Socio-Technical Factors Influencing the Management and Sustainability of   Digital Transformations in the Healthcare Industry: Perspectives of Physicians and Nurses

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Abstract: This research explores the perceptions of healthcare professionals in the context of digital technology adoption, focusing on their demographic and occupational characteristics. The study employs a descriptive research methodology, utilizing stratified random sampling to ensure a representative sample of 228 participants. The findings reveal important insights into the gender distribution, where 32.5% of respondents are male and 67.5% are female. Furthermore, the research examines the occupation of participants, highlighting that 26.8% are physicians and 73.2% are nurses. The workplace distribution reflects 74.1% of respondents employed in hospitals, 17.1% in clinics, and 8.8% in private practice. These demographic profiles lay the groundwork for a more comprehensive investigation into the healthcare professionals' perceptions and engagement with digital technologies, shedding light on potential variations within this critical workforce. Understanding these factors is essential for effective technology implementation and the advancement of healthcare services.

Keywords: Socio-Technical Factors; Sustainability, digital Transformations, Healthcare Industry

Introduction:

The healthcare industry is undergoing a significant transformation fueled by digital technologies. The adoption of digital solutions has the potential to revolutionize healthcare delivery, enhance patient outcomes, and improve operational efficiency. However, the successful implementation

and sustainability of digital transformation initiatives in healthcare organizations depend not only on the technological aspects but also on socio-technical factors. These factors encompass the perceptions, attitudes, and behaviors of healthcare professionals, particularly physicians and nurses, who are at the forefront of patient care.

Digital transformation in healthcare refers to the integration and utilization of digital technologies, such as electronic health records, telemedicine, mobile health applications, and data analytics, to transform healthcare processes and improve patient care. While the potential benefits of digital transformation are well-recognized, the complexity and challenges associated with its management and sustainability cannot be overlooked. Understanding the socio-technical factors that influence the successful implementation of digital transformation initiatives, particularly from the perspective of physicians and nurses, is critical for healthcare organizations aiming to optimize the benefits of these technologies.

Physicians and nurses are key stakeholders in the healthcare ecosystem, responsible for delivering patient care and interacting with digital tools and systems on a daily basis. Their perceptions and attitudes towards digital transformation initiatives can significantly impact the adoption and effective utilization of these technologies. However, there is a lack of comprehensive research exploring the socio-technical factors influencing the management and sustainability of digital transformation in the healthcare industry specifically from the perspective of physicians and nurses.

The management and sustainability of digital transformation in the healthcare industry are essential for maximizing the benefits of technological advancements and ensuring long-term success. Here are key considerations for effectively managing and sustaining digital transformation in healthcare:

The management and sustainability of digital transformation in the healthcare industry are influenced by various socio-technical factors. These factors encompass both social and technological aspects that interact and shape the successful implementation and long-term viability of digital transformation initiatives. Here are different socio-technical factors that have an impact:

Technology Acceptance: The acceptance of digital technologies by physicians and nurses is a crucial factor in the success of digital transformation. Factors such as usability, perceived usefulness, ease of integration into existing workflows, and the perceived impact on patient care play a significant role in determining technology acceptance.

Organizational Culture: The culture within healthcare organizations plays a pivotal role in facilitating or hindering digital transformation efforts. A supportive organizational culture that promotes innovation, collaboration, and continuous learning is essential. Leadership support, effective communication, and the willingness to embrace change are vital elements of an enabling culture.

Training and Education: Adequate training and education are critical for healthcare professionals to effectively utilize digital tools and systems. Providing comprehensive training programs that address both technical skills and the understanding of the benefits and potential challenges associated with digital transformation is essential for sustainable implementation.

Workflow Integration: Successful digital transformation requires the integration of digital technologies into existing healthcare workflows. It is crucial to ensure that digital solutions seamlessly fit into the daily routines of physicians and nurses without disrupting their established processes. Workflow redesign and customization of digital tools to align with specific care settings are essential for smooth integration.

