represents an increase from the year 2020 of 12,38% and the year with the lowest number of publications is 2018 with only 26 registered publications. There is an incremental increase in the number of publications from 2018, until 2022, and a decrease in the range of 2021 to 2022 of 5,21%, that means 16 articles less than 2021. So, from 2018 (26 articles) to 2019 (44 articles), increased 5,86%, from 2019 to 2020 (59 articles) increased 4,89%, from 2020 to 2021 (97 articles) increased 12,38%, and from 2021 to 2022 it possible to verify a decrease represented with a 5,21% crash (Figure 7).

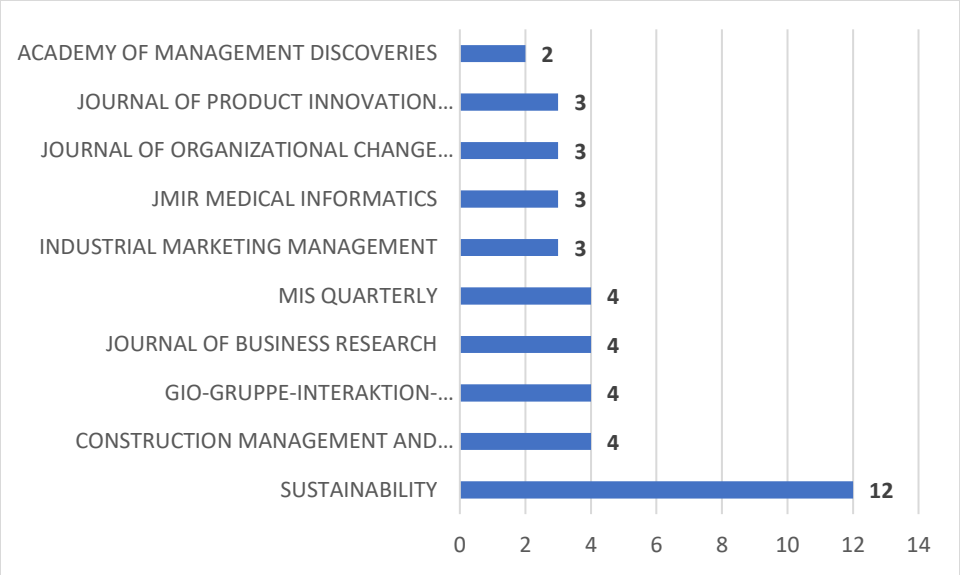
Figure 7 – Number of Publications per Year



Sources

308 journals were identified that published the 308 articles. Although it is possible to highlight journals that compose the gross number of publications, namely Sustainability with 12 publications (5% of total of publications), Construction Management and Economics, Gio- Gruppe-Interktion-Organisation-Zeitschrif Fuer Angewandte OrganisationsPsychologi, Journal of Business Research, Mis Quarterly with 4 publications (2%), and with 4 publications (2%), all the other journals have below 4 publications which represents less than 2% (1,32%). As can be seen in figure 8 below:

Figure 8 – Number of Publications per Journal



Authors

There were identified 868 authors with an average of cite per author of 6.36. A total 842 articles (97%) were single authorship, and a total 26 articles (3%) have multiple authorship. There were identified 52 authors that have more than one publication. The rest authors (842 that represents 97%) have only one publication per author. The top 3 most cited authors were Warner, KSR; Wager, M (2019), with the title "Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal", from Research Policy with 342 cites with an JCR impact factor[2] of 7.825 in 2021, then Hinings, B; Gegenhuber, T; Greenwood, R (2018) with the title "Digital innovation and transformation: An institutional perspective" with 286 cites, with an JCR impact factor of 5.387 in 2021, the last but not the least the authors Hanelt, A; Bohnsack, R; Marz, D; Marante, CA (2021) with the title "A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change" from Journal of Management Studies with 136 cites with an JCR impact factor of 9.72 in 2021 (Figure 9).

Figure 9 – Number of Citations per Author

Authors	Article Title	Cites	Year

[2] All impact records were extracted from Web Of Science database

Warner, KSR; Wager, M	Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal	342	2019
Hinings, B; Gegenhuber, T; Greenwood, R	Digital innovation and transformation: An institutional perspective	286	2018
Hanelt, A; Bohnsack, R; Marz, D; Marante, CA	A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change	136	2021
Tronvoll, B; Sklyar, A; Sorhammar, D; Kowalkowski, C	Transformational shifts through digital servitization	104	2020
Schwarzmuller, T; Brosi, P; Duman, D; Welpe, IM	How Does Digital Transformation Affect Organizations? Key Themes of Change in Work Design and Leadership	80	2018
Urbinati, A; Chiaroni, D; Chiesa, V; Frattini, F	The role of digital technologies in open innovation processes: an exploratory multiple case study analysis	70	2020
Raffaelli, R; Glynn, MA; Tushman, M	Frame flexibility: The role of cognitive and emotional framing in innovation adoption by incumbent firms	68	2019
Isensee, C; Teuteberg, F; Griese, KM; Topi, C	The relationship between organizational culture, sustainability, and digitalization in SMEs: A systematic review	64	2020
Kotarba, M	DIGITAL TRANSFORMATION OF BUSINESS MODELS	58	2018
Baiyere, A; Salmela, H; Tapanainen, T	Digital transformation and the new logic of business process management	57	2020

Countries

Were identified 7 clusters (Figure nº11) of collaboration containing 23 countries. In a total of 4626 citations, it is acknowledged that the Germany is the country with the highest score of citations with 1094 citations, followed by USA (360) and Scotland (343), Portugal appears in a Top 10 list in 8th place 210 citations at world level (Figure nº10).

