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## A SWOT Analysis With A Digital Transformation: A Case Study For Hospitals In The Pharmaceutical Supply Chain

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*Abstract* - The pharmaceutical business meets all requirements for a complicated and tightly regulated sector, including multi-stakeholder participation. The objective is to study digital transformation strategies in hospitals to improve the safety and convenience of pharmaceutical services when providing healthcare services. In this study, a SWOT analysis is performed to identify strengths, weaknesses, opportunities, and threats with a digital transformation case study for hospitals in the pharmaceutical supply chain in Ho Chi Minh City, Vietnam. Information source for SWOT analysis of published articles and reports in the following aspects: Digital transformation environment of hospitals in the global pharmaceutical supply chain; new technology with reliability, safety, and security; Culture with human resources and customer experience; Laws and policies. The outcomes of the SWOT analysis highlight the opportunities, threats, weaknesses, and opportunities. The SWOT matrix and pertinent strategies should be used by hospitals in the pharmaceutical supply chain to maximize their strengths and opportunities while minimizing risks or managing their weaknesses and issues with the digital transformation. Finally, decision-makers and stakeholders are urged to apply the lessons learned from SWOT analysis and planning to the hospital's role in building a reliable pharmaceutical supply chain. The consequences of this study include integrating potent new technology, revising methods, and redesigning organizational structure in order to alter and modernize a pharmaceutical supply chain operation.

*Keywords*—Digital Transformation, Hospital Pharmacy, SWOT Analysis, Supply Chain

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### I. INTRODUCTION

The onset of digitalization is a change we have seen in the early 21st century. The digital world and vast volumes of data are becoming more and more important to modern civilization. The COVID-19 epidemic, which has exploded



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the whole e-business industry, is an example of how this is altering how we build things and distribute them to consumers. This has revolutionized value creation and customer demand [1]. In the healthcare sector, digitization is an inevitable but slow process. As a result of the COVID-19 pandemic, healthcare delivery has undergone rapid digitization to meet new provider requirements and changing patient expectations [2]. The pharmaceutical industry is the fastest-growing high-tech industry in the world. Digital services facilitate sharing of up-to-date patient health data between different stakeholders in the care process [3]. Digital transformation refers to the changes associated with the application of digital technology in all aspects of human society. Digital transformation shows that almost all processes that were previously performed manually can be analyzed and transformed into a more scalable, more consistent, and faster digital process [4].

The pharmaceutical sector looks for long-term solutions to fulfill the highest ethical standards and lessen its negative environmental effects. The literature on the pharmaceutical supply chain demonstrates that the adoption of innovative techniques can decrease pharmaceutical waste, increase the effectiveness of inventory control, and improve the quality of healthcare services, all of which increase the supply chain's innovation and informational reliability in Figure 1 [5-7]. There are also risks in the pharmaceutical supply chain that can not only waste resources but also threaten patients' lives. Internal uncertainties and risks, e.g., financial and quality assurance. Uncertainty and external risks, e.g., supply, demand, and environment [8]. Though they appear to lack expertise and skills in executing projects, the pharmaceutical supply chain has not yet fully implemented lean innovation [5]. In the pharmaceutical industry, digital transformation refers to the adoption of various digital technologies to enhance the creation and provision of healthcare goods and services. The following sectors in the pharmaceutical sector can benefit from digital transformation: greater patient care and interaction, better drug research and development, and improved medication development; Increasing drug delivery, lowering costs, and cutting carbon emissions; to increase supply chain transparency [9].

