MANAGEMENT PERSPECTIVE ON DIGITAL HEALTH'S SOCIAL IMPACT

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ABSTRACT

Digital health management changes across Europe present a critical challenge & huge opportunities for healthcare managers with serious social challenges. Analyzing this from different cultural angles reveals unexpected patterns. In this paper we examined data from the European Court of Auditors and Eurostat, plus comparative studies spanning from 2009-2024, and focusing on "How digital health affects social equity across different European welfare systems?", which is the core question we are answering in this paper. The review outcomes show that Nordic countries are exceptional, where 86% of seniors are digitally included, driven by their universal strong healthcare guidelines, coordination and user-friendly models. While Mediterranean countries stagnated around 40%, which seems counterintuitive given their strong family-care traditions. COVID-19 essentially accelerated decades of gradual change into three intense years. Digital technologies such as telemedicine and telehealth grew exponentially; however, some older adults and low-income patients appear to have difficulties adapting these new digital technologies. Surprisingly these outcomes seem to follow existing welfare patterns rather than simple tech adaptation curves. Social Impact assessment suggests that standardized rollouts often fail, while culturally adapted approaches tend to stick better than national portals. The generational shift is a prime change factor; future healthcare users have demanding expectations like intuitive interfaces & minimizing paperwork use. For managers & stakeholders, digital health could bring European systems closer together rather than creating new divisions, via cross-cultural management approaches with deliberate attention to equity and cultural sensitivity from day one, rather than focusing only on digital health technical impact.

KEYWORDS: *Cross-Cultural Management; Digital Health Management; European regions comparative studies; Social Impact Assessment; Social Equity.*

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1. INTRODUCTION

Digital Healthcare across Europe is going faster than really prepared for, reshaping how entire populations experience medical care & the social fallout appears more complicated than expected.
Digital tools could make healthcare more accessible and efficient; however, it creates unpredictable managerial social impacts, digital divide, language barriers, broadband quality trust in public system on different levels. Moreover, it impacts how families traditionally share caregiving responsibilities. These changes play out differently across European welfare systems.
Countries with strong public healthcare traditions may adapt digital tools more smoothly but that is not guaranteed. For healthcare managers and policymakers, the priority objectives & concerns are mainly the technical efficiency of digital health & it is return values. Digital health tools could act

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as equalizers, or amplifier for existing inequalities when identity verification or data costs become new barriers. The answer likely depends less on the technology itself and more on implementation.
Once these digital systems become embedded in healthcare infrastructure, changing courses becomes exponentially harder. A massive experiment is being conducted on European populations without putting into consideration the social impact besides the technical side. The challenge lies in steering it toward equity and social cohesion across different European contexts before these patterns become permanent.

2. LITERATURE REVIEW

Studying the literature of digital health social impacts across Europe is highly interdisciplinary & developed through multi-theoretical stages. As illustrated in Figure 1, it begins with mid-20th century sociotechnical systems theory, progresses through late 20th century cultural and social construction perspectives, and extends to early 21st century welfare regime approaches, digital divide research, and management frameworks. Recent contributions emphasize institutional influence, social equity, and telemedicine adoption, highlighting digital health outcomes not only from technological contexts, but also cultural and organizational perception.

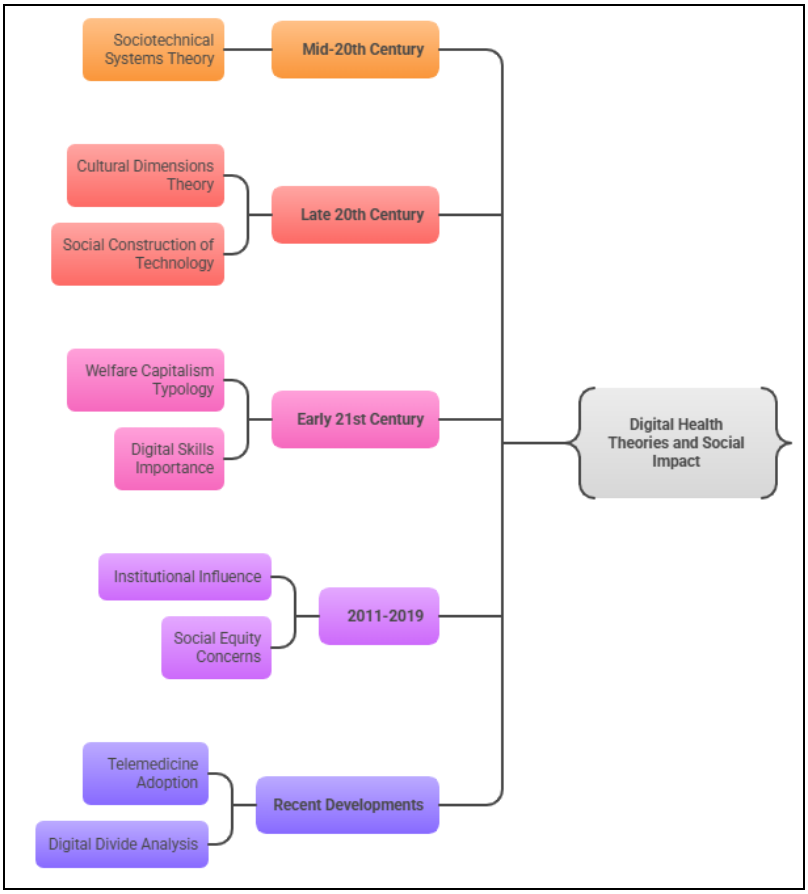

Figure 1. Evolution Timeline for Digital Health Theories & Social Impact
Source: Author's owns conception

