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The Transformative Impact of Health Technology and AI Integration on Patient-Centric Care: A Hypothetical Role of Strategic Planning

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Abstract: **This study explores the transformative influence of integrating Health Technology and Artificial Intelligence (AI) within the TOWS matrix framework in healthcare organizations. The research addresses three key questions to investigate the measurable improvements, decision-making processes, and actionable insights resulting from the AI-enhanced TOWS matrix. Firstly, it assesses whether there are discernible enhancements in strategic outcomes to inform managers of the gains available with the integration of AI in their healthcare delivery processes. Secondly, the study delves into the ways in which the integration of AI within the TOWS matrix shapes decision-making processes across various levels within healthcare organizations. Lastly, it examines the capacity of AI-driven TOWS matrix analyses to provide actionable insights, contributing to more informed and strategic decision-making in healthcare settings. The hypothetical nature of the study allows for a forward-looking exploration of the potential impact of advanced technologies on strategic planning in healthcare. The findings aim to inform discussions on leveraging AI and other technology for strategic improvement in patient-centric care.**

Keywords: **Health Technology, AI, Patient-Centered Care, Strategic Planning.**

I. INTRODUCTION

Article Scenario

St. Champ, a distinguished hypothetical Healthcare System renowned for its dedication to providing exceptional patient care and pioneering medical solutions, has opted for a strategic shift. Recognizing the dynamic changes in the healthcare landscape. St. Champ Healthcare System is embarking on a transformative journey towards high-tech, AI-driven healthcare delivery. This decision prompts a strategic analysis, where St. Champ aims to adeptly navigate and capitalize on its internal strengths and address weaknesses, while leveraging external opportunities and mitigating potential threats in the evolving healthcare environment.

To take advantage of the advances made in healthcare technology, St. Champ Healthcare System is leading a transformative endeavor towards prioritizing patient-centric care. In the rapidly changing and technology-driven healthcare environment, the provision of outstanding healthcare surpasses the capabilities of clinicians alone. To meet patient care needs and enhance operational efficiency, healthcare organizations, including St. Champ, are dependent on dependable and sophisticated technology. Whether navigating the vast domains of virtual care and clinical mobility, ensuring secure patient data, or facilitating the efficient distribution of vaccines, the integration of technology plays a crucial role in delivering superior care and enhancing overall healthcare experiences (CDW, 2023). This article delves into the strategic analysis of St. Champ

Healthcare System's integration of health technology, with a focus on Artificial Intelligence (AI). This integration aims to revolutionize patient care, enhance operational efficiency, and position St. Champ's Healthcare System as a pioneer in leveraging cutting-edge technologies with a competitive edge in the healthcare market. Organizations often plan strategically to pursue their missions and profitability. To continue earning profit and provide quality care at the same time, healthcare managers must think strategically, plan, and implement valuable strategies for their organizations to survive. Strategic management is becoming increasingly important for sustainable management in healthcare as seen in the increasing complexity, dynamics, and uncertainty of the healthcare industries' regimes: resulting in the need for strategic thinking in a long-term period (Huebner & Flessa, 2022). Over the last three decades, the healthcare industries have continually faced tremendous transformation, especially with the introduction of modern technology, including data analytics and AI.

With this shift in paradigm, many healthcare organizations continue to change their strategic orientation to gear up for the inclusion of AI in care giving. Many providers have already moved on this new system to improve the quality of care. For example, Welch (2023) noted that chronic diseases are on the rise and life expectancy has increased gradually over the years. As a result, there is a need for novel patient care solutions. Welch highlighted the ever-increasing role of AI applications in healthcare today and in the future including the development of medicines, understanding genetic variations that cause diseases. Welch also noted that by applying AI to anonymize data sets, scientist can fill in missing information as to what causes diseases. This type of capability is a breakthrough for the healthcare industry. However, there some challenges facing the industry. Siwicki (2020) highlighted the six big challenges ahead in 2021, namely rightsizing after the telehealth explosion; adjusting to changing clinical trials; encouraging digital relationships that ease physician burdens; forecasting for uncertainty; reshaping health portfolios for growth; and building a resilient and responsive supply chain for long-term health. Siwicki lamented that these challenges will continue to plague the healthcare industry if strategic actions are not taken to mitigate them. In fact, Price water Coopers (PwC) (2021) reported that the use of AI and related technology is now the new direction for most businesses including healthcare. Such move by healthcare organizations need good planning and governance to help stir the strategic direction of the organization. Elahi and Cook (2023) reported that seamless integration of artificial intelligence into the existing workflow of a health care system requires a well-defined governance process. The authors noted that even though hospitals have governance structures for operations, a strategic plan should inform the governance process. As such, governance structures do not always directly apply to AI strategy. In some cases, they can even hinder AI implementation because these solutions require a different set of resources and a different form of oversight.

Many organizations have attempted to implement AI solutions but are inefficient, as each new tool should reidentify the necessary stakeholders. This lack of inefficiency resulting from evaluations and deployments often take years and required important steps which were omitted or delayed (Elahi & Cook, 2023). Elahi and Cook's position shows a lack of proper strategic planning. Furthermore, the rapid evolution and potential superiority of artificial intelligence (AI) highlight the critical importance of effective strategic planning in navigating this transformative landscape. The current definition of AI emphasizes its ability to emulate human-like intelligent behavior, encompassing crucial competencies. However, the accelerating advancements in AI, exemplified by programs like Google's AlphaGo Zero, underscore the need for strategic foresight. The lack of effective strategic planning in adopting and adapting to AI innovations may leave organizations ill-prepared for the profound impact on various sectors. Failure to anticipate and integrate AI's capabilities strategically could result in missed opportunities and increased exposure to risks, emphasizing the imperative for proactive and well-informed strategic planning practices in the face of AI's evolving landscape.