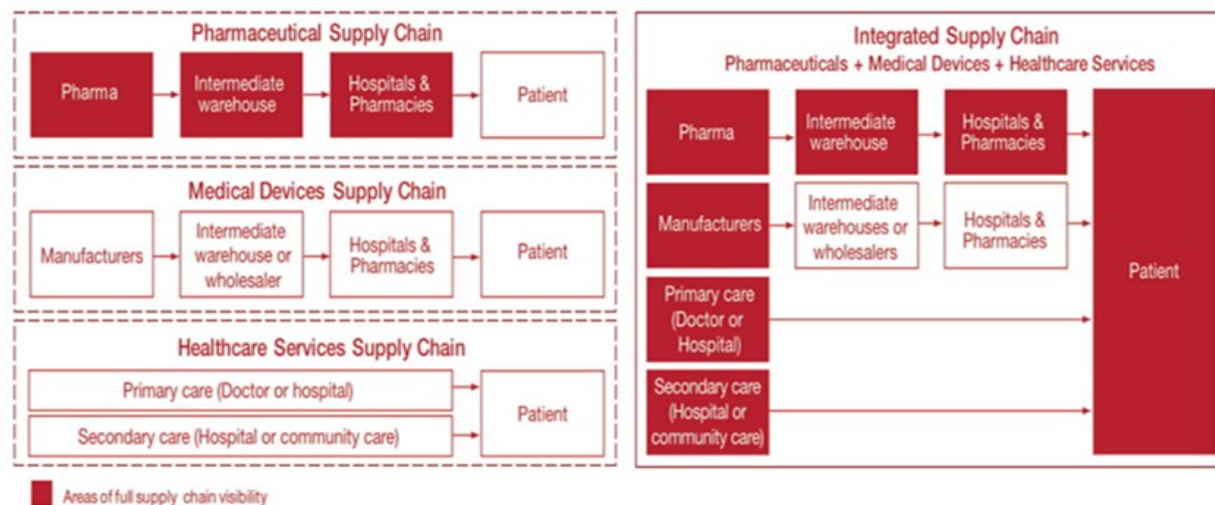


Figure 1. Digital Transformation of the Pharmaceutical Supply Chain in Hospitals

With intentions to use digital technology in three primary pillars—smart hospitals for prevention, examination, smart treatment, and intelligent health management—the Vietnamese health sector has set specific targets to establish a smart health system. The healthcare digitalized communication network concept is one such endeavor. It is a closed network of communication channels that is managed and maintained through the Internet in a hospital setting [10]. Ho Chi Minh City will become a smart city with a strategy for 2030, a digital society. SWOT analysis is commonly used for policy-making, decision-making, and strategic planning (or planning) [11]. The common goal is that Ho Chi Minh City implements the digital transformation process, develop digital government, digital economy, and digital transformation in industries with the spirit of becoming the country's economic locomotive, taking the lead in the field of digital transformation. Ho Chi Minh City has strategy “Development of clinical pharmacy, pharmaceutical supply chain” period 2021-2025 [12]. The city's health system provides care for residents not just in the immediate vicinity but also in the southern provinces and in neighboring nations like Laos and Cambodia. Ho Chi Minh City contains 128 hospitals, representing 9.38% of the total number of hospitals in the nation. Of these, 82 are public hospitals, comprising general and specialist hospitals, and 46 are private hospitals, or 35.9% of the total. Many of the city's

hospitals are large-scale facilities with up-to-date medical technology, a staff of qualified specialists, and cutting-edge procedures that produce excellent medical examination and treatment outcomes [13].

In this study, the interest in digital transformation with related topics is the transparency of the pharmaceutical supply chain, improvement of pharmaceutical distribution, and interaction of hospital-patient pharmacy care in the pharmaceutical supply chain research with the following specific objectives: (i) collect insights from digital transformation hospital experiences worldwide in the pharmaceutical supply chain; (ii) SWOT analysis of strengths, weaknesses, opportunities, and challenges of digital transformation that can affect hospitals in the product supply chain; (iii) recommend strategies for hospitals to prioritize digital transformation in the pharmaceutical supply chain.

## II. LITERATURE REVIEW

### *A. Digital transformation achieves more transparency within the pharmaceutical supply chain*

The pharmaceutical sector fulfills all the criteria for a complex and highly regulated industry, including multi-stakeholder involvement (e.g., countries, banks, supply companies, manufacturing companies, wholesalers, logistics companies, distribution companies, and prescribers/dispensers...). These stakeholders have significant decision-making authority at several decision points that may be corruptible in the absence of adequate openness and accountability. If developed and used properly, the use of digital technologies can lower the dangers of corruption. Studies show a growth in the study of technologies to enhance the functioning of the pharmaceutical supply chain and procurement [14]. A system created for use in the pharmaceutical supply chain. For instance, because Blockchain is decentralized, anybody can access the data in the ledger, and manufacturers may scan and analyze the data to better understand the needs of the drugs they are producing. Similar to this, customers may examine a drug's route to determine its genuineness. It is simple to spot a bad agent if there is one [15].

The main objective of medication procurement is to guarantee that a product is bought in the appropriate amount, quality, and price range at the appropriate cost and is readily available when needed. Process fraud, collusion, and agreements between public and commercial actors are some examples of specific corruption in the drug procurement industry. Depending on the phase of procurement, corruption might take numerous forms (e.g., pre-bid, procurement, post-bid, and implementation) [16]. Since these pharmaceuticals go via a variety of intricate distribution networks, it can be difficult to detect fakes before they join the real supply chain. The safety of the collaborative pharmaceutical supply chain has become a major concern for public health. Since everyone's health comes first, many health organizations emphasize medicine traceability throughout distribution to prevent counterfeit medications by utilizing cutting-edge information technology [17].

### *B. Digital transformation improved the distribution of pharmaceuticals in hospital*

A typical supply chain is made up of a number of locations, including factories, warehouses, distribution hubs, and supplier sites. The hospital in particular is crucial to the delivery process in a healthcare system where patient demand must be met [18]. Digital health platforms for monitoring diagnosis and treatment, patient adherence, and the traceability of drug goods, as well as personalized drug delivery systems—implying patient-tailored dose, dosage form, time of administration, and drug release kinetics—are growing scientific fields [1]. The delivery of healthcare is complicated, and healthcare professionals' capacity to uphold uniform standards of quality and safety varies. The possibility to create data and analytics that track quality and safety standards across every patient, every time, in almost real-time is provided by smart hospitals [19].

The pharmaceutical industry's supply chain is quite intricate and has unique traits that are not often found in supply networks for other consumer items. Higher security, comprehensive traceability, and guarded record keeping are among these unique qualities, especially if documents include sensitive information. The lack of drug product traceability throughout the pharmaceutical supply chain, the availability of substandard drugs, the inability to instantly verify authenticity, and the availability of drugs in short supply all contribute to social pressure on regulatory agencies and researchers to advance the field [1]. In a hospital, logistics management is a multifaceted process that meets both pharmaceutical and non-pharmaceutical needs. Improved pharmacy and inventory management inside the hospital, which are essential to better hospital administration, are facilitated by the acquisition, distribution, and stocking of these resources through more adaptable supply chains. administration of hospital facilities. For hospital pharmacy support services in particular, an ideal inventory control plan may proactively lower the risk of surplus inventory [20]. Information technology was applied to management by establishing new automatic dispensing cabinets to solve the

hospital expansion. Modifying the electronic order entry system to include new protocols and drug shortage information is also important in management [21].

### C. Digital transformation help achieve better patient interaction and care

Improvements in health and care support information pharmacy systems face many barriers. But fundamental to overcoming these barriers is understanding that in 21st-century health care delivery. eHealth is now integral to improving healthcare services [22]. Telemedicine, telepharmacy, artificial intelligence (AI), assistive medical devices, and electronic health records are digital transformation in healthcare that is reshaping the way medical professionals and patients interact. Intelligent systems capable of understanding health problems and complex new diseases will lead to innovations impacting the pharmaceutical industry [23].