This review synthesizes key theoretical foundations and empirical contributions, from earlier stages of digital health research to sociotechnical perspective & contemporary analyses of welfare regimes.
Digital health is not only a technological revolution but also a modifier for health delivery and services (Topol, 2023). It involves technologies such as telemedicine, mobile health applications,

and electronic health records to promote health service access, efficiency, and personalized treatment (Shaw et al., 2021). Health management represents healthcare strategies and resource management to enhance positive patient outcomes, which require adaptive leadership with data-driven decision-making and ethical considerations (Murray et al., 2022). Digital inclusion is the equity to use and access digital health technologies; it requires infrastructure (the ability to access digital tools and services such as the internet and computers), digital literacy (the ability to use those tools effectively (e.g., accessing a telemedicine platform or an online health portal) and affordability (the ability to afford the cost of internet, devices, and services). Meanwhile, digital exclusion often reflects broader social and economic inequalities (Van Dijk, 2019). Continental Europe refers to diverse healthcare and welfare models, mainly Bismarckian and hybrid systems, producing varying capacities for digital transformation and impacting social equity (Saltman & Duran, 2021).

In this paper we have combined the understanding from the literature review on the 9 themes of prior work in an inter-connected framework summarized by the four areas below:

(1) Challenges related to digital divides and healthcare management.
(2) European policy development opportunities in digital health social context.
(3) Critical gaps in digital health social research
(4) Theoretical integration in future research, in a longitudinal cross-cultural social impact assessment approach.

The following points explain this in more detail:

2.1 Digital Health Transformation and Social Impact Theory

It begins with Rogers' diffusion of innovation theory (Rogers, 2003), highlighting that adoption patterns reflect social structures and communication networks not only technical context. Then Van Dijks' three-level digital divide analysis (access, skills, usage) creating systematic technological exclusion patterns (Van Dijk, 2020). Followed by "Sociotechnical systems theory", by Trist and Bamforth (1951) and refined by Orlikowski (2007), where establishes crucial frameworks to highlight how digital health technologies and social systems are related & cooperated. Then "The social construction of technology (SCOT) perspective", pioneered by Bijker et al (1987) explain how identical technologies can produce different social & cultural outcomes, (Pinch & Bijker, 1984). Later, "Contemporary applications" by Greenhalgh et al. (2017) to healthcare contexts demonstrate how sociotechnical mental approach enhance sustainable digital health implementations through accompanying organizational culture, professional relationships, and patient experiences with technological efficiency, while Oudshoorn's (2011) work highlights adoption patterns are affected by age, gender, and socioeconomic factors.

2.2 Welfare Regime Theory and Healthcare Digitalization

A primary framework to understand how institutional arrangements affect digital health has been established by Esping-Andersen's (1990) welfare capitalism typology, covering social democratic regimes, expanded by Ferrera (1996) to include Southern European systems and Arts and Gelissen (2002) for Eastern European, explaining the ability of different market & social factors to create social protection systems which impact technology adoption and equity patterns, alongside Crescenzi et al. (2016) highlights the impact of institutional arrangements on inclusion outcomes. Räsänen (2006) reports higher equitable technology access in social democratic regimes compared to liberal conservative ones, Alexopoulou et al. (2022) analysis covers elderly digital divides, outcome that Nordic countries achieve superior digital equity according to their comprehensive public policies (Alexopoulou et al, 2022). While Bambra's (2005) works on health outcomes, combined with Reher's (2007) analysis of family support variations across European regions, illustrating that institutional differences influence patterns of healthcare technology adoption.

2.3 Digital Divide Research and Healthcare Applications

This developed from initial access inequality study patterns of use and outcomes, DiMaggio et al. (2001) established frameworks to study reproduction of socioeconomic inequalities in digital sectors, while Hargittai (2002) illustrates the necessity of digital skills & access. Followed by, Czaja and Lee (2007) comprehensive analysis of aging and technological adoption, identifying physical, cognitive, and social factors outcomes to (age-related exclusion patterns). Peacock and Künemund (2017) illustrate senior citizens' internet use across European regimes, spotting the light that Mediterranean countries show strongest relationships between education and digital access, while Nordic has more universal patterns, alongside with longitudinal analysis illustrated motivation and knowledge barriers despite declining financial challenges. Neves et al. (2018) highlights the intersection between (age, gender, education, and geography) creating complex exclusion patterns, while Hunsaker and Hargittai (2010) study the influence of health conditions on digital use.

2.4 Healthcare Management and Digital Transformation

Agarwal et al. (2010) established seminal analysis highlighting specific healthcare complexes because of professional autonomy traditions, regulatory requirements, and life-or-death consequences, Lluch (2011) illustrate the influence of institutional arrangements on implementation success more than technical capabilities, extended by Greenhalgh et al. (2017) spotlight social networks, organizational readiness, and adaptive capacity. Current studies cover social equity dimensions from management perspectives, Benda et al. (2020) illustrate organizational approaches to digital health equity while Reed et al. (2020) analyzed inclusive adoption strategies but focused on individual organizational contexts more than social impact assessment. Hofstede et al. (2010) create cross-cultural healthcare management research highlights the impact of cultural factors on healthcare organization patterns, while Saltman et al. (2004) analyses the effect of different system structures on adoption of innovation and equity outcomes.