Problem Statement

St. Champ Healthcare System faces the pressing challenge of optimizing its healthcare delivery model to align with the evolving technological landscape. St. Champ grapples with the need to leverage high-tech, AI-driven solutions effectively to enhance patient care, operational efficiency, and overall healthcare outcomes. The shift towards advanced technologies requires a comprehensive strategic analysis to identify and address internal constraints, harness external opportunities, and ensure a seamless integration of AI-driven innovations into its healthcare practices. This article aims to explore and propose solutions to the complex problem of transitioning St. Champ Healthcare System towards a technologically advanced and patient-centric healthcare delivery paradigm. As Elahi and Cook (2023) pointed out, this lack of inefficiency resulting from the lack of proper strategic planning has been the problem for many healthcare organizations. Studies of this nature may help healthcare organizations in their planning efforts in gleaning the benefits of AI in patient care. The study did not

comprehensively tackle all the challenges faced by healthcare organizations. Instead, it offers a perspective on the TOWS matrix as a valuable tool for these organizations to consider in their strategic planning endeavors.

Purpose of the Study

The purpose of this study is to conduct a comprehensive hypothetical strategic planning analysis, specifically, (Threats, Opportunities, Weakness, and Strengths) of St. Champ Healthcare System with a focus on transitioning towards a high-tech, AI-driven healthcare delivery model. The study aims to identify and address the internal strengths and weaknesses within the organization, capitalize on external opportunities, and mitigate potential threats in the rapidly evolving healthcare landscape. Through this strategic analysis, the study intends to provide insights and recommendations that will guide St. Champ Healthcare System in effectively integrating advanced technologies, particularly AI, to optimize patient care, enhance operational efficiency, and stay at the forefront of innovation in the healthcare industry.

Research Questions

The following research questions guided the study.

RQ 1: Are there measurable improvements in strategic outcomes resulting from the AI-enhanced TOWS matrix?

RQ 2: In what ways does the integration of AI-enhanced TOWS matrix influence decision-making processes at various levels within healthcare organizations?

RQ 3: Can an AI-driven TOWS matrix analyses provide actionable insights that lead to more informed and strategic decisions in healthcare settings?

II. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Conceptual Framework

Fred Davis' (1985) Technology Acceptance Model (TAM) served as the conceptual framework for this work. Davis initially introduced the model in a paper titled "A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results." The model has since undergone various adaptations and extensions, becoming a widely used framework for studying the adoption and acceptance of new technologies. Various researchers have built upon the original model to address specific contexts, technologies, and research questions. Here are some notable variations and extensions of the TAM model. Straub, Keil, and Brenner (1997) adapted TAM to consider cultural influences on technology acceptance. Cultural factors, such as individualism and collectivism, were incorporated to account for variations in technology adoption behavior across different cultures. Straub, Keil, and Brenner's study compared the TAM model across three different countries: Japan; Switzerland; and the United States. The results indicate that TAM holds for both the U.S. and Switzerland, but not for Japan, suggesting that the model may not predict technology use across all cultures.

In another study, Venkatesh and Davis (2000) extended the original TAM and introduced TAM 2 with additional constructs, including perceived ease of use, subjective norm, and cognitive instrumental processes. Their model aimed to provide a more comprehensive understanding of technology acceptance. The authors explained the perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes. The extended model was tested using longitudinal data collected regarding four different systems at four organizations, two involving voluntary usage and two involving mandatory usage. Model constructs were measured at three points in time at each organization: pre-implementation, one-month post-implementation, and three months postimplementation. The extended model was strongly supported for all four organizations at all three points of measurement, accounting for 40% - 60% of the variance in usefulness perceptions and 34% - 52% of the variance in usage intentions. Both social influence processes and cognitive instrumental processes significantly influenced user acceptance. The findings of Venkatesh and Davis advanced theory and contributed to the foundation for future research aimed at improving the understanding of user adoption behavior.

Three years later, Venkatesh et al. (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT integrated various models, including TAM, Theory of Reasoned Action, and the Innovation Diffusion Theory. It identified key constructs influencing technology acceptance, such as performance expectancy, effort expectancy, social influence, and facilitating conditions. Later, Venkatesh and Bala (2008**)** extended TAM to include additional factors relevant to specific contexts. For example, extensions may include trust, perceived risk, and system characteristics, providing a more nuanced understanding of technology adoption. Further, Holden and Karsh (2010) worked on another extension of TAM,

the Health Information Technology Acceptance Model (HITAM). HITAM was designed for the healthcare context. It includes factors such as workflow integration, perceived usefulness, and perceived ease of use to understand healthcare professionals' acceptance of health information technologies. Also, Zhang et al. (2012) introduced Mobile Application Acceptance Model (MAAM). With the proliferation of mobile technologies, MAAM extends TAM to capture factors specific to mobile applications. It includes variables like mobility, ubiquity, and convenience. Finally, Venkatesh et al. (2012) advanced the idea of TAM 3 by incorporating the concept of the "unified view of acceptance and use of technology." The authors integrated variables like hedonic motivation, price value, and habit into the model, enhancing its applicability to a broader range of technologies.

These variations highlight the flexibility of the TAM framework and its adaptability to different technological contexts and user groups. Researchers continue to refine and extend the model to enhance its explanatory power in diverse settings. The Technology Acceptance Model (TAM) is a relevant framework in the context of strategic planning for healthcare organizations incorporating AI and health tech. TAM focuses on understanding how users, such as healthcare professionals, patients, and administrators, come to accept and use new technologies. In the strategic planning process outlined above, TAM can be applied to assess the acceptance and integration of AI within healthcare organizations.

Key Components of TAM

The key components of TAM have implication for the adoption of AI enhanced processes through strategic planning in healthcare organizations. For providers to invest in any technology related improvement, the following TAM-related key components must be fulfilled.

Perceived Usefulness. In the context of strategic planning, healthcare organizations need to assess the perceived usefulness of AI technologies. This involves understanding how AI can contribute to improved patient care, operational efficiency, and overall organizational effectiveness.

Perceived Ease of Use. The ease with which healthcare professionals and administrators can adopt and integrate AI into their workflows is crucial. Strategic planning should address the design and implementation of AI solutions to ensure they are user-friendly, intuitive, and align with existing practices.

Behavioral Intention. Strategic planning should focus on fostering a positive behavioral intention toward AI adoption. This involves addressing concerns, providing training programs, and creating a supportive organizational culture that encourages stakeholders to embrace AI technologies.

External Variables. As part of strategic planning, healthcare organizations must consider external variables influencing AI adoption. This includes factors like regulatory compliance, industry standards, and the availability of resources for implementing and maintaining AI solutions.