The primary function of pharmacists is to provide support to clinical services. Through the implementation of clinical pharmacy operating procedures, pharmacists manage the drug inventory and guide the treatment of patients [21]. Healthcare might become more human and individualized as a result of the digital revolution, but caution must be exercised to ensure data security and transparency. To make sure that medical technologies are person-centered, both patients and physicians should be included from the very beginning. The lives of patients and clinical pharmacists must be improved through the work of healthcare technologists and engineers. These actions are required to forge a common commitment to the design principle that technology and compassionate care are not incompatible and may even work together [24].

Consensual Pharmaceutical Care was described as "Any professional activity in which the pharmacist interacts with the patient (and/or caregiver). Health care professionals to meet the patient's needs, including making plans to meet the short-, medium-, and long-term goals of pharmacotherapy and using new technologies and other ways to keep in touch with the patient." [25]. Hospitals' conventional safety and quality monitoring audits have been challenged by the introduction of an electronic medical record that incorporates rich clinical data connected across the patient's healthcare journey and uses digital platforms to improve patient care [19].

### III. RESEARCH METHODOLOGY

SWOT analysis involves developing a strategy for the future by analyzing the strengths-weaknesses and opportunities-threats of an organization. The word SWOT consists of the first letters of four English words, Strengths, Weaknesses, Opportunities, and Threats [26]. As a result, no ethics committee, informed consent, or legal permission was made to conduct the study. The steps of this research are structured in Figure 2.

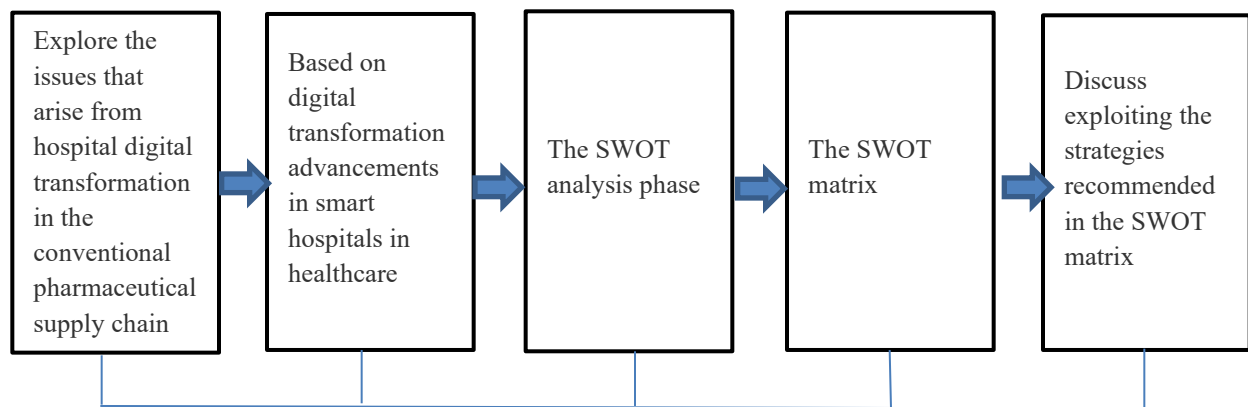


Figure 2. Design Based Research Model

We will first explore the issues that arise from hospital digital transformation in the conventional pharmaceutical supply chain by presenting some definitions we found in the literature and keywords from the mentioned document in Figure 2. Analysis of data that was gathered by someone else for a different main goal is known as secondary data analysis. The use of this current data offers a practical choice for this researcher, who could be working with constrained time and resources. Secondary analysis is adaptable and has many applications. Similar to gathering and analyzing primary data, it is likewise an empirical exercise and a systematic technique with procedural and evaluative

elements [27]. We are interested in digital transformation in hospitals, achieving more transparency within the pharmaceutical supply chain, improved distribution of pharmaceuticals, and helping to achieve better patient interaction and care” owing to digital technologies. Based on information gathered by hospitals adopting digital transformation in the supply chain pharmaceutical application in Ho Chi Minh City, the SWOT analysis phase is used to assist identify strengths, weaknesses, opportunities, and threats [28]. Then, the SWOT matrix is integrated into four different strategies: strengths-opportunities (SO), weaknesses-opportunities (WO), strengths-threats (ST), and weaknesses-threat (WT) [28]. We will discuss exploiting the strategies recommended in the SWOT analysis that can also reduce the risks involved while taking advantage of the opportunities and strengths available to diseases. The hospital realizes the digital transformation into the smart hospital of the future [29].

#### IV. RESULTS AND DISCUSSIONS

Organizations and behaviors involved in the supply chain will benefit greatly from digitization. However, integrating digital technologies into the present supply chain necessitates a thorough comprehension of their advantages. Furthermore, it has been noted that the digitalization of supply chain procedures would address significant supply chain management issues [30]. The deep integration of the digital world with the physical world can bring profound transformation to the global supply chain[31]. Recently, the phrase "digital transformation" has gained popularity on the Internet. In order to pinpoint and look for the precise notions of hospital digital transformation in the pharmaceutical supply chain, the author employs SWOT analysis. After the definitions have been condensed to their most fundamental components, the difficulty of defining the notion of digital transformation may be overcome. Recognize the most crucial research areas [4, 32]. There are several types of research papers related to the topic that is focused on by this systematic literature review [33]. This search resulted in articles, and we collected the keywords used in Table 1.