2.5 European Digital Health Policy and Implementation Research

Despite of EU coordination efforts, "European digital health policy" research report substantial variation in a national approach level, European Commission's (2004, 2012) eHealth action plans provide frameworks that member states interpret according to national institutional arrangements. Stroetmann et al. (2007) did a comparative analysis illustrate the influence of healthcare system on structures adoption patterns, while Codagnone and Lupiañez-Villanueva (2014) report that despite of coordination efforts; cross-national variations persist. Alongside, European Court of Auditors (2017, 2019, 2024) reports identify social equity concerns as persistent challenges, specifically elderly inclusion and rural access. Recent comparative research study the social impact variations across implementations, (Fonda et al., 2023) provided detailed analysis across four European countries (Denmark, Italy, Slovenia, Catalonia), demonstrating substantial differences in priorities, implementation approaches, and professional competency development. This explains how cultural values and institutional arrangements shape social impacts more than technical capabilities. Klecun (2016) analyzes digital health equity across European contexts, revealing cross-sectional relationships between welfare regime characteristics and inclusion outcomes & explaining how universalistic systems can produce more equitable access compared with insurance-based systems that reproduce existing socioeconomic stratification in digital domains.

2.6 Cross-Cultural Management in Healthcare Contexts

To understand digital health implementation across diverse European contexts we need to do Cross-cultural management research. Hofstede (1980, 2001) with his cultural dimension's theory revealed important frameworks regardless of various criticisms. Nakata and Sivakumar (1996) created applications to demonstrate the impact of factors like power distance, individualism-collectivism,

uncertainty avoidance & long-term orientation on healthcare delivery patterns. Recent research examines cultural intelligence and adaptive leadership, alongside Ang and Van Dyne (2008) developed comprehensive frameworks that address cultural sensitivity impact upon patient outcomes and professional relationships (Ang & Van Dyne, 2008). Healthcare-specific cross-cultural research highlight challenges around professional cultures, patient expectations, and family involvement, Jirwe et al. (2006) examine this through analyzing cross-cultural competence impact on patient care quality, while Betancourt et al. (2003) examined organizational cultural competence strategies. Contemporary research progressively addresses digital technology dimensions. Boogerd et al. (2015) as an example examined cultural factors in patient portal adoption and Wilson-Stronks et al. (2008) analyzed organizational strategies for culturally competent digital health implementation.

2.7 Social Impact Assessment in Healthcare Innovation

Vanclay developed tradition for environmental contexts for healthcare innovations researchers to understand the social impact of medical technologies (Vanclay, 2003), Lehoux et al. (2014) developed comprehensive frameworks adopting social dimensions alongside clinical and economic evaluation, Dougherty and Conway (2008) study the impact of innovations on patient empowerment, professional relationships, and care cooperativeness. Esteves et al. (2012) report that adoption of digital health needs continuous self-driven engagement also documents that significant social impact variation across population groups and cultural contexts. Rigby (2007) provides early eHealth social impact analysis, while Lluch (2011) study organizations and social dimensions across EU countries, Healthcare-specific assessment is challenged by undefined relation & long-term outcome, so gap is still there.

2.8 Longitudinal Analysis of Digital Health Transformation

A theoretical frameworks for innovation diffusion processes were developed by Rogers (2003), while Venkatesh et al. (2012) navigated the correlation between user experience & technology acceptance patterns, while Chaudhry et al. (2006) came with early longitudinal e-health record analysis revealing complex relationships between implementation approaches and outcomes, then Black et al. (2011) demonstrate that initial expectations may not necessarily match longitudinal social effects & may differ significantly. COVID-19 Pandemic unique experience enables acceleration of digital health adoption, Monaghesh and Hajizadeh (2020) documented rapid telemedicine adoption and Tuckson et al. (2017) analyzed healthcare delivery implications in a longer-term way. Hence European longitudinal research encountered by challenges related to cross-national data availability and comparability, as per Stroetmann et al. (2006, 2007) studies which report variation in adoption and implementation approaches across European welfare countries and cultural contexts over time, despite the presence of limited systematic longitudinal analysis of social impacts a research gap is still there and need additional empirical investigation.

2.9 Research Gaps and Theoretical Integration

The literature review highlights multidisciplinary gaps in managerial contexts, as current research focuses on individual technical adoption rather than social impact, with limited Comparative longitudinal analysis across cultural institutional level. Social impact assessment methodology requires adoption to digital health contexts & community approaches. Figure 2 below summarizes the literature review theme for Digital Health Social Impact.