User Experience. TAM emphasizes the importance of user experience. In strategic planning, healthcare organizations should prioritize the creation of a positive and satisfying user experience with AI applications, ensuring that users perceive the technology as valuable and beneficial.

Integrating and adopting AI related technology in healthcare business processes must fulfill all these conditions and more to fully experience its inherent benefits, while being cognizant of the potential risks involved.

Related Studies

The search of academic journals and professional websites revealed several studies related to AI and other computer aided technology. Sørensen, Møller, Andreassen, Malling (2018) pointed out that at the level of hospital or clinical offices, implementation of SWOT is achievable by asking questions related to the strengths, weaknesses, opportunities, and potential threats. Responses to these questions may provide guidance to an efficient analysis for managerial decision making and improvement of processes in healthcare organizations. Misbah and Mahboob (2017) conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis of integrating the World Health Organization (WHO) patient safety curriculum. The analysis facilitated the enhancement of the WHO programs. Other researchers have used the tool in clinical studies. For example, Klein et al. (2019) conducted a SWOT analysis that underlined the significance of a centralization of pancreatic surgery for patient safety and to increase the chance of long-term survival.

In another study, Tang, Huang, Ma, and Liu (2018) conducted a SWOT analysis in relation to the internationalization of the traditional Chinese medicine. The authors concluded that in the process of the internationalization of traditional Chinese medicine, emphasis must be placed on the advantages to avoid the disadvantages, seize the opportunity to overcome the threats, by carrying out specific internationalization processes, avoiding detours and promoting a rapid internationalization process. Issayev et al. (2018) conducted a study to identify the professional and personal abilities of economists in medical organizations to actively participate in the management decisions of the medical organization in the transition from public administration to the right of economic management. The results of the study made it possible to identify the behavioral professional and personal capabilities of medical economists in market conditions. Furthermore, the study revealed the strengths and weaknesses within the organization.

In summary, identification of organizations strengths and weaknesses, and identification of opportunities would help overcome threats and facilitate improvement of processes within the organization.

Healthcare Benefits of AI

The healthcare benefits of AI include:

Efficient diagnosis and treatment. AI has been used in the diagnosis and treat of patients in many ways with precision. In most cases, AI assisted diagnosis are faster. Rajpurkar et al. (2017) developed an algorithm, CheXNet, a 121-layer convolutional neural network trained on ChestX-ray14 that can detect pneumonia from chest X-rays at a level exceeding practicing radiologists. The authors found that CheXNet exceeded the average radiologist performance. Furthermore, they extended the CheXNet to detect all 14 diseases in ChestX-ray14 and achieved a state-of-the-art result on all 14 diseases because of the integration of AI technology.

Predictive analytics and disease prevention. AI models analyze historical patient data to predict disease risks, enabling proactive measures for prevention and early intervention. Preventive strategies based on AI predictions contribute to a shift from reactive to proactive healthcare, reducing the burden on healthcare systems. Obermeyer and Emanuel (2016) were able to analyze massive amount of data using machine learning for predictive purposes. With the use of machine learning, the authors predicted the occurrence of diseases and other conditions which is a valuable tool for clinicians.

Enhanced imaging and diagnostics. AI-powered imaging systems, such as those interpreting medical scans and pathology slides, enhance diagnostic accuracy and speed. Rapid analysis of medical images by AI can significantly reduce the time required for diagnosis, enabling prompt treatment decisions. Ardila et al. (2019) proposed a deep learning algorithm that uses a patient's current and prior computed tomography volumes to predict the risk of lung cancer. The computer assisted model used by the authors achieved a state-of-the-art performance. This creates an opportunity to optimize the screening process via computer assistance and automation, showing the potential for deep learning models to increase the accuracy, consistency, and adoption of lung cancer screening worldwide.

Virtual health assistants. AI-driven chatbots provide real-time interaction, aiding in preliminary diagnosis, symptom checking, and medication adherence. These tools enhance patient engagement, offer immediate assistance, and contribute to more efficient healthcare service delivery. Laranjo et al. (2018) reviewed the characteristics, current applications, and evaluation measures of conversational agents with input capabilities used for health-related purposes. The authors found that half of the conversational agents supported consumers with health tasks such as self-care. The randomized control trial evaluating the efficacy of a conversational agent found a significant effect in reducing depression symptoms. This result has implication for the use of virtual health assistants in healthcare.

Drug discovery and development. Researchers have used deep learning in biomedicine specifically for the discovery of drugs. For example, Zemouri, Zerhouni, and Racoceanu (2019) reviewed the major deep learning concepts pertinent to biomedical applications such as Omics, bio, and medical imaging, brain and body machine interface and public health management. The authors found that among all the deep neural architectures, there is a growing interest in an end-to-end convolutional neural network, replacing the traditional handcrafted machine learning methods. Similarly, Mamoshina et al. (2016) found that the deep neutral networks (DNN) are efficient algorithms which are useful for biomarker identification and drug discovery.

Administrative efficiency. Models have been developed to enhance administrative processes in health systems. Sittig and Singh (2016) introduced an 8-dimensional model specifically designed to address the socio-technical challenges involved in design, development, implementation, use, and evaluation of HIT within complex adaptive healthcare systems. The authors illustrated how their model has been successfully applied in real-world complex adaptive settings to understand and improve HIT applications at various stages of development and implementation.

Remote patient monitoring. AI facilitates continuous monitoring of patients with chronic conditions, detecting deviations from normal parameters and triggering timely interventions. Remote monitoring enhances patient autonomy and reduces hospital visits. Dinesen et al. (2016) used preventive home monitoring to reduce hospital admission rates and reduce costs via telehealth among chronic obstructive pulmonary disease patients.

Personalized medicine and treatment plans. AI algorithms analyze individual patient data, including genetic information, to tailor treatment plans based on the specific characteristics of each patient. Personalized medicine increases treatment efficacy, minimizes adverse effects, and optimizes overall patient outcomes. Topol (2019) noted that artificial intelligence, big data, along with enhanced computing power and cloud storage, across all sectors. The authors suggested this is beginning to have an impact for clinicians, through rapid, accurate image interpretation; for health systems, by improving workflow and the potential for reducing medical errors; and for patients, by enabling them to process their own data to promote health.