Table 1. List of Words Based on Classification of Concepts Study

Rank	Cluster 1	Cluster 2	Cluster 3
1	Digital transformation	Supply Chain	Pharmaceutical
2	Technology	Chain	Hospital
3	Smart	Supply	Hospital pharmacy
4	Digitalization	Logistic	Pharmaceutical services
5	Industry 4.0	Supply Chain Management	Pharmaceutical care
6	Traceability	Supplier	Clinical pharmacy

Case study of the hospital pharmacy in Ho Chi Minh City, perform a search with keywords related to hospital digital transformation in the pharmaceutical supply chain. The study observes pharmacy services at a few Ho Chi Minh City hospitals. We also consider ensuring a comprehensive and complete view of the SWOT analysis. As shown in table 2, articles, conference papers and books were searched using a database at Google Scholar, the National Library of Medicine, and Direct Science [34]. In addition, the author conducts observational research in some hospitals and collects it through hospital conference reports and other relevant documents (books, legal documents, etc.). Especially, the conference reports of the Ho Chi Minh City Hospital Pharmacists Association have been held every year since 2017. Pharmacists report on the current status and innovation of pharmacy activities at the hospital in Ho Chi Minh City [12, 35, 36].

Table 2. The Database using SWOT Analysis of The Research From 2018-2022

Document Type	2018	2019	2020	2021	2022	Number of documents
Article	2	4	4	7	5	22
Conference paper	2	1	2	1	1	7
Conference report of hospitals in Ho Chi Minh	1	3	2	3	5	14
Book		1	1	2		4
Total	5	9	9	13	11	47

Selection criteria during data collection, studies that were not published in Vietnamese or English were not included in the study. The data obtained in the study are documentary data without permission. Strategic management will use SWOT analysis to evaluate the hospital’s Internal and external advantages and disadvantages, as well as possibilities and dangers are discussed [20]. Secondary data analysis provides methodological benefits and can progress research by generating new insights. It provides academics with the opportunity to work on projects that explore cutting-edge

theories, ideas, frameworks, and research design approaches [27]. Data analysis is performed by analyzing the internal and external factors of the current state of digital transformation in hospitals in the pharmaceutical supply chain [11]:

• Strengths (Internal): A 'strength' is something positive that should help an activity to succeed. Strengths are the organization's internal attributes that are useful for achieving goals, and it's a win-win situation [37]:

- S1: Hospitals with a mission vision to connect national and local policy. Clinical pharmacy in the hospital is developed with attention and guidance from health authorities.
- S2: Pharmacists have the spirit to adapt to changes and contribute to the development.
- S3: The presence of young pharmacists facilitates digital transformation.
- S4: Experience in telehealth, telepharmacy with anti-COVID-19 process.
- S5: Ensure the quality of imported drugs also during storage.
- S6: Improve sustainability with anti-counterfeiting, timely and complete product delivery. Providing clinical pharmacy services to control dispensing confusion.
- S7: The existence of companies that provide advanced technologies that support health services
- S8: The domestic market has great potential to meet the demand in public hospitals and private hospitals, which are expected to produce high practical values.

• Weaknesses (Internal): 'Weakness' is something negative that can hinder the success of an activity, and weaknesses are internal attributes of the organization that are harmful to achieving goals. An unfavorable condition can lead to reduced profitability or adoption [37].

- W1: Changing habits slowly of medical staff. Most medical facilities do not have a standard data center according to regulations.
- W2: Some medical facilities also use non-specialized home network equipment.
- W3: Lack of synchronization of system integration inside and outside the hospital. The application of information technology in clinical pharmacy has not been maximized.
- W4: Information technology investment costs and operating costs face difficulties.
- W5: Applying information technology in consulting and controlling outpatient prescriptions.
- W6: Major change in management model and working habits of drug management, archival records.
- W7: Universities are not fully prepared to train digital health pharmacy students.
- W8: Lack of standardization regulations, data security.

• Opportunities (External): 'Opportunities' are an innovative way to make an activity more successful - to create an environment more conducive to profitability or adoption. Opportunities are external conditions for achieving a goal [37].

- O1: Government regulations, ministry of health, and local authorities. Policies to support hospitals, opportunities for investors outside the medical industry.
- O2: Integrate and apply technologies such as big data, IoT, AI... smart hospitals.
- O3: Access to new technology, modern technology brings more advantages.
- O4: Demand from customers for speed, time, and accuracy. Reduce human resources, reduce costs, eliminate waste, streamline infrastructure.
- O5: Clinical pharmacy services develop and reduce risk in treatment services.
- O6: Digital technology positively changes the way of management from the supplier company to the patient.
- O7: Bringing great opportunities in pharmacy education and health education.
- O8: The system always accepts prescriptions with 24-hour service.

• Threats (External): A "threat" is something potential such as an event or condition that, if it occurs, will harm the operation and reduce the chances of success. Threats are external conditions that harm the goal's achievement [37].

- T1: The paper system at the hospital is a barrier to the digital transformation of the healthcare industry. Procedures and regulations in medical facilities, mainly for traditional work.
- T2: Few high-quality IT human resources are working for the hospital. Information technology human resources are difficult to process, and professional or medical expertise.
- T3: Knowledge and digital behavior skills of people using digital health facilities are still low.
- T4: Limitations in the field of legal, medical technology appraisal.
- T5: Potential issues related to ethics, privacy, and information quality.

- T6: External dependence on technology development and application of products.
- T7: Specialized information technology infrastructure requires highly specialized computerization.
- T8: Competition between hospitals and competition between digital technology companies.