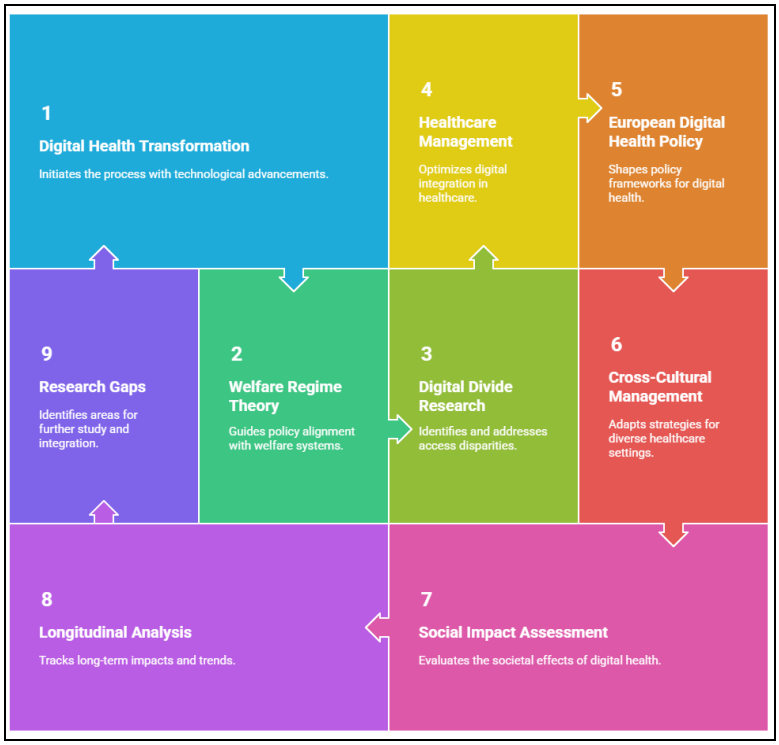

Figure 2. Summary of literature review theme for Digital Health Social Impact
Source: Author's owns conception

3. RESEARCH METHODOLOGY

3.1 Problem Statement and Research Gap

Current research focuses mainly on technical aspects of digital health implementation or individual-adoption patterns & lacks longitudinal impact analysis across different social-cultural contexts, while previous studies have unequal coverage among European regimes. This creates an absence of evidence-based guidance framework for managing long-term social consequences of digital transformation, this presents the importance of this research paper.

3.2 Research Objectives and Novel Approach

This study addresses these gaps through cross-sectional comparative management-focused analysis of digital health social impacts across European welfare regimes, combined with longitudinal impact assessment spanning 2009-2024. The study aims to provide cross-cultural evidence-based managerial frameworks and practical recommendations for healthcare managers to assess and manage social impacts of digital health implementation across diverse European contexts.

3.3 Methodology and Analytical Framework

In this study, 3 main methodologies were used as below:

- Applies regional comparative analysis to longitudinal transformation patterns.
- It follows a systematic twelve-question analysis framework that progresses from individual managerial social impacts Multiple data sources combined on this methodology including European Court of Auditors reports, Eurostat digital inclusion statistics, comparative welfare regime research, and cross-national healthcare system studies covering four distinct European regions (Nordic, Continental, Mediterranean, and Eastern European), the reason for adapting this classification is based on combination of geography (location and physical features), culture (like religion, social attitudes or food habits), history and socio-political development (cold war division and distinct political & economic trajectories).

- The research applies Esping-Andersen's (1990) welfare regime typology as a framework organizer while incorporating contemporary digital divide theory and sociotechnical systems analysis to study the interaction of institutional arrangements, cultural values, and management to end up with different social outcomes.

4. DISCUSSION

The discussion section presents a comprehensive management-focused analysis of the social impacts of digital health across diverse European welfare regimes, summarized under Digital Health's Social Impact Framework (DHSIF); through twelve interconnected points as demonstrated in figure 3.a in the following page. The framework has been simplified further by grouping the points into themes to create a structure that can allow understanding in an easier way. Thus the 12 element points are grouped into 3 themes illustrating common perspective in each of them as demonstrated in Figure 3.b below, which are:

(1) Demographics and Geography,
(2) Management & Assessment and
(3) Social Technical Context.

To understand further, below is the discussion for each theme with its elements and their sub-elements.

4.1 Demographics and Geography Context theme

Under this theme there are four elements, below are the details for each of them and the sub elements for each:

4.1.1 Affected Populations and Demographic Impact Patterns

Crisis driven acceleration and resilience where digital health transformation impacts different population entities on variant patterns. This creates intersectional impacts that need targeted intervention strategies as briefed in the four sub elements below:

4.1.1.1 Age-Related Digital Health Adoption Stratification:

Illustrates age-related patterns of digital health adoption and social impact (Alexopoulou et al., 2022, p. 285).

4.1.1.2 Generational Transition and System Transformation Pressures:

Longitudinal analysis of generational transitions highlights readiness need for variant patient expectations and capabilities (Sepetis et al., 2024, p. 8).

4.1.1.3 Socioeconomic Status and Educational Intersection Effects:

May lead to enclosing complex patterns of exclusion (Alexopoulou et al., 2022, p. 285),

4.1.1.4 Geographic Disparities and Cross-Border Variations:

Substantial geographic disparities require region-specific management approaches (European Court of Auditors, 2024, pp. 13, 26-27).

4.1.2 Regional Differences and European Comparative Analysis

distinct regional patterns that spot the light on the underlying welfare regional characteristics and cultural values, necessitating differentiated management approaches among regional contexts. As briefed in the four points below:

4.1.2.1. Nordic Excellence and Universalist Approach: Nordic shows superior performance among all digital health metrics according to universalist welfare guidelines and strong public sector coordination abilities (European Court of Auditors, 2024, p. 11).

4.1.2.2. Continental European Mixed Performance: Illustrate moderate performance with significant internal variation (Sepetis et al., 2024, p. 12), (Alexopoulou et al., 2022, p. 279).

4.1.2.3. Mediterranean Challenges and Family-Centered Adaptation: Mediterranean shows the most significant digital difficulties that need digital tools merging with current social support networks (European Court of Auditors, 2024, p. 13).