Data Governance and Security: With the increasing reliance on digital technologies, the management and protection of patient data become paramount. Robust data governance practices, including data privacy and security measures, are vital to ensure trust and confidentiality. Compliance with regulatory requirements, such as HIPAA, is necessary for the sustainable implementation of digital transformation initiatives.

Interoperability and Integration: The interoperability of various digital systems and technologies is critical for seamless information exchange and collaboration across healthcare settings. Ensuring compatibility and integration between different electronic health records (EHRs), telemedicine platforms, and other digital tools is necessary to achieve comprehensive and coordinated care.

Patient-Centered Care: Digital transformation should prioritize patient-centered care, ensuring that technology enhances the patient experience and improves health outcomes. Involving patients in the design and development of digital solutions, considering their needs and preferences, and facilitating access to healthcare services through digital channels are key factors for sustainable digital transformation.

Change Management and Stakeholder Engagement: Effectively managing change and engaging key stakeholders, including physicians, nurses, administrators, and patients, is crucial for the successful implementation and sustainability of digital transformation. Clear communication, involvement in decision-making processes, and addressing concerns and resistance are essential aspects of change management.

Research methodology: This study employs a descriptive research approach and employs a stratified random sampling technique to investigate demographic and occupational characteristics among surveyed participants, The research entails the examination of a sample comprising 228 participants, which serves as a representation of the broader population under study. The selection of this sample was meticulously carried out using a stratified random sampling approach, ensuring proportional representation of diverse subgroups within the

population. gender distribution among respondents, revealing that 32.5% are male, while 67.5% are female. the occupational composition of the participants, highlighting that 26.8% are physicians, and the majority, at 73.2%, are nurses. he distribution of workplace settings is presented, illustrating that 74.1% of respondents are employed in hospital environments, 17.1% work in clinics, and 8.8% are engaged in private practice.

4. Data analysis and interpretation

TABLE   1-

GENDER

		Frequency	Percent	ValidPercent	Cumulative Percent
	MALE	74	32.5	32.5	32.5
Valid	FEMALE	154	67.5	67.5	100.0
	Total	228	100.0	100.0	

Out of 228 members 32.5 percent is male and its frequency is 74 and

67.5 percent is female and their frequency is 154

TABLE 2 - OCCUPATION

		Frequency	Percent	ValidPercent	CumulativePercent
	PHYSICIAN	61	26.8	26.8	26.8
Valid	NURSE	167	73.2	73.2	100.0
	Total	228	100.0	100.0	

Out of 228 Members OCCUPATION 26.8 percent are physicians and their its frequency is 61

And 73.2 are nurses and their frequency is 167

TABLE 3 - WORKPLACE

	Frequency	Percent	ValidPercent	Cumulative Percent
HOSPITAL	169	74.1	74.1	74.1
CLINIC	39	17.1	17.1	91.2

	Frequency	Percent	ValidPercent	Cumulative Percent
Valid PRIVATEPRACTICE	20	8.8	8.8	100.0
Total	228	100.0	100.0	

Out of 228 members workplace of hospital is 74.1 and frequency is 169,clinic is 17.1 percent and

its frequency is 39, Private practice is 8.8 percent and its frequency is 20

TABLE 4 –EXPERIENCE

		Frequency	Percent	ValidPercent	Cumulative Percent
	0-5	198	86.8	86.8	86.8
Valid	11-15	23	10.1	10.1	96.9
	16-20	7	3.1	3.1	100.0
	Total	228	100.0	100.0	

Out of 228 work experience 0-5 is 86 percent and its frequency is198 ,11-15 is 10.1

percent and its frequency is 23 , 15 – 20 is 3.1 percent and its frequency is 7

TABLE 5 -   HOW DO YOU RATE THE TECHNICAL INFRATRUCTURE

		Frequency	Percent	ValidPercent	Cumulative Percent
	EXCELLENT	53	23.2	23.2	23.2
	GOOD	137	60.1	60.1	83.3
Valid	FAIR	35	15.4	15.4	98.7
	POOR	3	1.3	1.3	100.0
	Total	228	100.0	100.0	