Figure 10 – World Level – Nº Citations per Country

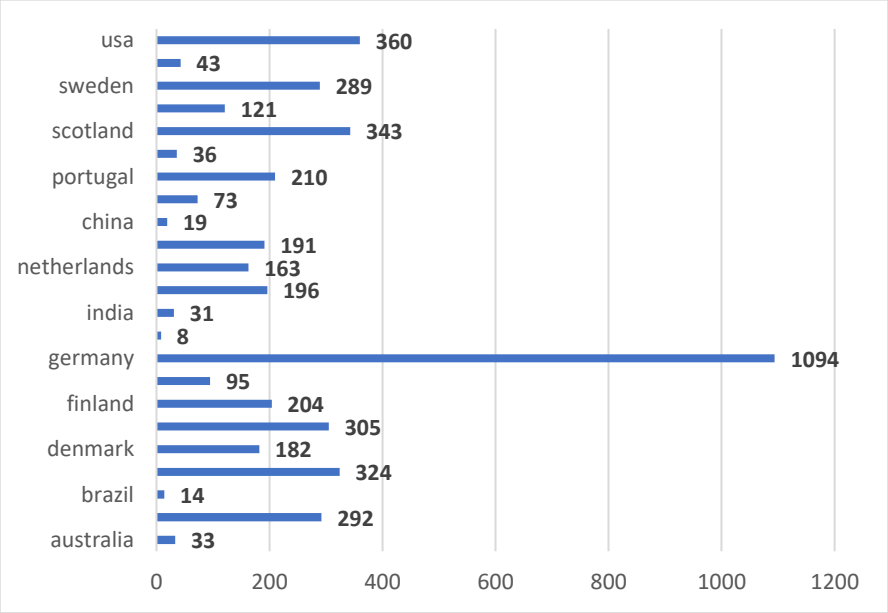
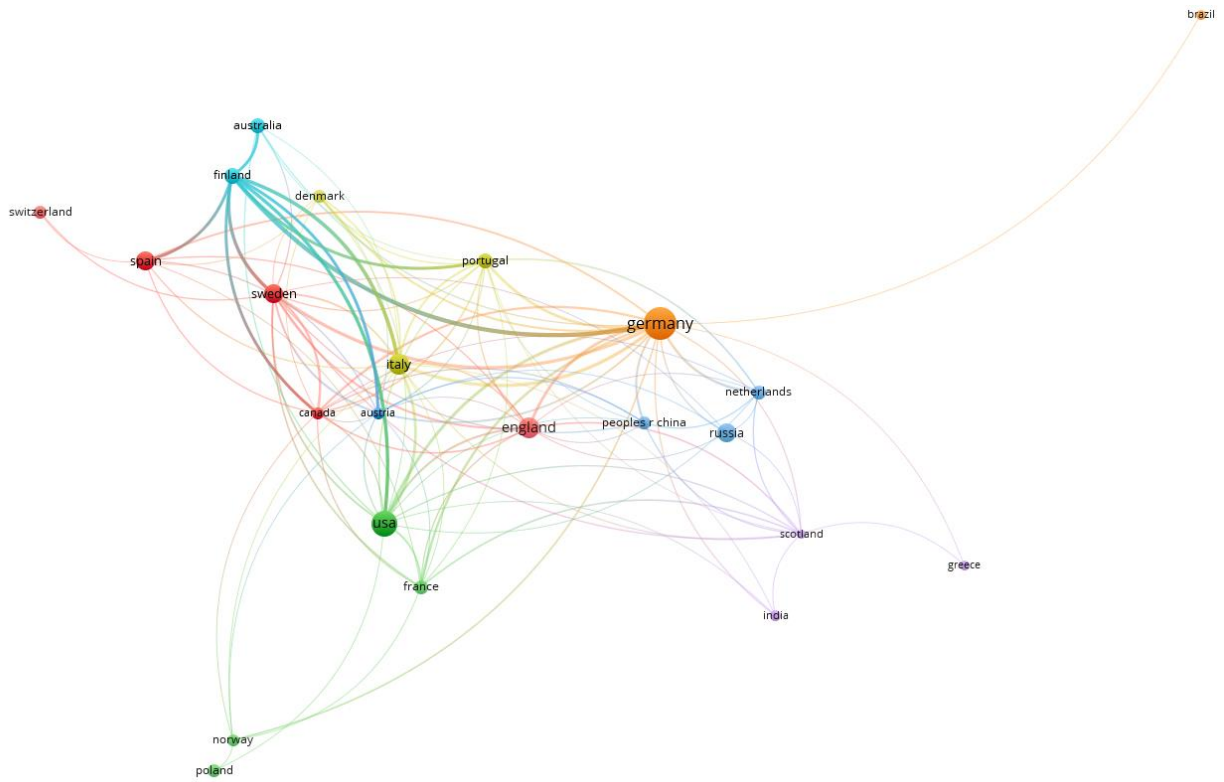