4.1.2.4. Eastern European Rapid Modernization: Poland example achieves 90% electronic health record access & maintain lower eGovernment service maturity scores showing fast unequal development patterns (European Court of Auditors, 2024, p. 27), (Alexopoulou et al., 2022, p. 280).

4.1.3 Cross-Regional European Social Impact Patterns

Comparative analysis across European regions demonstrates convergent and divergent patterns in digital health social impacts. This highlights unseen welfare regime differences and cultural variations as explained in the three points below:

4.1.3.1. Convergent Patterns Across Regions: Shows opportunities for cross-regional learning and coordination (European Court of Auditors, 2024, p. 18).

4.1.3.2. Divergent Regional Impact Patterns: Shows variation within regional levels (Alexopoulou et al., 2022, p. 279).

4.1.3.3. Welfare Regime Impact on Digital Equity: Shows a correlation between social protection systems and digital health equity outcomes (Peacock & Künemund, 2017, p. 281), (Alexopoulou et al., 2022, pp. 278-280).

4.1.4 Cross-Cultural Management Approaches

European diversity of cultural contexts requires a cross-cultural management approach that puts into consideration both regional differences & common digital health goals. as briefed in the four points below:

4.1.4.1 Culturally Adaptive Implementation Foundations: Highlights cultural values, social structures, and institutional arrangements significantly impact technology adoption patterns and user acceptance rates.

4.1.4.2 Trust-Building and Regional Adaptation Strategies: Must address different levels of digital literacy, that need transparent & gradual implementation (Peacock & Künemund, 2017, p. 282).

4.1.4.3 Multi-Level Governance Integration: Essential for cross-cultural management to cover coordination within EU-level, national policy frameworks, regional & social implementation requirements (European Court of Auditors, 2024, p. 22, 25).

4.1.4.4 Stakeholder Engagement and Professional Development Strategies: This need approaches that cover different cultural values, communication preferences, and institutional arrangements limited to each European region's social and professional contexts (Alexopoulou et al., 2022, p. 283).

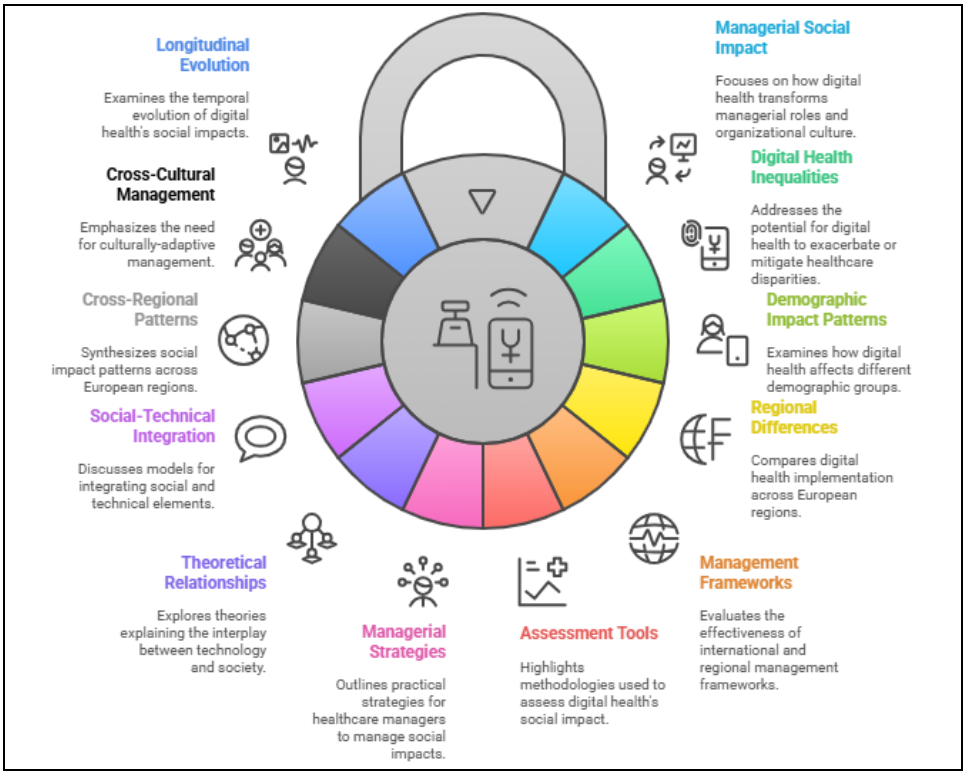

Figure 3. Digital Health's Social Impact Framework (DHSIF) Elements
Source: Author's owns conception