Fraud detection and security. Researchers have developed models to detect deceptive opinion spam among websites and other media discourse. Ott and Choi (2012) integrating work from psychology and computational linguistics, developed and compare three approaches to detecting deceptive opinion spam, and ultimately develop a classifier that is nearly 90% accurate on our gold-standard opinion spam dataset. Based on feature analysis of their learned models, the authors made several theoretical contributions, including revealing a relationship between deceptive opinions and imaginative writing.

Workflow optimization. AI has contributed immensely to workflow optimization. Kocaballi et al. (2018) developed the Personal Reminder Information and Social Management System (PRISM), a software application designed for older adults to support social connectivity, memory, knowledge about topics, leisure activities and access to resources. The authors evaluated the impact of access to the PRISM system on outcomes such as social isolation, social support and connectivity. The results of this study yielded important information about the potential value of technology for older adults and demonstrated how a user-centered iterative design approach can be incorporated into the design and evaluation of an intervention protocol.

Data analysis and population health management. AI excels in processing vast amounts of healthcare data, identifying patterns, and recognizing subtle nuances that may go unnoticed by human practitioners. Utilizing AI's capacity for data analysis allows for early detection of diseases and the identification of predictive markers, pattern recognitions, leading to timely interventions. Chen and Asch (2017) recommended the use of machine learning to analyze big data to identify patterns for the prediction of diseases and other public health concerns.

Patient outcomes and safety. AI has contributed to predictive modeling with electronic health record (EHR) data to drive personalized medicine and improve healthcare quality. Rajkomar et al. (2018) proposed a representation of patients' entire raw EHR records based on the Fast Healthcare Interoperability Resources (FHIR) format. The authors demonstrated that deep learning methods using this representation are capable of accurately predicting multiple medical events from multiple centers without site-specific data harmonization. Furthermore, the authors demonstrated deep learning models achieved high accuracy for tasks such as predicting in-hospital mortality, 30-day unplanned readmission, prolonged length of stay, and all of a patient's final discharge diagnoses. The authors noted that models outperformed traditional, clinically used predictive models in all cases.

Treatment Recommendation and decision Support. AI systems offer evidence-based treatment recommendations by analyzing a vast array of medical literature and patient outcomes. Clinicians can benefit from AI-driven decision support, ensuring adherence to best practices and improving the overall quality of care.

Natural Language Processing (NLP) in Healthcare Records. AI-driven NLP systems extract valuable information from unstructured healthcare data, such as clinical notes and narratives. Enhanced extraction of insights from healthcare records contributes to a more comprehensive understanding of patient histories, supporting accurate diagnoses

Artificial Intelligence (AI) has emerged as a transformative force in healthcare, revolutionizing the traditional methods of diagnosis and treatment. Its integration has significantly enhanced the efficiency and effectiveness of healthcare processes, particularly in the identification and management of diseases. Here are key aspects of AI's role in efficient diagnosis and treatment:

In conclusion, while recognizing the potential of AI, it is essential to address challenges such as data privacy, ethical considerations, and continuous validation of AI algorithms to ensure their reliability and safety in clinical practice. As AI continues to evolve, its role in healthcare promises to redefine the landscape by fostering precision, speed, and personalized approaches to diagnosis and treatment.

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Application of TAM to Strategic Planning

In the context of the strategic planning scenario outlined above, TAM can guide decision-makers in understanding how healthcare professionals and administrators perceive the integration of AI. By systematically evaluating perceived usefulness, ease of use, and behavioral intention, strategic planners can identify potential challenges and opportunities associated with AI adoption. This, in turn, informs the development of a strategic roadmap that addresses key considerations for successful AI implementation within a healthcare organization. This application is discussed further in the methodology below.

III. METHODOLOGY

Procedure

I conducted a hypothetical situational analysis general applicable to any typical healthcare organizations with the desire of integrating AI into their operations. I examined several healthcare organizations with a global view of the typical strengths, weaknesses, opportunities, and threats (SWOT) relating to technology including AI. SWOT analysis is a strategic planning tool used to identify and evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a business or project (Teoli, Sanvictores, & An, 2023). It involves assessing both internal and external factors to understand the current situation and make informed decisions about future strategies.

The breakdown of each component of the SWOT includes: *Strengths (S):* These are internal positive attributes that contribute to the organization's success. It could be a strong brand, skilled workforce, cutting-edge technology, or any other internal advantage. *Weaknesses (W):* These are internal factors that may hinder the organization's success. It could include limited resources, outdated technology, or any other internal disadvantage. *Opportunities (O):* These are external factors in the environment that the organization could exploit to its advantage. Opportunities may arise from market trends, technological advancements, or other external conditions. *Threats (T):* These are external factors that could potentially harm the organization. (See table 1 below). Threats might come from competition, economic downturns, changing regulations, environmental conditions, or other external challenges.

Situational Analysis of St. Champ's Healthcare System

Internal Environmental Analysis (Strengths; Weaknesses)

Table 1. Strengths and Weaknesses

Strengths (Maximize)	Weaknesses (Minimize)
1. **Innovative Product Development (S1):** XYZ Tech Solutions consistently introduces cutting-edge products with advanced features, giving them a competitive edge in the market. 2. **Strong Intellectual Property Portfolio (S2):** The company holds a robust portfolio of patents and intellectual property, providing a foundation for innovation and legal protection. 3. **Experienced Leadership Team (S3):** XYZ Tech Solutions is led by an experienced and visionary leadership team, contributing to strategic decision-making and long-term planning. 4. **Global Presence (S4):** With operations in multiple countries, XYZ Tech Solutions has established a global presence, allowing access to diverse markets and customer bases. 5. **Effective Supply Chain Management (S5):** The company has streamlined supply chain	1. **Limited Product Diversification (W1):** The company heavily relies on a narrow range of products, making it vulnerable to shifts in market demands. 2. **Dependence on Key Suppliers (W2):** XYZ Tech Solutions sources critical components from a limited number of suppliers, exposing it to potential disruptions in the supply chain. 3. **Slow Adoption of E-commerce (W3):** The company has been slow in adopting e-commerce strategies, limiting its reach and potentially losing market share to online competitors. 4. **Outdated IT Infrastructure (W4):** The current IT infrastructure is outdated, affecting operational efficiency and hindering the implementation of advanced technologies. 5. **Limited Presence in Emerging Markets (W5):** XYZ Tech Solutions has limited penetration in