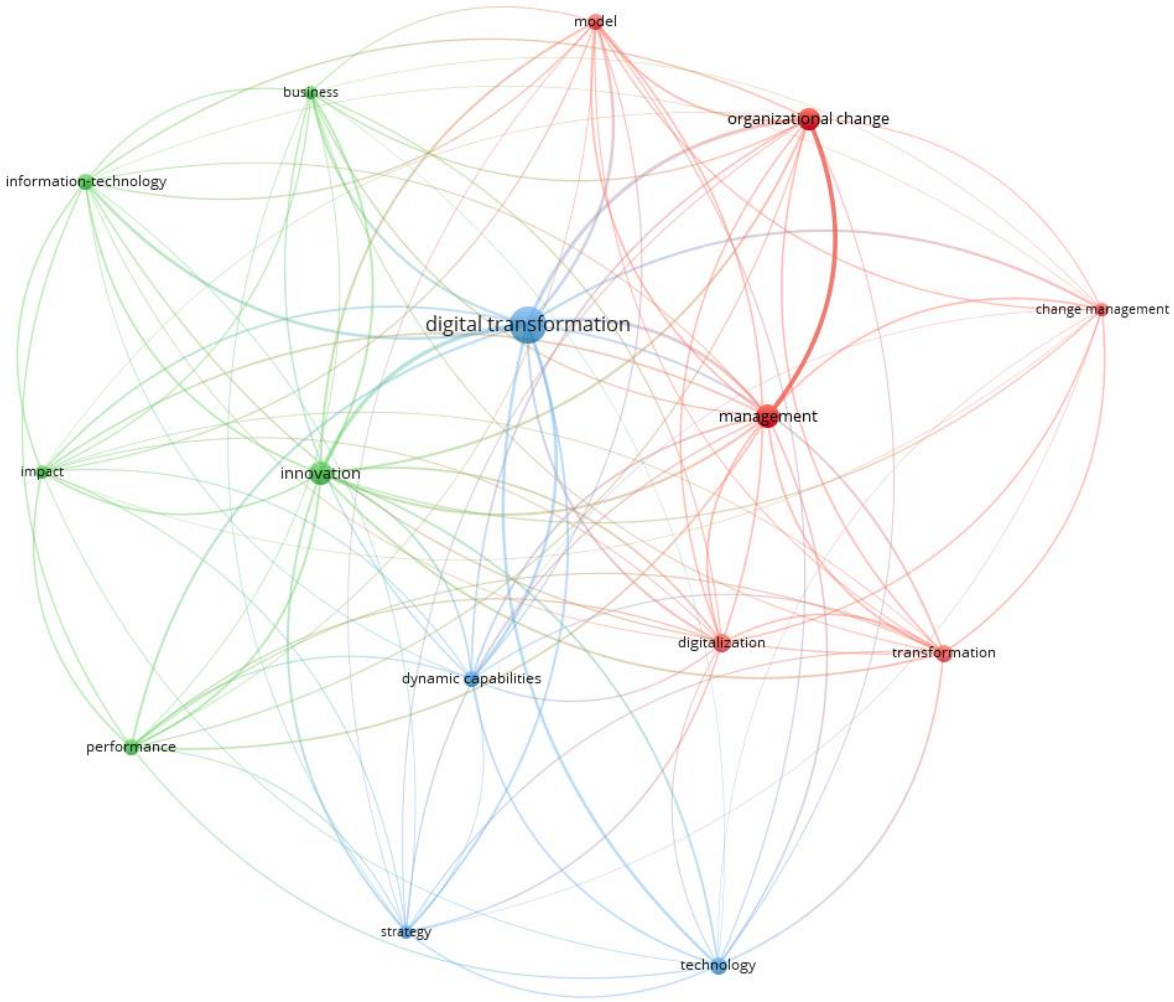
Figure nº 11 – World Level - Clusters – Citations per Country



Keywords

Centering the research analysis on keywords, the occurrences feature refers to how many publications in which a keyword exists. It will be used two fields of keywords, “author keywords” and “keyword-plus” comparison. According to Palacios et al (2021), for bibliometric analysis purposes when investigating it is more effective to use keywords-plus to return a better analysis output rather than author’s keywords(Palacios et al., 2021). So, there were indexed 308 articles by authors with a total of 3228 Author Keywords and with 1860 keywords-plus by WOS. It is possible to acknowledge three clusters (Figure 12), one with 4 items, another with 6 items, and another with 5 items performing a total 15 items.

Figure 12 – Keywords-Plus Clusters



The first well ranked keyword is “digital transformation” the in the top of the list (Figure 10), with 139 occurrences and a strength of 220. Then it follows, innovation (59 occurrences), management (47 occurrences), organizational change (40 occurrences), model (30 occurrences), and digitalization (37 occurrences). It is possible to observe in figure 12 that some keywords have collaborative correlation\dependence, for instance, between clusters, analyzing the first (with the highest score) two keywords from figure 13 (Performance and Digital Transformation), is possible to acknowledge that they directly relate. There were detected strange aspects Leadership and Organizational-Change, are not connect, and according to Albrecht et al (2020) performance is one of the changes focuses on management. Other awkward aspect is that Performance is not connected to Organizational Change, according to Aslam et al (2018), performance can influence management on organizations(Albrecht et al., 2020); (Silva et al., sem data).

Figure 13 – List of Keywords

Keywords	Occurrences	Total link strength
business	20	61
change management	21	51
digital transformation	139	220
digitalization	37	82
dynamic capabilities	29	80
impact	22	57
information-technology	29	66
innovation	59	148
management	47	116
model	30	84
organizational change	40	98
performance	27	67
strategy	22	58
technology	34	70
transformation	34	78

Focus Group Analysis:

The main words and concepts identified during the focus group were thoroughly analyzed and discussed. The term "Change," referring to digital transformation, emerged as a central theme in the discussions, underscoring its significance for the healthcare organizational landscape. Interestingly, the term "Change Management" was mentioned only once, indicating a potential gap in the discussion concerning how to strategically address the implementation of digital transformation. "Digital Transformation", emerged as a prominent construct, proving to be widely discussed and recognized by participants as a key factor in the health context. The emphasis given to "Leadership" was also evident in the discussions, pointing to the vital role of leaders in driving and successfully conducting digital transformation in healthcare organizations. In addition, the issue of "Performance" was mentioned, reflecting participants' concern to understand how the adoption of digital technologies could positively impact the overall performance of healthcare organizations. The interaction between these constructs is of fundamental importance to answer the main objective of this study, which is to understand whether digital transformation can increase the diagnostic and surgical capacity of healthcare organizations. The results presented in the previous chapter offer valuable insights into how effective leadership can be a differentiator in driving digital transformation, as well as the need for proper change management to ensure the successful implementation of technological innovations. The questions addressed topics are the nuclear to lead to the objective of focus group study, that is to understand whether digital transformation can increase diagnostic and surgical capacity.