In our SWOT analysis of the hospital's digital transformation's impact on the pharmaceutical supply chain, we look for strengths, weaknesses, opportunities, and threats: (i) 'Strength' is something positive that should help an activity to succeed. Hospitals have embraced digital health solutions thanks to better operations management and data storage. Healthcare digitization continues to help public hospitals improve their operational effectiveness and clinical results; (ii) 'Weakness' is something negative that can hinder the success of an activity. Many hospitals lack needed infrastructure investment; (iii) 'Opportunities' are an innovative way to make an activity more successful. The Vietnamese government is enticing investors to take part in the growth of digital health; Patients might raise their out-of-pocket expenses for expensive healthcare treatments when their personal income rises; (iv) Threats are external conditions that harm the goal's achievement. Hospital congestion and overcrowding are still difficult problems in Vietnam. Hospitals in Ho Chi Minh City are understaffed as a result. Other nearby hospitals experience inefficiencies as a result. Hospitals' progress in information technology, pharmacy, and digitalization is slowed by a number of issues.

The main findings of the hospital pharmacy's SWOT analysis in Ho Chi Minh City. We suggest developing a digital transformation plan for hospitals in Ho Chi Minh City's pharmaceutical supply chain between the SO, ST, WO, and WT cells while taking into account integration with the SWOT matrix in Table 3. A smart city can evaluate various social needs effectively and manage and leverage public resources, such as power, water, transportation, and healthcare, in a reasonable way to provide better public services [38]. Digital transformation as a smart trend hospital in the pharmaceutical supply chain is suitable for building and developing Smart cities. Such solutions require hospital leaders to start with a vision and long-term and short-term target strategies suitable for the hospital's digital transformation process [39, 40].

Table 3. Strategy Digital Transformation of The Hospital in Pharmaceutical Supply Chains in Ho Chi Minh City, Vietnam

SWOT matrix	Strength (S)	Weaknesses (W)
Opportunities (O)	<p><i>Building a vision in the hospital:</i></p> <ul style="list-style-type: none"> <li>•S1O1: Hospitals build a vision of strength, connect national and local policies, digitally transform, and complete hospital information systems.</li> </ul> <p><i>Develop long-term strategies:</i></p> <ul style="list-style-type: none"> <li>•W1O3: Accessing new and modern technologies with specialized equipment as prescribed and meeting medical technology testing standards (servers, PCs, active and passive network devices, software) ...).</li> <li>•S8O2: Cooperation with companies providing advanced digital transformation technology in hospitals step by-step horizontal and vertical integration (horizontal - in-hospital and mid-hospital; vertical - with health insurance).</li> <li>•W5O4: Facilitating the application of information technology associated with outpatient prescriptions. Hospital pharmacy supplies consult customer needs about speed, time, and accuracy (Medical center, Nursing center, retail pharmacies affiliated with the hospital ...).</li> <li>•S6T5: Make sustainable improvements against counterfeiting, potential ethics, and privacy issues.</li> </ul> <p><i>Develop short-term target strategies:</i></p> <ul style="list-style-type: none"> <li>•W4O1: Taking advantage of supportive policies, the hospital sets up priority projects for investment and construction of digital transformation infrastructure.</li> <li>•S5O6: Taking advantage of digital technologies to positively change the way of lean management to ensure the quality of drugs in stock also during storage and for patients.</li> <li>•W7O7: Developing an institute-university model that researches and trains students to adapt to the field of digital health.</li> </ul>	
Threats (T)	<ul style="list-style-type: none"> <li>•W3O5: Developing clinical pharmacy service activities, integrating information systems at the data level to manage risks of providing drug-related health services.</li> <li>•W6T1: GAP analysis of traditional activities of drug management, record keeping, hospital management methods step by step digital transformation application.</li> </ul>	

Table 3 presents ways to prioritize hospital digital transformation in the pharmaceutical supply chain in Ho Chi Minh City based on the SWOT matrix and real-world observations [41, 42]:

Strengths–Opportunities (SO) Strategies: Opportunities are presented by the organization's competitive advantages and possible solid opportunities. It serves as the primary area for creating a successful plan [29].

Weaknesses–Opportunities (WO) Strategies: The combination of potentially strong opportunities and comparable weaknesses is void of lost opportunities. This is the space of the organization's efforts to heal its comparative weaknesses so that opportunities can be seized [29].

Strengths–Threats (ST) Strategies: The combination of potentially powerful threats and comparative strengths is a defensible space. Here, strategic moves attempt to counter the appearance of a possible threat by mobilizing the strengths and aspects of the organization [29].

Weaknesses–Threats (WT) Strategies: Vietnam's overloaded and congested hospitals continue to be a problem. Due to the pressure on resources at central and provincial hospitals as well as the inefficiencies it causes at the district and community levels, there are actual dangers [29].

Hospitals may improve their competitive position by examining the value streams in which they engage as well as other parallel streams that utilize the same supply chain, distribution network, and retail as a "grid" on which to operate, according to the supply chain "value" view [43]. In any transition, it is important to define the focus for the transition. In this study, we propose the discussion to implement digital transformation for the hospital's strategy in table 3:

First, the 4.0 Revolution will place increasingly new requirements on employees. The education sector needs appropriate adjustments to meet new employee requirements besides labor and employment policies [44]. Execution strategy and financial customization are necessary to carry out the activities required to generate revenue and operating capital for hospitals, especially private sector hospitals. Financing is also required to deliver the hospital's quality and secure digital transformation program [45]. Deliver new values with any transformational change linked to the organizational culture. The Vietnamese government has recognized the role of digital health technology in improving healthcare and optimizing management processes. Awareness of current government regulations, future directions for digital health, and evidence of local research in the field are crucial for introducing these modern technologies in Vietnamese hospitals [46]. First, create innovative conversion teams. The organizational culture of healthcare organizations should be patient-centered in all respects, with an emphasis on openness and honesty. Any change should be implemented in the context of the organization's commitment to continual improvement rather than only to make financial savings, which frequently do not serve as the foundation for revolutionary change [45].