processes, ensuring efficient procurement, production, and distribution of its products. 6. **Strong Financial Performance (S6):** XYZ Tech Solutions consistently achieves strong financial results, providing stability and resources for future investments and expansions. 7. **High Employee Satisfaction (S7):** The company maintains a positive work culture, resulting in high employee satisfaction, increased productivity, and lower turnover rates. 8. **Customer Loyalty and Brand Recognition (S8):** XYZ Tech Solutions has a loyal customer base, and its brand is widely recognized for reliability and innovation.	emerging markets, missing out on potential growth opportunities in those regions. 6. **Inadequate Marketing Strategies (W6):** The marketing strategies lack effectiveness in creating awareness and promoting products, impacting the brand's visibility. 7. **Relatively High Production Costs (W7):** Production costs are relatively high due to outdated manufacturing processes, affecting the company's competitiveness in terms of pricing.

Healthcare managers aiming at a strategic shift in their operations must first assess their Strengths and Weaknesses regarding the intended shift. The goal is to leverage the strengths (maximize) to overcome (Minimize) or eradicate the weaknesses that may hinder the achievement of the strategic shift. Assessing both the Strengths and Weaknesses of the organization is referred to as the internal environment analysis.

External Environmental Analysis (Opportunities and Threats)

Table 2. Opportunities and Threats

Opportunities (Maximize)	Threats (Minimize)
1. **Growing Demand for Sustainable Products (O1):** The increasing demand for environmentally friendly products presents an opportunity for XYZ Tech Solutions to develop and market sustainable technology solutions. 2. **Strategic Alliances and Partnerships (O2):** Exploring collaborations with other tech companies can lead to shared resources, expanded market reach, and synergies in research and development. 3. **Rapid Technological Advancements (O3):** Advances in technology provide an opportunity for XYZ Tech Solutions to stay at the forefront of innovation and offer state-of-the-art products. 4. **Expansion into Untapped Emerging Markets (O4):** Identifying and entering untapped emerging markets can unlock new revenue streams and diversify the company's customer base. 5. **Increased Remote Work Trends (O5):** The rise in remote work trends creates opportunities for XYZ Tech Solutions to develop and market products catering to the needs of a remote workforce.	1. **Intense Competition in the Tech Industry (T1):** The technology sector is highly competitive, with numerous companies vying for market share, posing a threat to XYZ Tech Solutions' market position. 2. **Cybersecurity Threats (T2):** The growing sophistication of cybersecurity threats poses a risk to the company's products and services, requiring continuous investment in security measures. 3. **Global Economic Uncertainty (T3):** Economic downturns and uncertainties in global markets can impact consumer spending on technology products, affecting XYZ Tech Solutions' revenue. 4. **Fast Obsolescence of Technology (T4):** Rapid technological advancements lead to quick obsolescence, making it challenging for XYZ Tech Solutions to keep products relevant in the market. 5. **Stringent Regulatory Environment (T5):** Evolving and stringent regulations in the tech industry may pose compliance challenges and increase operational costs for XYZ Tech Solutions.

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6. **Government Incentives for Technology Innovation (O6):** Government initiatives and incentives for technology innovation present opportunities for XYZ Tech Solutions to receive support for research and development projects. 7. **Growing Consumer Awareness of Cybersecurity (O7):** The increasing awareness of cybersecurity threats creates a market for XYZ Tech Solutions to develop and market cybersecurity solutions.	6. **Supply Chain Disruptions (T6):** Events such as natural disasters or geopolitical tensions can disrupt the supply chain, affecting the availability and cost of key components.

The next analysis involves assessing the Opportunities available to the organization that may facilitate the intended strategic shift, and the Threats out there that may hinder the shift or the smooth operation of the organization after the implementation of the strategy, and thus result in the failure of achieving organizational goals.

By analyzing these four factors using the TOWS matrix, organizations can develop strategies to leverage their strengths, address their weaknesses, capitalize on opportunities, to mitigate potential threats. The TOWS analysis provides a comprehensive overview, helping in the formulation of strategic plans and decision-making processes. (See table 3 below).

Table 3. TOWS MATRIX

Strengths	**Weaknesses**
1. **Innovative Product Development (S1):** Leverage cutting-edge products to diversify the product range and address emerging market demands (S1-O4, S1-O2). 2. **Strong Intellectual Property Portfolio (S2):** Utilize patents to establish strategic alliances, safeguarding innovations and creating mutually beneficial partnerships (S2-O2, S2-O6). 3. **Experienced Leadership Team (S3):** Leverage leadership experience to guide the company's entry into emerging markets and technological advancements (S3-O3, S3-O5). 4. **Global Presence (S4):** Expand global presence by tapping into emerging markets and forming partnerships in different regions (S4-O4, S4-O2). 5. **Effective Supply Chain Management (S5):** Strengthen the supply chain to reduce production costs and enhance operational efficiency (S5-W7, S5-O2). 6. **Strong Financial Performance (S6):** Allocate resources for technology upgrades and strategic partnerships to maintain financial stability (S6-O3, S6-O2). 7. **High Employee Satisfaction (S7):** Utilize a positive work culture to enhance innovation and product development (S7-O1, S7-O3). 8. **Customer Loyalty and Brand Recognition (S8):** Leverage brand recognition to introduce new sustainable products, meeting growing market demands (S8-O1, S8-O4).	1. **Limited Product Diversification (W1):** Invest in R&D to diversify the product range and reduce vulnerability to market shifts (W1-O1; W1-O3). 2. **Dependence on Key Suppliers (W2):** Establish alternative suppliers and negotiate long-term contracts to minimize supply chain disruptions (W2-O2; W2-O6). 3. **Slow Adoption of E-commerce (W3):** Invest in e-commerce strategies to reach a wider audience and mitigate the impact of online competitors (W3-O4; W3-O5). 4. **Outdated IT Infrastructure (W4):** Allocate resources to upgrade IT infrastructure, enabling the implementation of advanced technologies (W4-O3, W4-O6). 5. **Limited Presence in Emerging Markets (W5):** Develop strategies to enter untapped emerging markets and diversify the customer base (W5-O4, W5-O2). 6. **Inadequate Marketing Strategies (W6):** Enhance marketing effectiveness to create brand awareness and improve product visibility (W6-O8, W6-O2). 7. **Relatively High Production Costs (W7):** Explore cost-effective production methods and technologies to improve competitiveness (W7-O3, W7-O2).