Research Question 1(RQ1): Do you consider that the results of digital transformation depend on leadership and the change process?
Research Question 4 (RQ4): Do you consider that leadership is a critical factor in leveraging digital transformation?

Research Question 5 (RQ5): Are you of the opinion that process innovation will mediate the relationship between organizational leadership and capabilities organizational and leadership capabilities benefits in healthcare organizations?

Research Question 7 (RQ7): How important is digital transformation in the strategy of healthcare organizations?
Research Question 10 (RQ10): How can leadership in the organizational context play an inspiring role in digital transformation?

The coding strategy was rooted in qualitative research, adopting an inductive rather than a deductive approach. While deductive research focuses on causality and testing theories, the inductive method is used to develop theories based on an analysis of the data collected (Schwarzmuller et al., 2018; Al-alawy et al., 2021). In this study, qualitative analysis emphasized the primary perceptions and opinions of the participants regarding the topic. Data gathered from the focus group were systematically organized into thematic categories using an inductive content analysis coding strategy (Schwarzmuller et al., 2018), and the findings were presented objectively in the article. The study's methodology provided a robust framework for examining how digital transformation influences the performance of healthcare organizations—especially in terms of diagnostic and surgical capabilities. A qualitative coding strategy, anchored in grounded theory and an inductive approach, was employed to thoroughly capture and analyse participants' perceptions and viewpoints. Key terms and concepts that emerged during the focus group were meticulously analysed and discussed. The concept of "Change," used in the context of digital transformation, emerged as a central theme, underscoring its critical role in shaping the healthcare organizational landscape. Interestingly, "Change Management" was mentioned only once, suggesting a potential gap in discussions about strategically managing the implementation of digital transformation. "Digital Transformation" itself was recognized as a prominent construct, widely acknowledged by participants as a crucial factor within the healthcare sector. Additionally, "Leadership" was heavily emphasized, highlighting its essential role in driving and successfully executing digital transformation initiatives in healthcare settings. The notion of "Performance" also surfaced, reflecting participants' concerns regarding how the adoption of digital technologies could enhance overall organizational performance. The interplay among these constructs is fundamental to addressing the study's primary objective: determining whether digital transformation can improve the diagnostic and surgical capacity of healthcare organizations. Findings from the previous chapter indicate that effective leadership is a key differentiator in advancing digital transformation and that robust change management practices are necessary to ensure the successful implementation of technological innovations. Building on these insights, the following discussion will delve deeper into the analysis of the results by integrating them with relevant scientific literature and situating them within the broader context of digital health transformation. Moreover, the discussion will explore the practical implications of these findings, offering recommendations for healthcare organizations striving to achieve tangible improvements in their diagnostic and surgical practices through digital transformation. Ultimately, this discussion aims to enhance our understanding of how harnessing the synergies between leadership, change processes, and technological advancements can drive superior outcomes and lead to more efficient and effective healthcare services. The results obtained from the focus group analysis conducted with the aim of investigating how digital transformation can influence the performance of healthcare organizations. The focus group brought together participants with experience and expertise in healthcare and technology, who shared their perspectives, insights and opinions on the key constructs related to digital transformation, leadership, change management and performance. Throughout this chapter, the data collected from the participants interactions during the focus group will be detailed and discussed extensively. The most frequent words and concepts in the

discussions were analysed, as well as the emphasis given to each of the constructs mentioned throughout the conversation. The chapter begins with a detailed analysis of the data related to the word "Change", "Change Management", "Digital Transformation", “Leadership”, “Performance” discussing its relevance

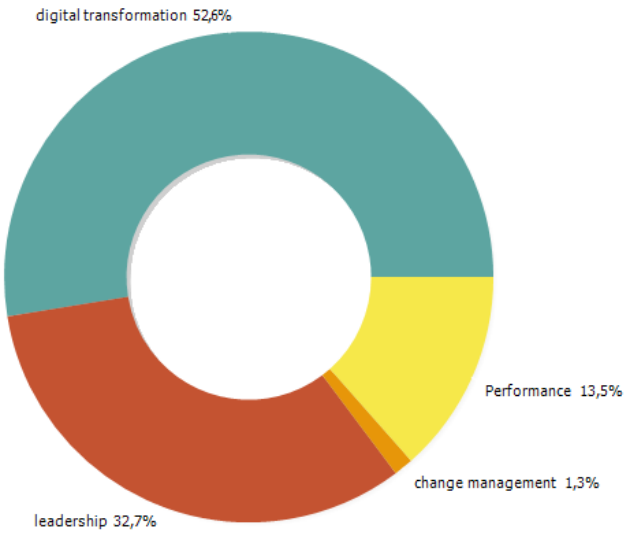




Figure 14 –Construct analysis part1

As can be seen (Figure 14), the most used word throughout the focus group was digital transformation, followed by leadership and performance, and change and change management are not even visible, namely change management is barely visible and change is not visible at all. The results will be carefully correlated with the research objectives, exploring how leadership and the change process can influence the outcomes of digital transformation in healthcare organizations. The analysis of the data will allow a deeper understanding of the participants' perceptions and the interactions between the different constructs, offering valuable insights for the development and successful implementation of digital transformation in the healthcare sector. This chapter makes a significant contribution to the understanding of the challenges and opportunities that digital transformation brings with it, as well as the importance of leadership and change management to leverage the benefits of this technological revolution in improving the performance and quality of services provided by healthcare organizations.