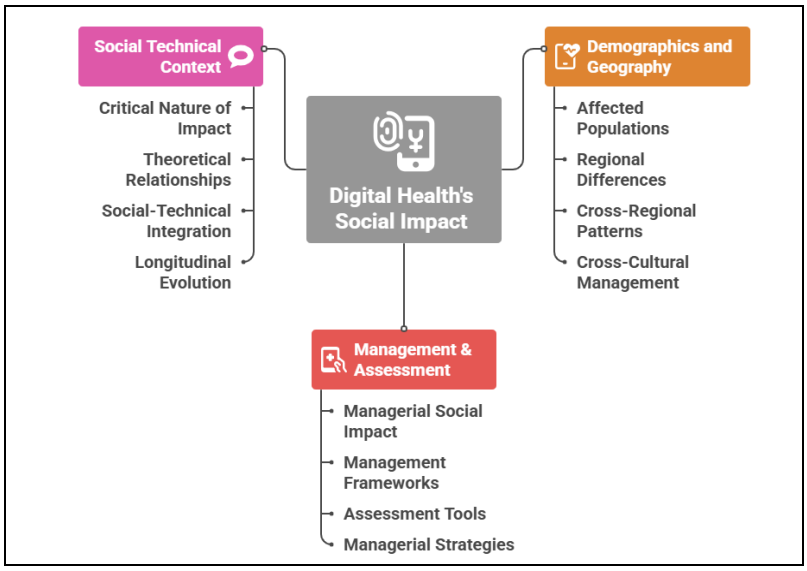

Figure 4. Digital Health's Social Impact Framework (DHSIF) Themes & Perspectives
Source: Author's owns conception

4.2 Management & Assessment Context theme

Under this theme there are four elements, below are the details for each of them and the sub elements for each:

4.2.1 Managerial Social Impact: Workforce Transformation and Organizational Change

This is briefed into five sub-elements. Managers should navigate restructured strategies, frameworks & measurement systems that sustain current service quality while implementing transformative digital solutions. As successful digital adoption relies on organizational culture,

employee competencies, and technological infrastructure, below is the breakdown of the sub-elements:

4.2.1.1. Digital Ecosystem Transformation and Strategic Realignment: Shift from traditional health service delivery to comprehensive digital ecosystems (European Court of Auditors, 2024, p. 17).

4.2.1.2. Workforce Evolution and Digital Competency Development: Digital shift from supplementary skills to main requirement.

4.2.1.3. Regional Implementation Approaches and Management Philosophy Variations: Taking Denmark & Slovenia's Model as an example.

4.2.1.4. Cultural Adaptation and Sensitivity Management: Cover successful digital adoption sensitivity to cultural factors (Sepetis et al., 2024, p. 3), (Peacock & Künemund, 2017, pp. 278-280).

4.2.1.5. Crisis-Driven Acceleration and Organizational Resilience: The COVID-19 pandemic speed up digital adoption timelines & maintain organizational stability (European Court of Auditors, 2024, p. 17).

4.2.2 Management Frameworks and Effectiveness Assessment

Digital health management frameworks among European regimen show different approaches to governance, implementation, and efficiency measurement, each highlighting variant institutional contexts and policy priorities as briefed in the three points below:

4.2.2.1. WHO and International Framework Adoption: This framework illustrates "four strategic objectives with TAPIC governance framework (practical problem-oriented analytical tool that can identify governance problems in five domains: Transparency, Accountability, Participation, Integrity and Policy Capacity) focusing on strengthening governance, advancing human resources for health, improving financing, and enhancing leadership (European Court of Auditors, 2024, p. 8, 10).

4.2.2.2. Regional Framework Adaptation: Takes Finland's Digi-HTA framework as a best example to study universal access principles & maintain implementation flexibility at the same time (European Court of Auditors, 2024, p. 15).

4.2.2.3. Effectiveness Measurement Challenges: Different methodological challenges across European regional contexts (European Court of Auditors, 2024, p. 5).

4.2.3 Assessment Tools and Methodological Approaches

The frameworks and assessment methodologies for European digital health assessments use different methodological approaches which highlight variant measurement priorities and institutional abilities among different regions as briefed in the five points below:

4.2.3.1 ICER-PHTI Framework Adaptation and Implementation Variations (Institute for Clinical and Economic Review - Population Health Technology Impact): Assess digital health interventions' social impacts among different healthcare contexts (European Court of Auditors, 2024, p. 16).

4.2.3.2 Finnish Digi-HTA Model and Advanced Integration Approaches: highlighted in point 4.2.2.2. above (European Court of Auditors, 2024, p. 15)

4.2.3.3 RE-AIM Framework Implementation and Regional Sophistication Differences: (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework provides structured many-dimensional evaluation.

4.2.3.4 Mediterranean Implementation Challenges and Resource Constraints: Challenge to adopt RE-AIM and other systematic assessment approaches (Peacock & Künemund, 2017, p. 282).

4.2.3.5 PROGRESS-Plus Framework and Institutional Capacity Dependencies: (Place, Race, Occupation, Gender, Religion, Education, Socioeconomic status, social capital - Plus age, disability, sexual orientation): provides equity assessment capabilities to address complex dimensions of digital health social impact.

4.2.4 Managerial Strategies for Understanding and Managing Social Impacts

Healthcare managers across Europe have developed different strategies to understand and manage digital health's social impacts accordingly, this spots the light on variation on institutional contexts and resource availability. as briefed in the six points below:

4.2.4.1. AHRQ Framework Adoption and Nordic Leadership Models (Agency for Healthcare Research and Quality's Digital Healthcare Equity Framework): Highlights gaps and targeted intervention strategies" (Sepetis et al., 2024, p. 9).

4.2.4.2. Continental European Multi-Stakeholder Adaptation Strategies: Adopt AHRQ principles to complex multi-stakeholder contexts.

4.2.4.3. ESG Integration as a Social Impact Strategy; (Environmental, Social, and Governance) emerging management strategy to address digital health's social impacts (Sepetis et al., 2024, p. 11).