Second, hospitals should strongly encourage clinical pharmacists to participate in pharmaceutical professional support to their departments, helping them to apply their acquired knowledge and skills into practice regularly and improving their level of expertise [47]. Encourage involvement and get rid of barriers since change is a dynamic process that takes time. There will always be opposition to change, but through persistent conversation and teamwork, we can eventually get over it [45]. Vision and learning in circulation, connectivity in a circular supply chain, circularity in business models, logistics policies and information technology collaboration to drive innovation. Collaboration of the circular supply chain in the healthcare industry [48]. Integrated care requires digital support and clinical pharmacists' presence on the care team, allowing them to contribute meaningfully to treatment outcomes [23].

Third, hospitals take the intermediate step of integrating the supply chain with key elements (Human Resource Management, Total Quality Management, Product Delivery, and Information Technology Application) to transform Changing the pharmaceutical supply chain model in hospitals. Hospitals that improve operational efficiency can manage risk and disruptions to the pharmaceutical supply chain, meeting the hospital's goals of reducing risk and ensuring patient safety [49, 50]. Risk management aspects are related to local/global sourcing in terms of having the capacity and reliable ability to deliver a given digital transformation component to the hospital. Global sourcing increases risk but improves cost-effectiveness in a stable condition, which can be altered by strategic positioning of safe stock and effectively improving delivery performance in nearby factories [43].

Fourthly, the growing footprint is driven by focus areas of the healthcare market combined with cost-effectiveness, time, and other performance metrics [43]. That has great opportunities, favorable policy, and social, technological, and economic environments to adopt this patient-centered holistic healthcare model. To adopt, adapt and successfully implement digital transformation in hospitals. Hospitals must adopt a system-wide approach to supply chain performance in transformation and operations [51]. The success of a transformation project depends on the ability to monitor predictable, budgeted activities that must be carried out. The leadership group must concisely and succinctly explain the transformation project's goal and how it got there. Many initiatives are aware of the final result but are unable to decide how the change process will be carried out. They are inconsistent, illogical, or incomplete [45].

## V. CONCLUSION

This study was evaluated with a SWOT analysis to view scenarios that provide long-term and short-term strategies for hospitals implementing digital transformation in the pharmaceutical supply chain. As a general finding in the study, a SWOT analysis is an important guide to seeing the full range of possible scenarios. The study proposes a common



strategy for all hospitals interested in implementing digital transformation with a vision, long-term strategy, and short-term strategy. In addition, it provides the following implications for hospital management that can successfully digitalize in the digital transformation process.

Vietnam's health policy is ready for digital transformation, and this study provides strategic directions for digital transformation connected to the general development strategy of the hospital related to pharmaceuticals. When reviewing SWOT analysis articles, there are also limitations as the SWOT analysis framework does not have a well-defined structure, which makes it difficult to use SWOT and derive strategies from it [11]. One way to increase access while preserving costs and improving clinical results is through digital health. The government must widen market access and promote global trade and collaborative clinical research in order to do this. In order to demonstrate the potential significance of the subject matter to some level, it will be essential to add additional studies that use qualitative and quantitative research methodologies to practice, such as artificial intelligence, the Internet of Things, big data, etc.

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#### REFERENCES

- [1] D. Raijada, K. Wac, E. Greisen, J. Rantanen, and N. Genina, "Integration of personalized drug delivery systems into digital health", *Advanced drug delivery reviews*, vol. 176, 113857, 2021.
- [2] M. Mooij, O. Foss, and B. Brost, "Integrating the experience: Principles for digital transformation across the patient journey", *Digital Health*, vol. 8, pp. 1-7, 2022. doi: 10.1177/20552076221089100
- [3] G. Petrova, and V. Andonova, "Application of Digital Technologies in The Pharmaceutical Sector", *International Interdisciplinary Virtual Meeting "Alumni Club and Friends"*, pp. 125-131, 2021.
- [4] M. Baker, "Digital transformation", *Buckingham Business Monographs*, 2015.
- [5] I. M. Kavaliauskiene, H. I. Cebeci, S. Ghorbani, and R. Cinčikaite, "An Integrated Approach for Evaluating Lean Innovation Practices in the Pharmaceutical Supply Chain", *Logistics*, vol. 5, no. 4, 74, 2021.
- [6] N. S. Zhang, W. He, and P. S. Tan, "Understanding local pharmaceutical supply chain visibility", *Operational Research*, vol. 25, pp. 234-239, 2008.
- [7] P. Global, "From vision to decision Pharma", 2020. <https://www.pwc.com/pharma2020>.
- [8] M. Wang, and F. Jie, "Managing supply chain uncertainty and risk in the pharmaceutical industry", *Health services management research*, vol. 33, no. 3, pp. 156-164, 2020. doi: 10.1177/0951484819845305.
- [9] S. Javaid, "Digital Transformation in Pharma: Technologies & Trends", *AI Multiple*: <https://research.aimultiple.com/digital-transformation-pharma/>, 2021.
- [10] A. Cameron, T. H. Pham, J. Atherton, D. H. Nguyen, T. P. Nguyen, S. T. Tran, T. N. Nguyen, H. Y. Trinh, and S. Hajkowicz, "Vietnam's future digital economy—Towards 2030 and 2045", Brisbane: Commonwealth Scientific and Industrial Research Organisation, 2019.
- [11] S. Ghazinoory, M. Abdi, M. A. Mehr, "SWOT methodology: a state-of-the-art review for the past, a framework for the future", *Journal of business economics and management*, vol. 12, no. 1, pp. 24-48, 2011. doi: 10.3846/16111699.2011.555358.
- [12] Ho Chi Minh City Department of Health, "Development of clinical pharmacy, pharmaceutical supply chain period 2021-2025", <https://medinet.gov.vn/chuyen-muc/trien-khai-chuong-trinh-hanh-dong-thuc-hien-nghi-quyet-dai-hoi-dang-bo-so-y-te-cmobile4694-63871.aspx>, 2021.
- [13] H. N. K. Giao, N. T. A. Thy, B. N. Vuong, T. V. Kiet, L. T. P. Lien, "Outpatient satisfaction at private general hospitals in Ho Chi Minh City, Vietnam", *Journal of Asian Finance, Economics and Business*, vol. 7, no. 7 pp. 323-334, 2020.
- [14] G. Saeed, J. C. Kohler, R. E. Cuomo, and T. K. Mackey, "A systematic review of digital technology and innovation and its potential to address anti-corruption, transparency, and accountability in the pharmaceutical supply chain", *Expert Opinion on Drug Safety*, vol. 2, no. 8 pp. 1061-1088, 2022. doi: 10.1080/14740338.2022.2091543.
- [15] S. K. Panda, and S. C. Satapathy, "Drug traceability, and transparency in medical supply chain using blockchain for easing the process and creating trust between stakeholders and consumers", *Personal and Ubiquitous Computing*, pp. 1-17, 2021. doi: 10.1007/s00779-021-01588-3.