So, analysing the data from **figure 15** regarding the investigation constructs, mentioned in the focus group about the influence of digital transformation on the performance of healthcare organizations, it can be observed some interesting trends:

- **Change:** It was mentioned in 23% of the interventions during the focus group conversation and was repeated 47 times. The high frequency of this word indicates that the topic of change is relevant to the group. This may suggest that digital transformation is being perceived as a significant change within healthcare organizations, and there may be concerns, opportunities or resistance associated with this transformation.
- **Change Management:** Surprisingly, the expression "Change Management" was mentioned only once during the entire focus group discussion, corresponding to 0% of the interventions. This may suggest that while the concept of change was discussed, the specific aspect of managing that change may not have been adequately addressed during the conversation. This may be a point to be further explored, as a successful digital transformation requires effective organizational change management.
- **Digital Transformation:** The construct of "Digital Transformation" was highly mentioned, representing 40% of the focus group interventions, and was repeated 80 times. This high incidence indicates that digital transformation is central to the discussion and is a topic of great interest to participants. There is likely a recognition that the adoption of digital technologies is a crucial factor for the development and advancement of healthcare organizations.
- **Leadership:** The topic of leadership also played a relevant role in the discussions, being mentioned in 26% of the interventions and repeated 52 times throughout the focus group. This suggests that participants perceive leadership as an important factor for the success of digital transformation in healthcare organizations. The approach, involvement and commitment of leaders can be crucial in guiding the organization through this change process.
- **Performance:** The construct "Performance" appeared in 10% of the interventions and was repeated 21 times during the focus group. This indicates that the issue of performance of healthcare organizations is a concern present in discussions about digital transformation. Participants may be interested in understanding how the adoption of digital technologies can positively impact the overall performance of healthcare organizations.

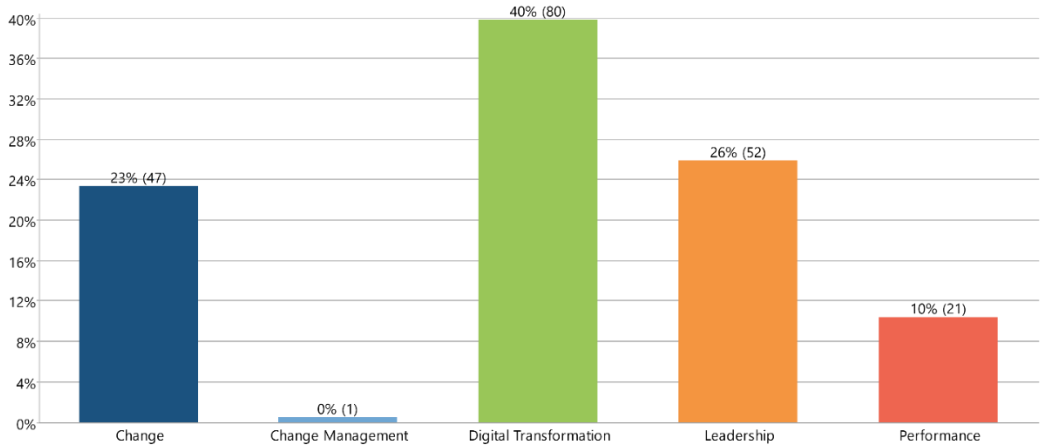


Figure 15 –Construct Analysis Part2

Regarding the general results (Figure 16) from all of the questions asked to the experts who were in the focus group, it was possible to denote that there was unanimity of agreement in all questions except question three and question five, and in question number three, "*Do you consider that there is a positive relationship between IT capacity and performance?*", the majority disagreed

advocating that there was no positive relationship between the area of information technology and performance in services. One of the examples, which the non-concordant experts emphasise, is for example the training gaps of the users of the technologies provided by the information systems area, stating that if a person does not have the appropriate training it can even be disruptive. They also mentioned that human resources may also be a barrier to the use of technology, so they say that change management must be considered so that changes are properly smooth and assertive for technology users. In the discussion triggered by question number three, most experts concluded that training and human resources in this specific case are considered a critical factor, which is recurrent in everyday life, and which will strongly influence the relationship between IT capacity versus performance. Regarding question number five, "*Do you think that process innovation will mediate the relationship between organisational leadership capabilities and benefits in healthcare organisations?*", only one expert disagreed, and not totally, with the remaining specialists, namely, it mentioned that the barrier to be considered would effectively be in the procedural scope.