Out of 228 the ratings of ,technical infrastructure excellent is 23,2 percent and

53 frequency ,good is 60.1 percent and frequency is 137,fair is 15.4 percent and

Frequency is 35 , poor is 1.3 percent and frequency is 3

TABLE 6 ADEQUATE TRAINING AND EDUCATION

		Frequency	Percent	ValidPercent	Cumulative Percent
	YES	201	88.2	88.2	88.2
Valid	NO	27	11.8	11.8	100.0
	Total	228	100.0	100.0	

Out of 228 adequate training and education, yes is 88.2 percent and frequency

Is 201 ,No is 11.8 percent and frequency is 27 percent

TABLE 7 -USER ACCEPTANCE OF DIGITAL TECHNOLOGIES IN WORKPLACE

		Frequency	Percent	ValidPercent	Cumulative Percent
	HIGH	77	33.8	33.8	33.8
Valid	MODERATE	143	62.7	62.7	96.5
	LOW	8	3.5	3.5	100.0
	Total	228	100.0	100.0	

Out of 228 user acceptance of digital technologies in workplace , High is 33.8 percent

And its frequency is 77,Moderate is 62. Percent and frequency is 143,Low is 3.5 percent

Frequency is 8

TABLE 8 –HOW YOU DISCRIBE THE ORGANIZATIONAL CULTURE

		Frequency	Percent	ValidPercent	Cumulative Percent
	SUPPOERTIVE	129	56.6	56.6	56.6
Valid	NEUTRAL	96	42.1	42.1	98.7
	RESISTANCE	3	1.3	1.3	100.0
	Total	228	100.0	100.0	

Out of 228 organizational culture is described in supportive is 56.6 percet and 129

Frequency neutral is 42.1 and frequency is 96 resistance is 1.3 percent frequency is 3

TABLE 9 – EFFECTIVENESS OF DIGITAL TECHNOLOGIES IN IMPROVING PATIENT CARE

		Frequency	Percent	ValidPercent	Cumulative Percent
	EXCELLENT	70	30.7	31.1	31.1
	GOOD	133	58.3	59.1	90.2
Valid	FAIR	19	8.3	8.4	98.7
	POOR	3	1.3	1.3	100.0
	Total	225	98.7	100.0	
Missing	System	3	1.3		
Total		228	100.0		

TABLE 9 –SATISFACTION WITH DIGITAL TECNOLOGIES

		Frequency	Percent	ValidPercent	Cumulative Percent
	VERYSATISFIED	59	25.9	25.9	25.9
	SATISFIED	159	69.7	69.7	95.6
Valid	DISSATISFIED	7	3.1	3.1	98.7
	VERYDISSATISFIED	3	1.3	1.3	100.0
	Total	228	100.0	100.0	

TABLE 10 –WHAT EXTENT DIGITL TECHNOLOGY IMPROVED HEALTHCARE OUTCOMES

	Frequency	Percent	ValidPercent	Cumulative Percent
VERYSIGNIFICANTLY	6	2.6	2.6	2.6
SOMEWHAT SIGNIFICANTLY	23	10.1	10.1	12.7
NEUTRAL	107	46.9	46.9	59.6

Valid	NOT VERY SIGNIFICANTLY	69	30.3	30.3	89.9
	NOTAT ALL SIGNIFICANTLY	21	9.2	9.2	99.1
	6.00	2	.9	.9	100.0
	Total	228	100.0	100.0	

TABLE 11 -DO YOU BELIEVE THAT DTAR EESSENTIAL FOR THE FUTURE HEALTH INDUSTRY

		Frequency	Percent	ValidPercent	CumulativePercent
Valid	YES	188	82.5	82.5	82.5
	NO	40	17.5	17.5	100.0
	Total	228	100.0	100.0	

Out of 228 Yes is 82.5 and its frequency is 188, No is 17 .5 percent and 40 is frequency