Opportunities	Threats
1. **Growing Demand for Sustainable Products (O1):** Capitalize on the demand for sustainable products by innovating eco-friendly technology solutions (O1-S1, O1-W1). 2. **Strategic Alliances and Partnerships (O2):** Collaborate with tech companies to enhance resources, expand market reach, and foster innovation (O2-S2, O2-W2). 3. **Rapid Technological Advancements (O3):** Stay ahead of competitors by continuously investing in and adopting emerging technologies (O3-S1, O3-W4). 4. **Expansion into Untapped Emerging Markets (O4):** Identify and enter emerging markets to unlock new revenue streams and diversify the customer base (O4-S4, O4-W5). 5. **Increased Remote Work Trends (O5):** Develop products catering to remote work needs, considering the rising trend of remote employment (O5-S5, O5-W3). 6. **Government Incentives for Technology Innovation (O6):** Leverage government incentives to support research and development projects (O6-S2, O6-W4). 7. **Growing Consumer Awareness of Cybersecurity (O7):** Address the cybersecurity market by developing and marketing advanced cybersecurity solutions (O7-S8, O7-T2).	1. **Intense Competition in the Healthcare Industry (T1):** Implement strategies to differentiate products and strengthen brand loyalty amidst intense competition (T1-S8, T1-O1). 2. **Cybersecurity Threats (T2):** Continuously invest in security measures and technology to counter evolving cybersecurity threats (T2-S2, T2-O7). 3. **Global Economic Uncertainty (T3):** Diversify revenue streams and implement cost-effective measures to navigate economic uncertainties (T3-S6, T3-O6). 4. **Fast Obsolescence (obsolete) of Technology (T4):** Focus on continuous innovation to keep products relevant and mitigate the risk of technological obsolescence (T4-S1, T4-O3). 5. **Stringent Regulatory Environment (T5):** Establish robust compliance measures to navigate evolving regulations in the tech industry (T5-S2, T5-O6). 6. **Supply Chain Disruptions (T6):** Develop contingency plans and alternative suppliers to mitigate risks associated with supply chain disruptions (T6-S5, T6-O2).

IV. RESULTS

The results outlined in the TOWS matrix serve as a guide to healthcare managers in their planning and decision-making process. Managers are encouraged to maximize the Strengths and Opportunities and minimize or eradicate the Weaknesses and Threats. The matrix in table 3 above, provides strategies which managers could implement to overcome weaknesses and mitigate threats to improve organizational performance. To illustrate few examples, see problems 1, 2, and 3 discussed below.

Problem 1: Weakness 1 - Limited Product Diversification (W1).

Proposed Solution: The results in the matrix suggested the following: Investing in Research and development (R&D) to diversify the product range and reduce vulnerability to market shifts. This solution could be achieved through the interaction of [(W1-O1; W1-O3); (O1-S1, O1-W1)].

Explanation: Healthcare managers may strategize to overcome the weakness of "Limited Product Diversification (W1)" by capitalizing on [Opportunity 1 (O1) - Growing Demand for Sustainable Products (O1)], [the need for Rapid Technological Advancements (O3)] as in the need for AI technology; and [capitalizing on Innovative Product Development (S1)]. This combination of strategy items shows that leveraging the combined impact of [Opportunity 1 (O1) and Strength 1 (S1)], managers may strategize to overcome the [Weakness 1 (W1)].

Problem 2: Threat 1 - Intense Competition in the Healthcare Industry (T1).

Proposed Solution: The results in the matrix suggested the following: Implement strategies to differentiate products and strengthen brand loyalty amidst intense competition. This solution could be achieved through the interaction of [(T1-S8, T1-O1)].

Explanation: As per analysis, the strategy to overcome the threat of *"Intense Competition in the Tech industry (T1)" is for St. Champ to combination of use its Strength* [(S8) - Customer Loyalty and Brand Recognition (S8): Leverage brand recognition to introduce new sustainable products, meeting growing market demands], and maximizing Opportunity 1 [(O1) - Growing Demand for Sustainable Products (O1): Capitalize on the demand for sustainable products by innovating eco-friendly technology solutions].

Problem 3: Dependence on Key Suppliers (W2).

Proposed Solution: The results of the TOWS matrix suggested: Establish alternative suppliers and negotiate long-term contracts to minimize supply chain disruptions. This solution is achieved through strategy [(W2-O2; W2-O6); (O2-S2, O2-W2)].

Explanation: The strategy to overcome the Weakness of "*Dependence on Key Suppliers (W2)" is for St. Champ to combine Opportunity* [(O2) - Strategic Alliances and Partnerships (O2): Collaborate with tech companies to enhance resources, expand market reach, and foster innovation], Opportunity [(O6) - Government Incentives for Technology Innovation (O6): Leverage government incentives to support research and development projects], and [Strengths (S2) - Strong Intellectual Property Portfolio (S2): Utilize patents to establish strategic alliances, safeguarding innovations and creating mutually beneficial partnerships.]

The remaining strategies: Weaknesses [W3 – W7] and Threat from [T 2 – T6] in the matrix could be pursued using the same explanations above. Of course, strategy implementation requires effective planning, availability of resources, and the appropriate steps (Miller, 2020).

Based on the analysis and explanations outlined above, the research questions are addressed.

RQ 1: Response. Yes, the analysis of St. Champ Healthcare System's integration of AI and technology through the TOWS matrix indicates measurable improvements in strategic outcomes. By strategically aligning strengths with opportunities, the healthcare system has successfully capitalized on its innovative product development, strong intellectual property portfolio, and global presence to form strategic alliances with AI innovators. The clear goal-setting and meticulous implementation process have contributed to enhanced patient-centric care, reflected in AI-powered diagnostics, telemedicine augmentation, and improved patient engagement. Furthermore, the healthcare system's strategic initiatives have not only addressed challenges such as fast technology obsolescence but have also set new industry standards, influencing the broader healthcare landscape. Overall, the systematic integration of AI into strategic planning, as demonstrated by St. Champ, has resulted in tangible improvements in strategic outcomes, reinforcing the effectiveness of the AI-enhanced TOWS matrix approach.

