

Questionnaire Designing on the Pharmaceutical Supply Chain Model: A Pilot Study in Ho Chi Minh City, Vietnam

Nguyen Huu Khanh Quan^{#1}, Premkumar Rajagopal²

¹Faculty of Pharmacy, Nguyen Tat Thanh University

300A Nguyen Tat Thanh Street, District 4, Ho Chi Minh City, Vietnam

^{1,2}School of Business & Management, Malaysia University of Science & Technology

No. 12 Jalan PJU 5/1 Kota Damansara 47810, Petaling Jaya, Selangor, Malaysia

Corresponding author: ¹nhkquan@ntt.edu.vn

²premkumar@must.edu.my

Abstract-Vietnam's pharmaceutical industry has the potential to create value for the nation. Impact of the COVID-19 epidemic in Vietnam's pharmaceutical industry. This study was conducted on a pilot scale, and we did develop a questionnaire that was sent to pharmacists working in different hospitals in Ho Chi Minh City. This study aimed to create a questionnaire to explore those criteria given the importance of the hospital pharmaceutical supply chain. A well-designed and original questionnaire from which the researcher can conduct a large-scale formal survey. This study targeted a small group of diseases in Ho Chi Minh City. We developed a questionnaire for pharmacists working in the department pharmacy of the hospital and collected responses accordingly. As a result, we have identified and built a questionnaire with 45 observed variables. The study showed that the acceptance level of the observed variables reached the Cronbach's Alpha confidence level above 0.7 and the Corrected Item - Total Correlation value of the accepted observed variable over 0.3. Research results with the absolute value of factor loading above 0.5 are optimal, and the observed variables are statistically significant. This study has identified the observed variables for the factors of the theoretical framework. The study results can establish a measurement for further quantitative research with an expanded research scope in the future.

Keywords — *Pharmaceutical supply chain network, Pharmacy hospital, Supply chain transformation, Pilot study*

1. Introduction

Vietnam participates in new-generation trade agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the EU-Vietnam Free Trade Agreement. Vietnam can become a more attractive destination and increase the country's standing in the world. According to the National Strategy for the Development of the Pharmaceutical Industry, the Vietnamese government has identified the pharmaceutical industry as a key

industry in economic development and creating welfare for people in the future. If the Vietnamese market can maintain its growth rate, the total value of the pharmaceutical industry can reach 34.1 billion USD or more by 2040. If compared with achievements globally, this value will help Vietnam become the 25th largest pharmaceutical market globally[1].

Vietnam's pharmaceutical industry has the potential to create value for the nation. Despite the challenges of the regulatory environment and Vietnam's resources and workforce[1]. The pharmaceutical supply chain in Vietnam is a complex system that involves many intermediaries between manufacturers and consumers. The supply chain sector in Vietnam has a high competition level from the domestics and local enterprises[2]. In addition, Vietnam's pharmaceutical industry is facing a shortage of imported raw materials because Covid-19 has disrupted the supply chain, so they cannot exploit their advantages during the epidemic[3].

The population of elderly persons is increasing and the prevalence of chronic diseases, and this change is causing increased healthcare costs to health care systems[4]. The worldwide COVID-19 epidemic is one of the main causes of improving people's health care needs[5]. Medicines are special goods, and the process of buying and selling drugs on prescription requires a doctor's prescription. Pharmacists need the high level of integrity necessary to maintain health standards and fulfill their ethical responsibilities to provide optimal patient care [6]. The Department of Health of Ho Chi Minh City has a policy of sending information technology applications to hospitals to build pharmaceutical supply chain management software for the whole hospital, linking data when necessary, and planning. Expanding telemedicine services for outpatients in the community [7].

2. Literature Review

In the past, the pharmaceutical supply chain was seen as a tool for bringing products to market taking into account the supply's safety [8]. The transformation of the pharmaceutical supply chain model will profoundly

affect the hospital's operating models/frameworks and management strategies. Hospitals need to adapt and adapt to new challenges in an integrated ecosystem with global supply chains[9, 10].