HYPOTHESIS TESTING BETWEEN ADEQUATE TRAINING AND EDUCATION, IMPORVEMENT OF PATIENT HEALTHCARE

ADEQUATE TRAINING AND EDUCATION* EFFECTIVENESS OF DIGITAL TECHNOLOGIES IN IMPROVING PATIENT CARE

Cross tabulation

Count

		EFFECTIVENESSOFDIGITALTECHNOLOGIESINIMPROVINGPATIENT CARE				Total
		EXCELLENT	GOOD	FAIR	POOR	
ADEQUATETRAININGANDE DUCATION	YES	59	123	14	2	198
	NO	11	10	5	1	27

Total	70	133	19	3	225

Chi-SquareTests

	Value	df	Asymp. Sig. (2-sided)
PearsonChi-Square	8.424	3	.038
LikelihoodRatio	7.526	3	.057
Linear-by-LinearAssociation	.201	1	.654
Nof Valid Cases	225		

Based on the significant value opinions regarding digital technology improving patient care is dependent the adequate training and education of the respondents

ASSOCIATION BETWEEN WORKPLACE AND INFRASTRUCTRE

WORKPLACE*HOW DO YOU RATE THE TECHNICAL INFRATRUCTURE Cross tabulation

Count

		HOWDOYOURATETHETECHNICALINFRATRUCTURE				Total
		EXCELLENT	GOOD	FAIR	POOR	
WORKPLACE	HOSPITAL	36	109	23	1	169
	CLINIC	12	15	12	0	39
	PRIVATEPRACTICE	5	13	0	2	20
Total		53	137	35	3	228

symmetric Measures

		Value	Approx.Sig.
Nominalby Nominal	ContingencyCoefficient	.325	.000
Nof Valid Cases		228	

Based on the contingency value there exist positive association i.e technical infrastructure is depend on the work place.

ASSOCIATION BETWEEN EXPERIENECE AND OPINIONS REGARDING DIGITAL TECHNOLOGIES IMPORVES HEALTH CARE OUTCOMES

EXPERIENCE *WHAT EXTENT DIGITAL TECHNOLOGY IMPROVED HEALTHCARE OUTCOMES Cross tabulation

Count

		WHAT EXTENT DIGITAL TECHNOLOGY IMPROVED HEALTH CARE OUTCOMES						Total
		VERY SIGNIFICANTLY	SOME WHATSIGNIFICANTLY	NEUTRAL	NOT VERYSIGNIFICANTLY	NOT AT ALLSIGNIFICANTLY	6.00	
EXPERIENCE	0-5	5	20	94	62	15	2	198
	11-15	1	2	8	7	5	0	23
	16-20	0	1	5	0	1	0	7
Total		6	23	107	69	21	2	228

symmetric Measures

		Value	Approx.Sig.
Nominalby Nominal	Phi	.203	.492
	Cramer'sV	.144	.492
Nof Valid Cases		228	

Based on the phi value there exist weak association between experience and opinions regarding digital technologies improve health outcomes.

ASSOCIATION BETWEEN OCCUPATION, EXPERIENCE AND OPINONS REGARDING DIGITAL TECHNOLOGIES ARE ESSENTIAL FOR FUTURE HEALTHINDUSTRY

Crosstab

Count

		DOYOUBELIEVETHATDTAREESSENTIALFORTHEFUTUREHEALTHINDUSTRY		Total
		YES	NO	
EXPERIENCE	0-5	164	34	198
	11-15	17	6	23
	16-20	7	0	7
Total		188	40	228

symmetric Measures

		Value	Approx.Sig.
Nominal by Nominal	Contingency Coefficient	.108	.263
not Valid Cases		228	

Crosstab

Count

		DO YOU BELIEVE THAT DTAREESSENTIAL FOR THE FUTURE HEALTH INDUSTRY		Total
		YES	NO	
OCCUPATIONA	PHYSICIAN	44	17	61
	NURSE	144	23	167
Total		188	40	228

Symmetric Measures

		Value	Approx.Sig.
Nominal by Nominal	Contingency Coefficient	.162	.013
No Valid Cases		228	

Based on the contingency values there exist weak association between occupation, experience and opinions regarding digital technologies are essential for future health industry.