RQ 2: Response. The integration of an AI-enhanced TOWS matrix significantly influences decision-making processes at various levels within healthcare organizations. At the executive level, the use of AI-driven analytics and insights derived from the TOWS matrix enables more informed and data-driven decision-making. Strategic planning benefits from a more comprehensive analysis of internal strengths and weaknesses, external opportunities, and threats, providing a nuanced understanding of the healthcare landscape. Middle management benefits from streamlined and efficient decision-making processes, as the AI-enhanced TOWS matrix facilitates real-time monitoring of strategic initiatives and key performance indicators. Frontline healthcare professionals also experience an impact, with AI-driven decision support systems enhancing diagnostic accuracy, treatment planning, and overall patient care. The integration of AI into the TOWS matrix, therefore, permeates decision-making processes across different organizational levels, fostering a more agile, adaptive, and effective approach to addressing healthcare challenges.

RQ 3: Response. Certainly, an AI-driven TOWS matrix analysis is positioned as a transformative tool that goes beyond traditional approaches, providing actionable insights that lead to more informed and strategic decisions in healthcare settings. By leveraging artificial intelligence, the TOWS matrix becomes a dynamic and adaptive framework, capable of processing vast datasets, identifying intricate patterns, and generating real-time analyses. This advanced analytical capability enhances decision-makers' ability to identify emerging trends, assess the impact of internal and external factors, and understand the interplay between various elements of strategic planning. The AI-driven TOWS matrix not only automates the analysis process but also offers predictive capabilities, allowing healthcare organizations to proactively address challenges and capitalize on opportunities. The actionable insights derived from this integration empower healthcare

professionals to make more informed, timely, and strategic decisions, ultimately contributing to improved patient outcomes, operational efficiency, and the overall effectiveness of healthcare systems.

Strategy Implementation

According to Miller (2020), strategy implementation is the process of turning plans into action to reach a desired outcome. In other words, it is the art of completing organizational obligations. The success of every organization rests on its capacity to implement decisions and execute key processes efficiently, effectively, and consistently. However, to ensure that implementing a strategy is successful, Miller highlighted seven key steps involved. These steps are discussed below.

Generic Steps in effective Strategy Implementation

Miller (2020) advanced seven key steps to consider to effectively implement a strategy, namely:

1. *Begin by clearly defining the objectives and key variables* of the new strategy to avoid setting unattainable goals. Ensure that goals are realistic by learning from past experiences and assessing the feasibility within the given timeframe and resources.

2. *Develop a roadmap for achieving the goals*, set expectations, and communicate the implementation plan clearly. Document available resources and outline their responsibilities, establishing a communication process to enhance coordination.

3. *Delegate tasks based on the identified goals and timeline.* Clearly communicate the company's vision to the team, ensuring everyone understands their specific responsibilities. Set deadlines and avoid micromanaging, focusing on achieving goals and keeping the team on-task.

4. *Execute the plan, monitor progress, and provide ongoing support*. Guide and support employees effectively, making yourself available to address questions or challenges. Use regular check-ins and status reports to track progress and keep teams aligned.

5. *Take corrective action as necessary*. Recognize that strategy implementation is an iterative process. Be attentive, flexible, and willing to adjust plans as unforeseen issues arise. Periodically assess the need for adjustments and consider the evolving nature of the project.

6. *Achieve closure on the project* by ensuring agreement on the final product based on the initial goals. Check in with team members and departments to confirm they have everything they need to complete the job successfully. Provide detailed information and results for reporting to the management team.

7. *Review of the implementation process.* Evaluate whether goals were achieved and identify reasons for any shortcomings. Reflect on roadblocks or challenges and strategize ways to avoid them in the future. Extract lessons from the process, viewing unsuccessful aspects as opportunities for valuable learning and improvement.

Stages of the Transition Process

The progression toward an AI-integrated healthcare system involves multiple stages, as illustrated in Figure 1 below. It is essential to recognize while certain organizations may adhere to these stages sequentially, others might deviate from this order due to unique factors and resource availability. The following sections delve into the different stages.

Stage 1: Traditional Healthcare System. The starting point depicts the traditional healthcare system characterized by manual processes, paper-based records, and limited connectivity. This stage represents the conventional model with little to no reliance on digital technologies.

Stage 2: Introduction of Basic Health Information Systems. In the next phase, introduce basic health information systems. This involves the implementation of electronic health records (EHRs) to digitize patient records, improving data accessibility and reducing paperwork. This stage marks the initial steps toward technological integration.

Stage 3: Integration of Telehealth Solutions. Move to the integration of telehealth solutions, emphasizing remote patient monitoring, virtual consultations, and telemedicine services. This step enhances accessibility to healthcare, especially in remote areas, and lays the foundation for more advanced technologies.

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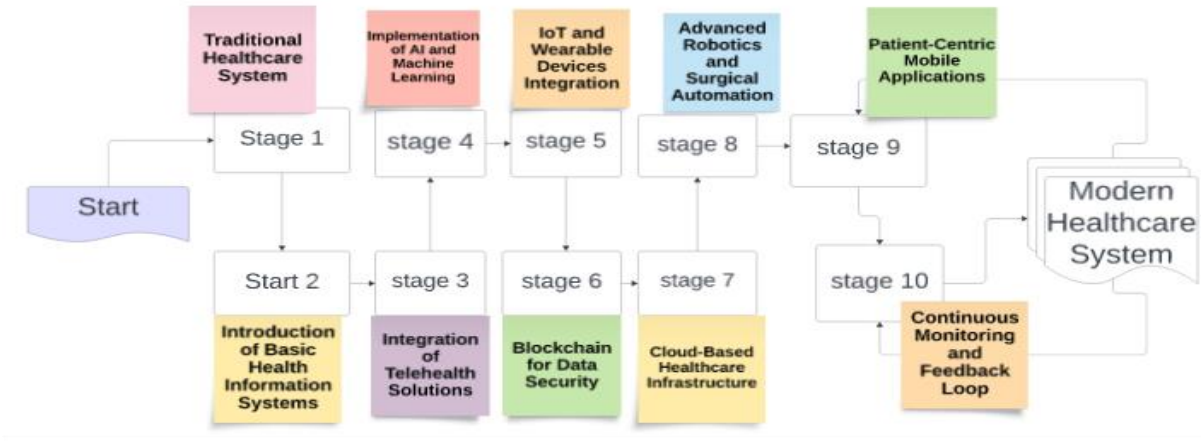

Fig. 1. Stages of Transformative AI – Hi Tech Integration in Healthcare organizations

Source: Prepared by the author (Bull, D.A.)