4.2.4.4. Regional ESG Variations and Capacity Constraints: Between Nordic, Mediterranean & Eastern Europe.

4.2.4.5. Social Impact Bonds and Outcome-Based Financing (SIBs): Financing mechanisms that allow outcome-focused digital health investments (European Court of Auditors, 2024, p. 25)

4.2.4.6. Barriers and Institutional Requirements for SIBs: SIB needs powerful measurement capabilities, risk management systems, and regulatory frameworks.

4.3 Social Technical Context theme

4.3.1 Critical Nature of Digital Health Social Impact

The criticality of digital health's social impact is due to its capability to either increase current healthcare inequalities or play an equalizing force role, depending on implementation approaches (Alexopoulou et al., 2022, p. 274). This is briefed into four sub-elements to explain this critical nature in more detail below:

4.3.1.1 Regional Disparity Patterns and Stratification Effects: Highlights digital exclusion systematic patterns & current welfare regime characteristics (Alexopoulou et al., 2022, p. 279), (Alexopoulou et al., 2022, p. 278).

4.3.1.2 Structural Amplification Factors and Cascading Effects: Structural factors develop a chain progressive unequal reaction upon population or technical support (European Court of Auditors, 2024, p. 21).

4.3.1.3 Age-Based Digital Exclusion and Intersectional Marginalization: Older people encounter relatively more difficulties in adopting digital technology (Alexopoulou et al., 2022, p. 276).

4.3.1.4 Welfare Regime-Specific Exclusion Mechanisms and Management Implications: Shows different welfare regimes need differentiated managerial strategies (Peacock & Künemund, 2017, p. 281).

4.3.2 Theoretical Relationships Between Social and Technical Perspectives

The relation between social and technical perspectives in digital health is a cross-sectional relation that combines management approaches and policy development across European contexts. as briefed in the four points below:

4.3.2.1 Sociotechnical Systems Theory Foundations: Covers social and technical components rather than isolated technological solutions (Baxter & Sommerville, 2011), (Hyppönen et al., 2019).

4.3.2.2 Social Construction of Technology (SCOT) Applications: Covers mechanism for social interpretation and usage patterns rather than inherent technical characteristics alone.

4.3.2.3 Actor-Network Theory (ANT) Insights and Implementation: Highlights the network of human and non-human actors that constitute digital health systems (Latour, 2005), (Vehko et al., 2018).

4.3.2.4 Integrated Theoretical Framework for Management Practice: Between sociotechnical, Scot & Ant theories (Greenhalgh et al., 2017).

4.3.3 Social-Technical Integration Possibilities

European experiences illustrate different possibilities for social and technical elements integration in digital health systems. It reveals a successful approach as well that needs considerable attention to cultural contexts and institutional arrangements. as briefed in the five points below:

4.3.3.1 Community-Based Participatory Research (CBPR) Foundations: Provides principles for social-technical integration assurance.

4.3.3.2 Nordic CBPR Implementation Excellence: Leading example for CBPR implementation (European Court of Auditors, 2024, p. 18).

4.3.3.3 NYU Langone Digital Health Integration Framework: Addresses interdependences between technical infrastructure, clinical processes, and social support mechanisms that identify digital health success (Sepetis et al., 2024, p. 10).

4.3.3.4 European Adaptations of Integration Models: Provides sustainable integration compatible with European characteristics.

4.3.3.5 Richardson Digital Health Equity Framework Applications: Methodology for digital health implementation lifecycles to assure equity considerations guide for social-technical integration processes (Alexopoulou et al., 2022, p. 278).

4.3.4 Longitudinal Social Impact Evolution

The evolution of digital health social impacts across Europe illustrates accelerating transformation patterns with significant implications for future management approaches and policy development as briefed in the five points below:

4.3.4.1 Early Adoption Phase Foundations (2009-2015): Highlights a two faces role of digital health either decrease or amplify current healthcare inequalities relying on implementation approaches and policy frameworks (Alexopoulou et al., 2022, p. 279).

4.3.4.2 COVID-19 Acceleration Phase Transformation (2015-2020): Shows unequal transformation & established sustained engagement opportunities while it witnessed risks of post-crisis regression that need careful management attention (European Court of Auditors, 2024, p. 18).

4.3.4.3 Current Institutionalization Phase Dynamics (2020-2024): This highlights the need for sustainable institutional frameworks to maintain digital health engagement beyond crisis

conditions & address continuous exclusion patterns within vulnerable populations (Alexopoulou et al., 2022, p. 279).

4.3.4.4 Generational Impact Patterns and Trajectories: Longitudinal analysis shows generational differences in digital health social impacts. This highlights the critical need for proactive management strategies to predict & react to user expectations at the same level (Sepetis et al., 2024, p. 12), (Peacock & Künemund, 2017, p. 285), (Alexopoulou et al., 2022, p. 284).

4.3.4.5 Future Trajectory Implications and Strategic Projections: This can be achieved through adopting sustainable managerial attention to equity and inclusion in the transformation process, guaranteeing that digital health evolution enhances European social solidarity objectives not the opposite (European Court of Auditors, 2024, p. 27, 28), (Sepetis et al., 2024, p. 13).