- [16] T. K. Mackey, and R. E. Cuomo, "An interdisciplinary review of digital technologies to facilitate anti-corruption, transparency and accountability in medicines procurement", *Global health action*, vol. 13, no. sup1, 1695241, 2020. doi: 10.1080/16549716.2019.1695241 .
- [17] F. Jamil, L. Hang, K. Kim, and D. H. Kim, "A novel medical blockchain model for drug supply chain integrity management in a smart hospital", *Electronics*, vol. 8, no. 5, 505, 2019.
- [18] M. C. Kees, J. A. Bandoni, and M. S. Moreno, "An optimization model for managing the drug logistics process in a public hospital supply chain integrating physical and economic flows", *Industrial & Engineering Chemistry Research*, vol. 58, no.9, pp. 3767-3781, 2019. doi: 10.1021/acs.iecr.8b03968.
- [19] A. Barnett, M. Winning, S. Canaris, M. Cleary, A. Staib, and C. Sullivan, "Digital transformation of hospital quality and safety: real-time data for real-time action", *Australian Health Review*, vol. 43 ,no. 6, pp. 656-661, 2018. doi: 10.1071/AH18125.
- [20] X. Xie, Z. Fang, L. Chen, Q. Lu, T. Tan, Z. Ye, and M. Pitt, "Facilitating Patient-Centric Thinking in Hospital Facility Management: A Case of Pharmaceutical Inventory", *Buildings*, vol. 12, no. 7, 888, 2022.
- [21] A. L. Dzierba, T. Pedone, M. K. Patel, A. Ciolek, M. Mehta, K. Berger, L. G. Ramos, V. D. Patel, A. Littlefield, T. Chuich, H. B. May, J. Muir, B. S. Verkerk, T. Poon, C. D. Nigoghossian, P. Nikolos, M. Gunther, J. Shah, "Rethinking the Drug Distribution and Medication Management Model: How a New York City Hospital Pharmacy Department Responded to COVID-19", *Journal of the American College of Clinical Pharmacy*, vol. 3,no. 8, pp. 1471-1479, 2020. doi: 10.1002/jac5.1316.
- [22] World Health Organization, "Global strategy on digital health 2020-2025", <https://apps.who.int/iris/handle/10665/344249>, 2021.
- [23] J. A. Gomez, "Digital health in pharmaceutical care", *Proceedings of the International Research Conference in Health Sciences*, 2022.
- [24] H. J. Warraich, R. M. Califf, and H. M. Krumholz, "The digital transformation of medicine can revitalize the patient-clinician relationship", *NPJ digital medicine*, vol. 1, no. 1, pp. 1-3, 2018.
- [25] R. M. Verdugo, M. A. C. Hernández, M. A. R. Cortés, J. L. P. Andrés, "A new definition and refocus of pharmaceutical care: the Barbate Document", *Farmacia Hospitalaria: Organo Oficial de Expresion Cientifica de la Sociedad Espanola de Farmacia Hospitalaria*, vol. 44, no. 4, pp. 158-162, 2020.
- [26] M. Filiz, "Metaverse and A Swot Analysis of Turkish Health System", *Turkish Research Journal of Academic Social Science*, vol. 5, no. 1, pp. 61-68, 2022.
- [27] M. P. Johnston, "Secondary data analysis: A method of which the time has come", *Qualitative and Quantitative Methods in Libraries*, vol. 3, no. 3, pp. 619-626, 2014.
- [28] P. Rauch, U. J. Wolfsmayr, S. A. Borz, M. Triplat, N. Krajnc, M. Kolck, R. Oberwimmer, C. Ketikidis, A. Vasiljevic, M. Stauder, C. Mühlberg, R. Derczeni, M. Oravec, I. Krissakova, M. Handlos, "SWOT analysis and strategy development for forest fuel supply chains in South East Europe", *Forest Policy and Economics*, vol. 61, pp. 87-94, 2015. doi: 10.1016/j.forpol.2015.09.003.
- [29] C. Vlado, "On a correlative and evolutionary SWOT analysis", *Journal of Strategy and Management*, vol. 12, no. 3, pp. 347-363, 2019. doi: 10.1108/JSMA-02-2019-0026.
- [30] P. Agrawal, and R. Narain, "Digital supply chain management: An Overview", *IOP Conference Series: Materials Science and Engineering*, vol. 455, no. 1, 012074, 2018. doi: 10.1088/1757-899X/455/1/012074
- [31] L. Wu, X. Yue, A. Jin, and D. C. Yen, "Smart supply chain management: a review and implications for future research". *The International Journal of Logistics Management*, vol. 27, no. 2, pp. 395-417, 2016. doi: 10.1108/IJLM-02-2014-003.
- [32] J. Reis, M. Amorim, N. Melão, Y. Cohen, and M. Rodrigues, "Digitalization: A literature review and research agenda", *International Joint conference on industrial engineering and operations management*, pp. 443--456, 2019. doi: 10.1007/978-3-030-43616-2\_47.
- [33] S. L. M. Keong, and Z. C. Embi, "A Systematic Review on Non-Functional Requirements Documentation in Agile Methodology", *Journal of Informatics Web Engineering*, vol. 1, no. 2, pp. 19-29, 2022.
- [34] W. Mengist, T. Soromessa, and G. Legese, "Method for conducting systematic literature review and meta-analysis for environmental science research", *MethodsX*, vol. 7, 100777, 2020.
- [35] Electronic Health Administration- Ministry of Health, V.N., "The National Health Digital Transformation Conference", <https://ehealth.gov.vn/Index.aspx?action=Content&MenuChildID=406&type=33>, 2020.
- [36] N.H.K. Quan, "International Integration of Pharmaceutical Supply Chains in Vietnam: An Overview of Challenges and Opportunities at Hospitals in Ho Chi Minh City", *International Journal of Medical and Health Sciences Research*, vol. 7, no. 1, pp. 37-48, 2020.
- [37] J. Suh, and N. F. Emtage, "Identification of strengths, weaknesses, opportunities and threats of the community-based forest management program", *Annals of Tropical Research*, vol. 27, no. 1, pp.55-66, 2005.
- [38] N. Hasan, A. A. Aziz, A. Mahmud, N. A. BintiHamzah, and N. Z. A. Rahman, "Localization Techniques Overview Towards 6G Communication", *Journal of Informatics Web Engineering*, vol. 1,no. 1, pp. 35-47, 2022.