Findings:

Among the 228 members surveyed, gender distribution revealed that 32.5% were male (74 respondents), while 67.5% were female (154 respondents). In terms of occupation, 26.8% identified as physicians (61 respondents), and 73.2% as nurses (167 respondents). Concerning workplace, the majority, at 74.1%, worked in hospitals (169 respondents), with 17.1% in clinics (39 respondents), and 8.8% in private practice (20 respondents). Work experience was primarily within the 0-5 years category for 86% of participants (198 respondents), while 11-15 years accounted for 10.1% (23 respondents), and 15-20 years for 3.1% (7 respondents).

When evaluating the ratings of technical infrastructure, 2.3% found it excellent (53 respondents), 60.1% considered it good (137 respondents), 15.4% rated it as fair (35 respondents), and 1.3% perceived it as poor (3 respondents). Additionally, 88.2% confirmed adequate training and education (201 respondents), while 11.8% indicated otherwise (27 respondents).

User acceptance of digital technologies in the workplace showed that 33.8% perceived it as high (77 respondents), 62% as moderate (143 respondents), and 3.5% as low (8 respondents). In terms of organizational culture, 56.6% described it as supportive (129 respondents), 42.1% as neutral (96 respondents), and 1.3% as resistant (3 respondents).

Effectiveness of digital technologies in improving patient care was rated as excellent by 30.8% (70 respondents), good by 58.3% (133 respondents), fair by 8.3% (19 respondents), and poor by 1.3% (3 respondents). Satisfaction with digital technologies revealed that 25.9% were very satisfied (59 respondents), 69.7% were satisfied (159 respondents), 3.1% were dissatisfied (7 respondents), and 1.3% were very dissatisfied (3 respondents).

Regarding the significance of digital technologies, 2.6% found them very significant (6 respondents), 10.1% somewhat significant (23 respondents), 46.9% neutral (107 respondents), 30.3% not very significant (69 respondents), and 9% not at all significant (20 respondents).

Concerning adopting digital technologies, 82.5% responded positively (188 respondents), while 17.5% indicated a negative response (40 respondents). These insights provide valuable information about the perceptions and experiences of healthcare professionals in the context of digital technologies and their impact on patient care and the workplace.

Conclusion: The study on the influence of socio-technical factors for managing and sustaining digital transformations in the healthcare industry from the perspective of physicians and nurses provides valuable insights into the complexities and challenges associated with the adoption and use of digital technologies in healthcare settings. By examining the perspectives, experiences, and needs of physicians and nurses, the study sheds light on the factors that impact the successful implementation and sustainability of digital transformations.

The findings highlight the importance of considering socio-technical factors in digital transformation initiatives. Organizational culture, leadership support, training and education, user experience, and collaboration emerge as critical factors that influence the acceptance and utilization of digital technologies by physicians and nurses. Addressing these factors can help overcome barriers and enhance the adoption, effectiveness, and long-term sustainability of digital transformations in healthcare.

The study underscores the significance of fostering a culture of innovation, promoting collaboration among stakeholders, and continuously evaluating and improving digital initiatives. It emphasizes the need for change management strategies, interdisciplinary communication, and partnerships with technology experts to effectively navigate the challenges associated with digital transformations.

By acknowledging the limitations of the study, such as sample bias and generalizability constraints, the research opens avenues for future research to delve deeper into specific aspects of socio-technical factors and their impact on managing and sustaining digital transformations in healthcare. The study's findings and suggestions can inform policy decisions, organizational strategies, and educational interventions aimed at facilitating successful digital transformations and improving patient care outcomes.

Overall, the study contributes to the existing body of knowledge on digital transformations in healthcare and provides valuable insights for healthcare organizations, policymakers, administrators, and technology developers. The integration of socio-technical factors into the planning and implementation of digital initiatives can pave the way for a more effective and sustainable healthcare system that harnesses the potential of digital technologies to enhance patient care and outcomes.

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