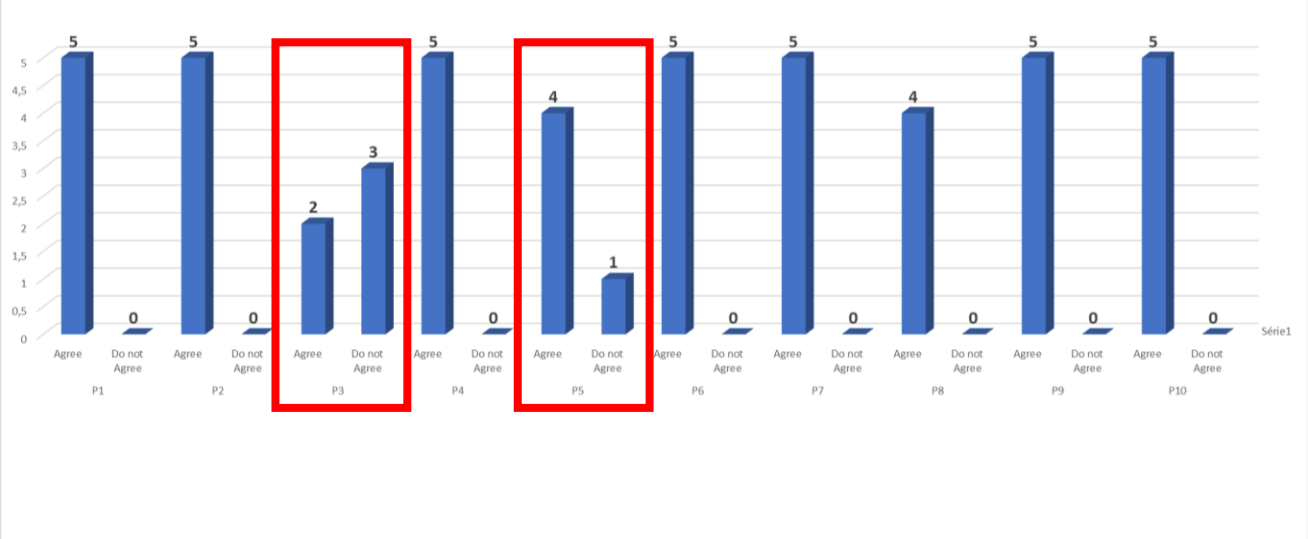


Figure 16 – Focus Group Questions General Qualitative Analysis

The question number one discussed in the focus group, "Do you think the results of digital transformation depend on leadership and the change process?", is of extreme relevance and depth when addressing the influence of digital transformation on the performance of healthcare organizations. The unanimous response of participants agreeing with this question is quite significant. It indicates that group members clearly recognize and perceive the interdependence between leadership, the change process, and the outcomes of digital transformation. Let's extensively analyse the factors that underpin this agreement:

- **Effective Leadership:** Leadership plays a crucial role in driving digital transformation in healthcare organizations. Leaders must articulate a clear vision for the transformation, aligned with the organization's strategic goals. In addition, they must inspire, engage, and motivate team members to embrace the necessary changes. Effective leadership is essential to overcome resistance and foster a culture of innovation and adaptation.
- **Change Process:** Digital transformation represents a significant shift in processes, structures, and mindsets within healthcare organizations. A well-managed change process

is critical to ensuring that transformation initiatives are successfully implemented. Change management involves careful planning, clear and constant communication, employee engagement, and the identification and mitigation of potential obstacles.

- **Interaction between Leadership and Change Process:** Leadership is key to setting the direction of digital transformation, but it is also responsible for leading the change process. Committed and engaged leadership can positively influence employee adoption of new digital technologies and practices. In addition, efficient change management is indispensable to ensure that leadership is well understood, accepted, and implemented by all levels of the organization.
- **Impact on Digital Transformation Outcomes:** Leadership and the change process have a direct impact on digital transformation outcomes. Weak or misaligned leadership can lead to resistance, internal conflict, and lack of commitment, resulting in unsuccessful implementation of digital transformation. Similarly, a poorly structured change process can hinder the adoption of new technologies and limit the uptake of expected benefits.

Therefore, the unanimous response from participants emphasizes that the results of digital transformation in healthcare organizations are dependent on effective leadership and a well-planned and executed change process. To succeed in this transformation journey, it is essential that organizations value the importance of visionary, committed and inspiring leadership, as well as invest in change management that involves all employees, from senior management to the operational base. It was possible to realize that effective leadership is directly related to the construct "Leadership" discussed in the focus group. Furthermore, the approach and importance given to the "Change Process" can be correlated with the construct "Change Management", which was little mentioned in the focus group. Therefore, participants unanimously agreed that digital transformation is a significant change, and that the success of this change is intrinsically linked to effective leadership and adequate change management. By recognizing this interdependence, healthcare organizations have a greater chance of successfully addressing the challenges of digital transformation, fostering a positive impact on overall performance and the ability to adapt to the demands of the ever-evolving digital environment.

The question number four discussed in the focus group, is extremely relevant when addressing the topic of the influence of digital transformation in healthcare organizations. The unanimous response of the participants agreeing with this question indicates a high level of consensus on the importance of leadership in the digital transformation process.

As in the first question, it is possible to correlate the data referring to the constructs discussed in the focus group with the question under analysis:

- **Change**: Leadership is a critical factor in leveraging digital transformation because this change is not just about adopting new technologies, but a cultural and organizational transformation. Effective leadership is essential to guide the organization through this change journey and ensure that all team members are aligned and engaged in the process.
- **Change Management:** Although the expression "Change Management" was barely mentioned in the focus group, its relevance can be inferred when discussing the importance of leadership in the digital transformation process. Leadership plays a key role in change management by setting the vision, communicating it effectively and providing the

necessary support for employees to adapt to the changes arising from digital transformation.

- **Digital Transformation:** The unanimity in agreement with the question "Do you consider leadership to be a critical factor to leverage digital transformation?" reinforces the relevance of this construct in the discussions. Leadership is key to driving the adoption of digital technologies, fostering a culture of innovation, and stimulating the mindset change needed to harness the full potential of digital transformation in health organizations.