Today, adopting supply chain management practices by applying techniques and methods developed in industrial environments is valued by many healthcare organizations. The pharmaceutical industry is looking for new approaches to create additional benefits. There are many actors in the pharmaceutical supply chain: primary manufacturing facilities, distribution centers, wholesalers, hospitals, and many other facilities. The interdependence between those ingredients and the sensitivities of pharmaceutical products makes it necessary to require complex supply chain optimization techniques [7]. An analytical perspective is needed to

provide a complete and comprehensive understanding of how factors interact with key supply chain variables to transform hospital pharmaceutical supply chains[9, 11]. The relationship between factors should be evaluated and determined with the help of the hospital. The pharmaceutical supply chain must reduce unnecessary costs while improving the quality of products and services delivered to patients [12]. here are many challenges for the pharmaceutical industry in the current era of globalization. In this context, we are developing a theoretical framework approach to transforming the pharmaceutical supply chain model in hospitals in figure 1, responding to the technical needs of pharmaceutical supply chain optimization with priorities of the hospital [11, 13]:

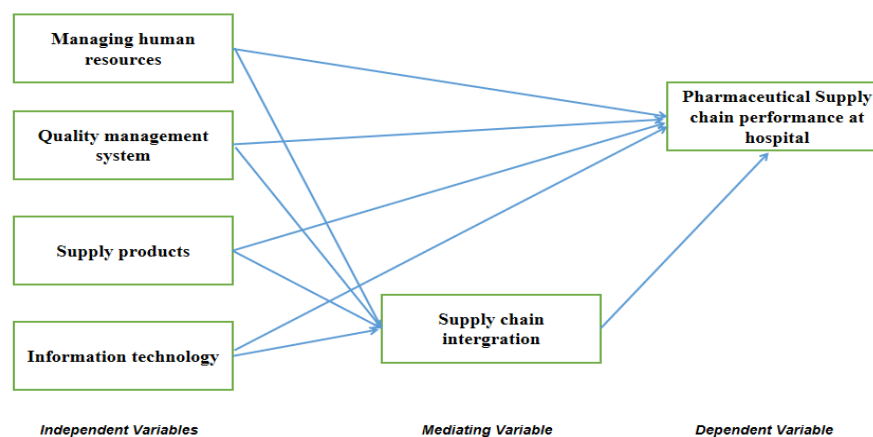


Figure 1. Conceptual framework transforms model of the pharmaceutical supply chain in hospitals, Vietnam[13]

●**Managing human resources:** It should be noted that every supply chain involves people, which can present challenges and difficulties in coordinating the activities of the pharmaceutical supply chain. Human resource capabilities are supply chain members who have conflicting goals or objectives and do not agree on decisions in action[14]. Human resource management standards in the healthcare industry play an important role. Hospital pharmacists play an important role in ensuring the quality and safety of medicines in the hospital[15]. Improve professional efficiency and enhance compliance with professional pharmaceutical standards to ensure patient safety[16].

●**Quality management system:** The key concept to implement TQM in the healthcare system is a corporate framework created for quality, change corporate culture, end-user focusing, improvement process by collaborating approach, education, and training level for the employees[17]. Inadequate quality control implementation can lead to poor results. Returned products, recalled or complained products/services create a terrible impression between the hospital and the customer. In addition, issues related to patient safety can affect the trust and long-term viability of the hospital [15, 18].

●**Supply Products:** Pharmaceuticals are an essential physical chain in the healthcare system. Hospitals

should note that inventory management is financially effective, reducing costs in drug supply is necessary[19]. Hospitals need to connect directly with suppliers to collaborate on a common platform without interruption in supplying pharmaceutical products from suppliers. Supply management does not stop at finding suppliers but must proactively create and maintain close or less binding relationships with other suppliers to optimize the cost of investment in a new supplier's product[20].

●**Information technology:** An intelligent supply chain challenges supply chain operators to integrate business models with technological innovations[21]. Supply chains are technology-driven, and digital supply chains include all information about products, transactions, and locations; stored and shared in electronic form. Hospitals need to choose and apply the most optimal technology innovative, maximum support for work, user-friendly[15]. Hospitals remain around challenges in the pharmaceutical supply chain, especially in the global market through management systems. Supply chain efficiency in hospitals of the future will be more guided by emerging technologies in information technology[22, 23].

●**Supply chain integration:** An integrated supply chain allows hospitals to access other resources, thereby improving the efficiency of hospitals in meeting customer needs[24]. Hospitals can increase

organizational efficiency by implementing integrated activities in examination and treatment care, improving interoperability and coordination among hospital units, and improving customer experience. Patients achieve greater efficiency and value from health delivery systems [25, 26]. For example, a team of pharmacists in the pharmaceutical supply chain provides leadership, systems support, and expertise to enable the organization to support the continuum of inpatient and outpatient care[27].