- [39] I. Ilin, O. Iliyashenko, and A. Konradi, "Business model for smart hospital health organization", SHS Web of Conferences, vol. 44, 00041, 2018. doi: 10.1051/shsconf/20184400041.
- [40] V. Bozic, "Smart hospital–our experience", Smart Cities and Regional Development Journal, vol 3, no. 2, pp. 95-99, 2019.
- [41] Y. Kodolitsch, A. M. Bernhardt, P. N. Robinson, T. Kölbl, H. Reichenspurner, S. Debus, and C. Detter, "Analysis of strengths, weaknesses, opportunities, and threats as a tool for translating evidence into individualized medical strategies (I-SWOT)", Aorta, vol 3, no. 03, pp. 98-107, 2015.
- [42] M. A. Benzaghta, A. Elwalda, M. M. Mousa, I. Erkan, and M. Rahman, "SWOT analysis applications: An integrative literature review", Journal of Global Business Insights, vol. 6, no. 1, pp. 55-73, 2021.
- [43] M. Holweg, and P. Helo, "Defining value chain architectures: Linking strategic value creation to operational supply chain design", International Journal of Production Economics, vol. 147, pp. 230-238, 2014. doi: 10.1016/j.ijpe.2013.06.015.
- [44] N. H. Tien, and H. T. T. Minh, "Challenges for Vietnamese Business Leaders in the Era of International Economic Integration and Industrial Revolution 4.0", International Journal of Commerce and Management Research, vol. 5, no. 5, pp. 19-24, 2019.
- [45] D. Burke, P. Godbole, and A. Cash, "Hospital transformation: From failure to success and beyond", 2019.
- [46] D. M. Tran, C. L. Thwaites, J. I. V. Nuil, J. McKnight, A. P. Luu, and C. Paton, "Digital Health Policy and Programs for Hospital Care in Vietnam: Scoping Review", Journal of medical Internet research, vol. 24, no. 2, e32392, 2022.
- [47] H. Y. N. Thi, T. T. N. Ngoc, M. T. D. Tran, D. V. Do, L. D. Pham, and Ng. D. T. Le, "Job satisfaction of clinical pharmacists and clinical pharmacy activities implemented at Ho Chi Minh city, Vietnam", PloS one, vol. 16, no. 1, e0245537, 2021. doi: 10.1371/journal.pone.0245537.
- [48] M. L. Tseng, H. M. Ha, K. J. Wu, and B. Xue, "Healthcare industry circular supply chain collaboration in Vietnam: vision and learning influences on connection in a circular supply chain and circularity business model", International Journal of Logistics Research and Applications, vol. 25, no. 4-5, pp. 743-768, 2022. doi: 10.1080/13675567.2021.1923671.
- [49] N. H. K. Quan, and P. Rajagopal, "Transforming model of the pharmaceutical supply chain: a conceptual framework at hospitals in Viet Nam", International Journal of Advances in Engineering and Management, vol. 3, pp.245-252, 2021.
- [50] N. H. K. Quan, and P. Rajagopal, "Questionnaire Designing on the Pharmaceutical Supply Chain Model: A Pilot Study in Ho Chi Minh City, Vietnam", International Journal of Supply Chain Management, vol. 11, pp. 1-9, 2022.
- [51] T. H. Dang, T. A. Nguyen, M. H. Van, O. Santin, O. M. T. Tran, and P. Schofield, "Patient-centered care: Transforming the health care system in Vietnam with support of digital health technology", Journal of Medical Internet Research, vol. 23, no. 6, e24601, 2021.