5. CONCLUSIONS

This study has traced the evolution of digital health in a wider context of European welfare regimes, cultural frameworks, and institutional arrangements, navigating other influencing factors rather than technology side. The study applies integration theme between macro-level welfare state typologies & micro-level management practices. The analysis demonstrates and reshapes the longitudinal equity patterns of digital health access and cultural adaptation. The following breakdown of conclusion into three outcomes, key findings and contributions, recommendations & future directions and way forward for managing digital health transformation across diverse European contexts:

5.1 Key Findings and Contributions

The main highlight is the necessity of management approaches to prepare both digital-native generation & support digitally excluded elderly, below are the breakdown of the findings:

(1) Digital health social impacts follow distinct welfare regime patterns, for example, Nordic universalist systems report 86% senior digital inclusion Mediterranean family-centered systems report 40% (Alexopoulou et al., 2022, pp. 279-280), as shown below in figure 4.
(2) There is an impact of institutional arrangements on social outcomes.
(3) Critical management challenges related to workforce transformation, cultural adaptation, and equity maintenance.
(4) COVID-19 played an unexpected catalyst role that compressed decades of gradual transformation into 2-3 years of rapid change (European Court of Auditors, 2024, p. 18).
(5) Longitudinal analysis demonstrates that the most fundamental social changes come up through generational replacement rather than individual behavior modification.
(6) Digital health is progressing from a potential social divider into a way for European social cohesion by adopting implementation approaches that put into consideration equity and cross-cultural contexts.
(7) Limitations related to data availability for specific regions and time periods acknowledging that rapid technological transformation may outpace some analytical frameworks.

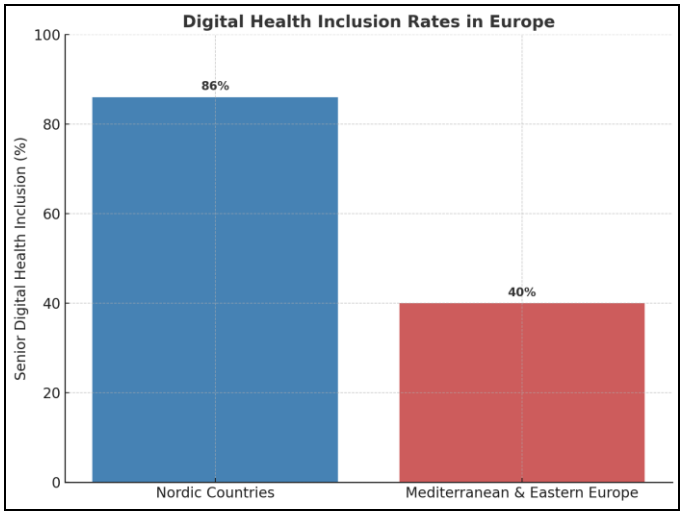

Figure 5. Comparative analysis of digital health inclusion between regions in Europe
Source: Author's owns conception, percentage data adapted from (Alexopoulou et al., 2022, pp. 279-280) and (European Court of Auditors, 2024, p. 18)

5.2 Recommendations

To develop culturally adaptive implementation frameworks for management practice; organizations should:

(1) Consider cross-cultural **competency development** as apriority among healthcare decision makers.
(2) Establish **differentiated** stakeholder engagement **strategies** that are compatible with local cultural values.
(3) Implement **multi-level of governance approaches** with flexibility for subsidiarity while maintaining interoperability standards.

On the other hand, there are regional & social welfare regime characteristics to be implemented that will also achieve European digital health objectives, these include the following recommendations:

(1) In Mediterranean contexts, **family-mediated digital health programs** need to be developed & in Nordic regions **leveraging collaborative governance** is recommended.
(2) **Systematic equity monitoring** using frameworks like PROGRESS-Plus should be established to suit regional contexts.
(3) **Generational bridge strategies** should be implemented to utilize Generation X and Millennials as facilitators for elderly digital inclusion.
(4) **Social Impact Bond mechanisms** should be created to link digital health investments to measurable social equity outcomes rather than adopting only technological deployment metrics.

5.3 Future direction and way forward:

The future direction vision implicates that digital health can serve as a cohesion mechanism for European social matrix via the four actions below as per figure 6:

(1) Adopting universal access policies, cross-border cooperation, and shared standards that respect cultural diversity.
(2) Adopting social impact assessment as a routine management process.
(3) Creating cross-regional learning networks to enhance the quality of practice exchange.

(4) Adopting sustainable political commitment to equity principles throughout the ongoing digital health evolution.

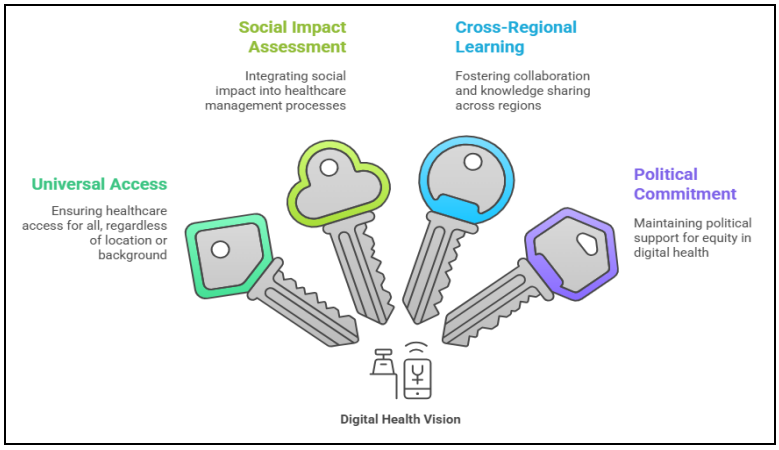

Figure 6. Future Direction recommendations
Source: Author's owns conception

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