- **Leadership:** The question itself is centred on the construct "Leadership", which demonstrates that participants recognize leadership as a key factor for the success of digital transformation. The emphasis given to leadership in the discussions (26% of interventions and 52 repetitions) underscores its importance in the context of digital transformation in healthcare organizations.

- **Performance:** The "Performance" construct is also related to the question, as effective leadership can positively impact the performance of health organizations through digital transformation. Leaders who promote innovation, efficiency and adaptation to technological changes can contribute to improved performance of healthcare organizations.

So, the unanimous response from participants corroborates the critical importance of leadership to leverage digital transformation in healthcare organizations. Effective leadership is key to driving change, promoting the adoption of digital technologies, managing resistance, and engaging employees in the process. The interplay between leadership, change management and digital transformation is of vital importance to achieve the desired outcomes and optimize the performance of healthcare organizations in the digital age. The findings from these analyses provide a solid foundation for the in-depth discussion of the results in the following chapter, exploring how leadership can be a critical factor in the success of digital transformation and how its actions can positively influence the performance of healthcare organizations.

The question discussed in the focus group, "Are you of the opinion that process innovation will mediate the relationship between organizational leadership capabilities and benefits in health organizations?", is a relevant topic when it comes to the influence of leadership and innovation on health organizations' outcomes. While most participants agree with this question, it is important to also consider the perspective of the expert who disagreed:

- **Change:** Process innovation represents a significant change in healthcare organizations. The ability of organizational leadership to promote this innovation is crucial to leverage the benefits and improvements in health services. Process innovation can be seen as a practical manifestation of change and digital transformation in healthcare organizations

- **Change Management:** The question about the mediation of process innovation between organizational leadership and benefits in healthcare organizations is also related to change management. Effective leadership can drive change management efficiently, allowing innovation to be implemented smoothly and with greater employee acceptance.

- **Digital Transformation:** Process innovation is a direct consequence of digital transformation. Organizational leadership can drive digital transformation in healthcare organizations, enabling the adoption of innovative technologies and solutions that result in more efficient and effective processes.

- **Leadership:** The question itself emphasizes the role of organizational leadership in the relationship between process innovation and benefits in healthcare organizations. Effective leadership can create an environment conducive to innovation, allowing staff to explore new ideas and implement improvements to existing processes.

- **Performance:** Process innovation has the potential to positively impact the performance of healthcare organizations by increasing efficiency, reducing costs, improving service quality and patient satisfaction. The mediating relationship between organizational leadership capabilities and benefits in healthcare organizations can be established by the leadership's ability to foster process innovation.

When considering that there was an expert who disagreed with the question, it is important to also explore the reasons for this disagreement during the discussion. The expert's perspective can provide valuable insights into possible limitations or challenges related to the mediation of process innovation by organizational leadership.

So, in advance while the majority of participants agree that process innovation can mediate the relationship between organizational leadership and benefits in healthcare organizations, it is important to consider the perspective of the expert who disagreed. This disagreement may reveal additional nuances and complexities in the mediation process and underscore the importance of carefully addressing the challenges and obstacles that may arise during process innovation implementation. The findings and analysis related to this question provide a solid basis for the in-depth discussion in the following chapter, which will explore the interplay between organizational leadership, process innovation and benefits in healthcare organizations, considering the different perspectives of the participants and the expert.

The question number seven discussed in the focus group, is key to understanding how digital transformation has become an essential component in the strategies of healthcare organizations. The unanimous response of participants agreeing with this question indicates that there is a high level of recognition about the importance of digital transformation in defining the strategies of healthcare organizations.

- **Change:** Digital transformation represents a significant shift in the way healthcare organizations operate and deliver services. It has become a key part of healthcare organizations' strategies, as it allows them to adapt to the rapid changes in the digital environment, meet patients' needs and remain competitive in the market.

- **Change Management:** The importance of digital transformation in the strategy of healthcare organizations is closely related to change management. Effective leadership must foster a culture of innovation and ensure that digital transformation is incorporated into organizational strategies in an efficient manner.

- **Digital Transformation:** The question itself underscores the relevance of digital transformation as a strategic component in healthcare organizations. Digital transformation enables the adoption of innovative technologies, the improvement of internal processes and the creation of new business models, which is essential for the sustainability and growth of healthcare organizations.

- **Leadership:** Organizational leadership plays a crucial role in defining and implementing digital transformation strategies. The ability of leadership to promote a clear vision, engage employees and make strategic decisions is critical to the success of digital transformation in healthcare organizations.

- **Performance:** Digital transformation has the potential to positively impact the performance of healthcare organizations. By adopting advanced digital technologies, organizations can improve efficiency, quality of services, patient experience and data-driven decision making, resulting in better outcomes and more satisfactory results.

Unanimity in agreement with the question underscores the critical importance of digital transformation in the strategy of healthcare organizations. Digital transformation is a key driver to drive innovation, improve operational efficiency and deliver personalized, patient-centric solutions. This relevance is of utmost importance to understand how digital transformation can empower healthcare organizations to adapt to changes in the digital environment and thrive in an increasingly competitive landscape. The findings and analysis related to this question provide a solid basis for the in-depth discussion in the following chapter, exploring the importance of digital transformation as a strategic component in healthcare organizations and how it can positively impact the performance, efficiency and quality of the services provided.