●**Pharmaceutical Supply chain performance at hospitals:** Hospital performance must be defined to clear objectives that reflect the values of various stakeholders such as patients, pharmacists, pharmaceutical suppliers, industry standards pharmaceuticals, and new technologies. The aim is to address the fragmentation of inpatient and outpatient pharmacy care services in the pharmaceutical supply chain, facilitating routine and continuum of care[28]. As the pharmaceutical supply chain increases, the responsiveness of the hospital improves. Hospitals can now adapt to fluctuations in patient demand and supply times. As a result, the hospital pharmaceutical supply chain will reduce inventory costs, supply costs, and supply shortages [29].

Pharmaceutical is an integral part of the conventional supply chain network from a healthcare perspective [30]. The desired performance of a sustainable pharmaceutical supply chain plays an important role in achieving health, and performance evaluation is an essential element of an efficient pharmaceutical supply chain[31]. The pilot study was conducted: we first reviewed the literature and developed a model to measure hospital performance in the pharmaceutical supply chain [13]. The aim of this study was conducted at a pilot-scale: first, it provides a systematic review of the literature relevant to the pharmaceutical supply chain at the hospital. Second, we did a pilot study that developed a questionnaire sent to pharmacists working in Ho Chi Minh city hospitals. A well-designed and original questionnaire from which the researcher can conduct a large-scale formal survey.

3. Methodology

A pilot study also has a specific design feature; it is conducted on a smaller scale than the main or full-scale

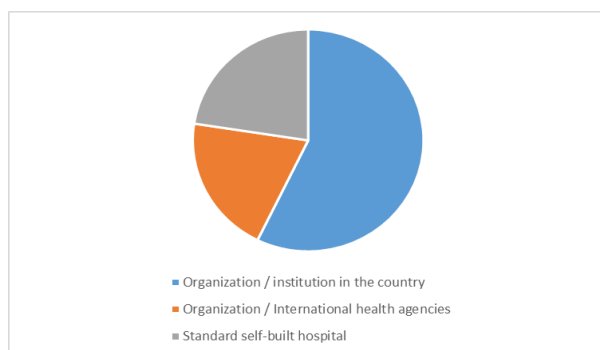


Figure 2. Range of participating hospitals with pharmaceutical standards

study. The pilot study is important for improving the quality and efficiency of the main study[32, 33]. Design of the research and the entire research project we are doing on the pharmaceutical supply chain in hospitals: First, determining the content validity of the tool was established by building on the proposed conceptual framework through literature review and conducting validation testing[13]. Next, we perform data collection and provide the pilot study results. Finally, the findings are discussed, conclusions and future research steps are indicated.

The appropriate sample size should be determined, the feasibility of the participants or the study design. The important point is that a sample in a pilot study needs to be similar to the primary study sample, and the sampling and exclusion criteria must be the same [33, 34]. The proposed analysis sample size with 30 participants representative from the population of interest is a reasonable minimum recommendation for a pilot study intended to be a preliminary survey [35].

Based on literature analysis, we designed a questionnaire to assess the acceptability of indicators measuring the effectiveness of the pharmaceutical supply chain in hospitals. The questionnaire is organized according to the following sections: Section 1 describes organizational demographics and respondent profiles; Sections 2 to 7 are observed variables related to independent variables, intermediate variables, and dependent variables of the theoretical framework of the hospital pharmaceutical supply chain as shown in Figure 1. Pre-testing of the questionnaire was done through a field visit and discussion with ten pharmacists working at the hospital[36, 37]. As a result of the discussion about examining the questionnaire, we found that the proposed observed variables were reasonable and included all observed variables in the final version of the questionnaire. Some explanations for observed variables suggested by pharmacists have also been added to make the questionnaire easier to understand.

A convenient sampling strategy was used: the unit of analysis was the pharmacy department of hospitals in Ho Chi Minh City; the implementation period is for two months, from March to May 2021; Respondents are guaranteed anonymity; Respondents were asked to indicate on a 5-point scale the level of acceptance (where 5 = Strongly Agree; 4 = Agree; 3 = neutral; 2 =



Figure 3. Experience of pharmacists practicing pharmacy practice in hospitals

Disagree; 1= Strongly Disagree). Analysis was performed with SPSS26 software using responses to survey questions from a questionnaire with 48 observed variables.

4. Results and Discussion

Organize the survey and collect data in person and online with Google form with 81 pharmacists working in hospitals compared to a sample size requirement of

30 for the pilot study[35]. An overview of participants in the pilot study and table 1 summarizes the descriptive characteristics of hospital pharmacy staff. In figure 2 and figure 3, participants answered a multiple-choice question. The results focus on the disparity between the job placement specialization segments in the pharmacy department and the standard range of hospitals involved in the pharmaceutical supply chain performance[10].