*Stage 4: Implementation of AI and Machine Learning***.** Progress to the implementation of artificial intelligence (AI) and machine learning (ML) applications. This includes predictive analytics for disease prevention, personalized treatment plans, and data-driven decision-making. AI-driven diagnostic tools can significantly enhance accuracy and efficiency.

*Stage 5: IoT and Wearable Devices Integration***.** Incorporate the Internet of Things (IoT) and wearable devices into the healthcare ecosystem. This stage involves the use of connected devices for continuous health monitoring, providing real-time data for both patients and healthcare providers. Wearable technologies contribute to proactive health management.

Stage 6: Blockchain for Data Security. Implement blockchain technology to enhance data security and integrity. Blockchain ensures secure, transparent, and tamper-resistant storage of health records, addressing privacy concerns and fostering trust in the healthcare system.

Stage 7: Cloud-Based Healthcare Infrastructure. Transition to a cloud-based healthcare infrastructure for seamless data storage, accessibility, and collaboration. Cloud solutions facilitate the sharing of medical information across healthcare providers, improving coordination and patient care.

*Stage 8: Advanced Robotics and Surgical Automation***.** Integrate advanced robotics and surgical automation for precision in medical procedures. This stage involves the use of robotic-assisted surgeries, enhancing surgical outcomes and reducing recovery times.

Stage 9: Patient-Centric Mobile Applications. Implement patient-centric mobile applications for enhanced engagement and self-management. Mobile apps can provide personalized health insights, appointment scheduling, medication reminders, and real-time communication with healthcare providers.

Stage 10: Continuous Monitoring and Feedback Loop. Establish a continuous monitoring and feedback loop to ensure ongoing optimization and adaptation. Regular assessments and feedback mechanisms contribute to the agility of the healthcare system in embracing emerging technologies and responding to evolving healthcare needs.

V. DISCUSSION

Considering the TOWS matrix analysis of St. Champ Healthcare System, the acknowledgment of the Weaknesses and Threats necessitates a comprehensive strategy for the implementation of technological advancements including AI. The healthcare system recognizes the need to stay ahead of evolving trends and rapidly integrate innovative technologies to mitigate the risk of its existing systems becoming outdated.

To address this challenge, managers of St. Champ's healthcare System Healthcare System must strategically plan and implement a robust system of technology adoption and adaptation project. This involves setting clear goals and defining key variables to identify the specific technological advancements required for enhanced patient care and operational efficiency. The healthcare system ensures that its objectives are not only realistic but also aligned with the evolving landscape of healthcare technology. Determined to leverage its strengths in innovative product development (S1) and a

strong intellectual property portfolio (S2), St. Champ's Healthcare System strategically forms alliances with leading AI innovators (O2). This proactive approach aims to not only keep pace with technological advancements but also to influence and shape the trajectory of healthcare technology through collaborative partnerships. The implementation plan includes establishing clear roles, responsibilities, and relationships, ensuring that the healthcare system's leadership team (S3) effectively communicates the vision for integrating AI into diagnostics and treatment planning.

As St. Champs Healthcare System delegates tasks and executes its strategic plan, continuous monitoring of progress and performance becomes a critical aspect of the implementation process. Daily, weekly, and monthly status reports are employed to assess the effectiveness of AI-driven applications, such as diagnostic processes and treatment planning. This monitoring mechanism ensures that the implementation remains aligned with the healthcare system's goals and responsive to the evolving landscape of health technology. The healthcare system recognizes the need for corrective action in the face of the ever-changing nature of healthcare technology. The iterative nature of implementation requires flexibility and adaptability. As the fast obsolescence of technology presents challenges, St. Champ's Healthcare System remains attentive and willing to adjust or revise plans as necessary. This corrective action is embedded in the implementation process, fostering an environment of continuous improvement.

In conclusion, the discussion on the Weakness and Threats within the TOWS matrix analysis for St. Champ Healthcare System underscores the importance of a dynamic and well-executed implementation plan. The healthcare system leverages its strengths and opportunities to navigate the challenges posed by rapidly evolving technology, ensuring that its strategic initiatives not only keep pace with industry trends but also contribute to shaping the future of patient-centric care through innovative and sustainable solutions.

Limitations of the Study

The study accepts the following limitations. It is a hypothetical case of St. Champ Healthcare System and the Strengths, Weaknesses, Opportunities, and Threats discussed are hypothetical. The strategical tool is predominantly the TOWS matrix and I relied on the results produced by the analysis to recommend to healthcare managers the beneficial use of the TOWS matrix in their strategic decision-making efforts. The problems identified and solutions proposed are all hypothetical. However, the benefits derived from the use or knowledge advanced by the proper use of the tool made help inform managers accordingly.

VI. CONCLUSION

In conclusion, the strategic analysis of St. Champ Healthcare System's integration of AI and technology through the TOWS matrix reveals a comprehensive and adaptive approach to address the challenges and harness the opportunities presented by the fast obsolescence of technology in healthcare. By aligning its strengths, such as innovative product development and a strong intellectual property portfolio, with strategic opportunities like forming alliances with AI innovators, St. Champ positions itself as a trailblazer in patient-centric care. The implementation process, guided by a clear vision, delineation of roles, and continuous monitoring, reflects the healthcare system's commitment to staying at the forefront of technological advancements. Embracing the iterative nature of implementation, St. Champ remains flexible and responsive, ensuring that its strategic initiatives not only navigate the complexities of the healthcare landscape but also contribute to setting new industry standards. Ultimately, the scenario underscores St. Champ's dedication to driving positive transformation in healthcare through strategic planning and AI integration.

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