The question ten discussed in the focus group, is extremely relevant when addressing the impact of leadership in driving digital transformation in health organizations. The unanimity of participants agreeing with this question indicates that there is a consensus on the inspiring and crucial role that leadership can play in this context:

- **Change:** Inspirational leadership can drive significant change in the context of digital transformation in healthcare organizations. Leaders who communicate a clear and exciting vision of digital transformation can motivate and engage employees, fostering a culture of innovation and readiness for change.

- **Change Management:** Leadership in the context of digital transformation is also related to change management. Inspiring leaders are able to effectively manage resistance to change, providing adequate support and resources for digital transformation to be successful.

- **Digital Transformation:** The question itself emphasizes the importance of inspirational leadership to drive digital transformation. Leaders who are able to articulate the benefits and opportunities of digital transformation can encourage team members to adopt new technologies and embrace change in a positive way.

- **Leadership:** Inspirational leadership is a key factor in the success of digital transformation in healthcare organizations. Leaders who demonstrate enthusiasm, confidence and commitment to digital transformation can create an environment conducive to innovation and organizational growth.

- **Performance:** Inspirational leadership can positively impact the performance of healthcare organizations during digital transformation. By motivating and inspiring employees, leaders can stimulate teamwork, creativity, and the search for innovative solutions, resulting in improved performance and better outcomes.

Leadership that inspires and motivates team members to embrace digital transformation plays a key role in creating a culture of innovation, managing change, and achieving the benefits delivered by digital transformation. This importance is of utmost relevance to understand how leadership can act as an inspiring factor in successfully driving digital transformation, stimulating the adoption of innovative technologies, and improving the performance of healthcare organizations.

Analysis related to this question provide a solid basis for the in-depth discussion in the following chapter, which will explore the different ways in which inspirational leadership can positively influence digital transformation and the impacts of this approach on the outcomes and benefits of healthcare organizations. As the chapter unfolds, we will traverse the realms of leadership and digital transformation, connecting the dots between visionary guidance and the innovative potential of digital technologies. With each revelation, a compelling narrative emerges, one that underscores the importance of nurturing visionary leaders who embrace technological advancements to drive healthcare organizations towards excellence. Ultimately, this journey concludes with a deeper appreciation for the interdependence between leadership, digital transformation, and healthcare performance. Armed with this understanding, organizations can pave the way for a future where cutting-edge technologies blend seamlessly with compassionate care. The pursuit of excellence in healthcare is no longer confined to traditional boundaries; it now embarks on an inspiring voyage into the digital frontier, guided by leaders who illuminate the path to transformative change. The analysis of results serves as a pivotal moment, propelling us towards the conclusion that emphasizes the undeniable impact of inspirational leadership on digital transformation and, in turn, on the future of healthcare. As far as it takes this transformative voyage together, the horizon is illuminated by the promise of a healthier, more technologically advanced world one that is led by visionary individuals inspiring change and redefining the possibilities for healthcare organizations.

Conclusion

This study examined the relationship between digital transformation, leadership, and change management in healthcare organizations, combining a bibliometric analysis with a focus group discussion. The findings highlight that digital transformation is not merely a technological shift

but a fundamental change in healthcare operations, requiring strong leadership and structured change management to succeed. Leadership emerged as a critical driver, shaping strategic direction, fostering innovation, and mitigating resistance to change. Additionally, process innovation was identified as a key mediator between organizational leadership and institutional benefits, enhancing healthcare performance and service delivery.

The bibliometric analysis revealed a growing academic interest in change management and digital transformation, with a marked increase in publications after the COVID-19 pandemic. The crisis acted as a catalyst, forcing healthcare organizations to accelerate digital adoption to ensure operational resilience, patient safety, and continuity of care. However, while the focus group participants frequently mentioned "change," discussions on structured change management were surprisingly limited, suggesting a gap in its recognition as a crucial component of successful digital transformation in healthcare settings.

A key insight from the focus group was the unanimous agreement that digital transformation outcomes in healthcare are intrinsically linked to leadership effectiveness and well-orchestrated change processes. Inspirational leadership plays a vital role in engaging healthcare professionals, driving the adoption of digital tools, and ensuring that technological advancements translate into tangible improvements in patient care, diagnostic accuracy, and treatment efficacy. However, challenges such as workforce resistance, digital literacy gaps, interoperability issues, and regulatory constraints must be addressed to fully harness the potential of digital transformation in healthcare.

This study reinforces the need for a strategic, healthcare-specific approach to digital transformation, where leadership and change management act as cornerstones for sustainable innovation. Future research should further investigate the impact of different leadership styles on digital transformation success in healthcare, employing hybrid methodologies that combine qualitative insights with quantitative validation. Additionally, longitudinal studies assessing the long-term effects of digital adoption on healthcare outcomes, efficiency, and patient satisfaction would provide deeper insights into best practices for digital healthcare evolution.

This study underscores that digital transformation in healthcare hinges on effective leadership, structured change management, and tailored technology integration strategies. To navigate the evolving digital healthcare landscape, organizations should:

- Develop leadership-driven transformation roadmaps aligned with regulatory requirements.
- Implement targeted workforce training programs to enhance digital readiness.
- Adopt phased technology deployment strategies, prioritizing patient care and data security.
- Leverage data-driven insights to continuously refine digital strategies based on patient outcomes and operational efficiency.

Future Research Directions

Future studies should explore:

- The long-term effects of digital transformation on healthcare service delivery.

- Comparative analyses between public and private healthcare institutions in digital adoption.
- Expanded quantitative assessments linking leadership approaches to digital transformation success metrics.

Abbreviations

Not applicable.

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Ethics approval and consent to participate

Ethical guidelines for research were followed throughout; in particular, participants gave written informed consent and were made aware that they are free to withdraw anytime during data collection.

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