Table 1. Respondents Profile of the study results – questions of section 1

Characteristic	Count	Percent	Characteristic	Count	Percent
Gender			Age		
Male	25	30.9	24-29 years old	30	37.0
Female	56	69.1	30-40years old	47	58.0
			41-50 years old	3	3.7
			51-65 years old	1	1.2
			> 65 years old	0	0
Hospital ownership status			Education pharmacy		
The public hospital managed by the Ministry of Health	24	29.6	Diploma or College Pharmacist	16	19.8
The public hospital managed the city	28	34.6	Bachelor of Pharmacy	45	55.6
The public hospital managed by the district	14	17.3	Master or Specialization I of pharmacy	19	23.5
Private hospital	15	18.5	Doctorate or specialization II of pharmacy	1	1.2
Workplace experience			Length of time in which hospital has been in business		
< 1 year	8	9.9	< 5 years	5	6.2
1 - < 3 year	15	18.5	5 -10 year	16	13
3 - < 5 years	13	16.0	11-20 year	13	15
5 - < 10 years	20	27.4	21- 30 year	15	16
> 10 years	25	30.9	> 30 years	32	39.5

From the pilot study, we analyze the results for the observed variables related to the proposed factors from the conceptual framework in figure 1. The results are descriptive with the mean and standard deviation listed in the tables, indicating the structure of the pharmaceutical supply chain at the hospital: the results are presented at the level of individual items: human resource management with table 2; quality management with table 3; supply products with table 4; information technology with table 5, supply chain integration with

table 6; performance of the pharmaceutical supply chain in hospitals with table 7. Mean value results mean that the average value of the variable whose mean score is between 3.04 and 3.73 compared to the threshold of minimum value 1 and maximum value 5. This result shows that the evaluative measures are appropriate to the nature of the study, together with the Std.deviation tells us the mean dispersion of the values around the mean[38].

Table 2. Summary of the study results – questions of sections 2-7

Factors and Corresponding Items	Mean	Std.Dev	Factor loadings
Management human resource			
The hospital/pharmacy department has a written statement of patient care and pharmacy operations	3.62	1.135	.826
All staff is trained constantly updated about scientific research and professional practice fields of pharmaceuticals	3.67	1.183	.776
The hospital/pharmacy department has a strategy and plans to implement the salary, bonus, and incentive system	3.77	1.110	.695
Pharmacists collaborate with suppliers and have patient-centered care responsibilities	3.90	1.136	.699
Pharmacists initiate, participate in, and support relevant clinical and practice-relevant research in hospital settings	3.77	1.154	.838
Pharmacists meet the expectations of the patient when the patient to the hospital in the state of drug users	3.70	1.089	.750
Hospital employees pharmacy has adequate procurement skills and pharmaceutical care	3.64	1.218	.795
The hospital provides a conducive environment to ensure employees pharmacy are satisfied in workplaces	3.74	1.127	.727
Cronbach Alpha= .898	3.73	1.144	

Cronbach's alpha was performed to evaluate the reliability of each scale. A Cronbach alpha value above 0.7 indicates that all data can be considered consistent [39]. Cronbach's alpha values ranged from 0.7572 to 0.898 with survey questions that probe two aspects of human resource management in table 2, quality management in table 3, product supply in Table 4, and information technology in Table 5. They are variables independent. The intermediate variable is supply chain integration, shown in table 6, and the dependent variable is pharmaceutical supply chain performance in hospitals shown in table 7. In addition, the Corrected Item - Total Correlation values of the observed variable accept above 0.3. Six constructs under the conceptual framework that can be considered

internally consistent and pilot study survey have high reliability of each scale. As a result of the pilot study survey, we have identified three observed variables that do not meet these two criteria. We were not used observed variables were included in the final questionnaire. In the results in table 3, we remove an observation variable (Pharmacy department of the hospital plans demand, quality has been improved). The results in table 4 exclude an observation (The hospital has minimized logistics costs due to appropriate inventory levels). The results in table 5 exclude an observed variable (Information technology system increases cooperation/interaction between functional areas).

Table 3. Summary of the study results – questions of sections 3-7

Factors and Corresponding Items	Mean	Std.Dev	Factor loadings
Quality management system			
Hospital construction, implementation, issuing, and monitoring standards of quality management and pharmacy services	3.30	1.299	.717
Effective leadership and management practices for delivering pharmacy services tailored to hospital and patient needs	3.69	1.281	.790
Pharmacists collaborate with healthcare professionals to develop documented policies and procedures to ensure the quality of drug therapy	3.72	1.207	.764
The hospital establishes a patient-centered culture: applying new ideas and incorporating quality management tools and philosophies into pharmacy operations	3.26	1.394	.762
Pharmacists always work according to pharmaceutical quality management standards at the hospital	3.53	1.324	.824
The hospital's supplier pharmaceutical delivery time has improved	3.54	1.295	.803
The hospital can deliver zero-defect products pharmaceutical to the final customer	3.53	1.246	.768
Cronbach Alpha= .852	3.51	1.292	

Table 4. Summary of the study results – questions of sections 4-7

Factors and Corresponding Items	Mean	Std. Dev	Factor loadings
Product supply			
Procurement, dispensing, and control policies for all hospital drugs are developed with input from pharmacists and other appropriate hospital committees.	3.01	.844	.717
The hospital's partner pharmaceutical companies are always committed to product quality and service throughout providing hospital products to patients.	3.00	.949	.674
The hospital/pharmacy has a written procedure for promptly handling and documenting recalls for any medical staff and patient-related defects encountered at the hospital.	3.10	.943	.737
The hospital/pharmaceutical department develops, implements, and evaluates relevant pharmacy operating procedures (SOPs).	3.01	.901	.717
Inspection of storage areas and items of inventory and specific regulations on responsibility for safe and effective storage of drugs	3.07	.919	.770
Drug-related damages, scrap, and waste are clearly identified and reported	2.93	.877	.770
Inventory control system increases the level of Cooperation/interaction between functional areas	3.16	.928	.820
Cronbach Alpha= .780	3.04	.909	

Ultimately, our results may lead to factor loading analysis being performed to understand and identify structures from this pilot group. The higher the absolute value of the load factor of the observed variable, the more significant the correlation between that observed variable and the factor. The total value of Factor loading above 0.5 is the optimal level, indicating that the observed variables are statistically significant [39]. The final questionnaire has 45 observed variables compared with 48 observed variables, and the reliability is 93.75%. The pilot study of 81 samples showed that the quality of the results was acceptable.

Table 5. Summary of the study results – questions of sections 5-7

Factors and Corresponding Items	Mean	Std.Dev	Factor loadings
Information technology			
The information technology system helps to manage internal risks, electronic medical records are secured and optimized in time when there is a problem.	3.26	.863	.789
The management information technology system keeps track of expenses (hospitalization, follow-up examination, emergency and drugs...) of the hospital.	3.06	.731	.605
The electronic prescribing system helps pharmacists with drug supply activities and use consultation for patients of the hospital.	3.20	.765	.698
Information technology system helps logistics services connect suppliers to help identify products and product origin easily at the hospital	3.63	.858	.631
Information technology system helps to order and supply medicines in a timely manner based on the use and expected needs of the patients coming to the hospital	3.27	.806	.764
Information technology systems that help deliver pharmaceutical care to outpatients at long distances through the use of telecommunications and other advanced technologies	3.25	.830	.774
The hospital has sufficient security system in warehouse zone	3.30	.798	.747
Cronbach Alpha= .757	3.28	.807	

Table 6. Summary of the study results – questions of sections 6-7

Factors and Corresponding Items	Mean	Std.Dev	Factor loadings
Integrating the pharmaceutical supply chain in hospitals			
The hospital/pharmacy department has a clear strategy with the need for pharmaceuticals that match the quality and cost of healthcare	3.51	.823	.698
The hospital/pharmacy department has a risk management system, warning of drug supply chain disruptions, and timely error reporting	3.69	.957	.741
The hospital/pharmacy has established a connection system with supplier companies to share and cooperate in exploiting pharmaceutical services	3.57	.935	.646
The hospital/pharmacy department has a process for determining and analyzing drug treatment costs, and the entire management system	3.99	.994	.738
Patients are provided with information about medications and have their drug needs met during treatment	3.72	.990	.865
The hospital has precise pharmaceutical supply chain cost knowledge and control mechanism	3.60	.944	.797
The hospital can deliver value-added pharmacy services to the final customer	3.65	.924	.737
The information shared by participants in the pharmaceutical supply chain at the hospital	3.60	.931	.797
Cronbach Alpha = .891	3.67	.937	

The findings from the results of this pilot study develop the conceptual framework. Hospitals measure the performance transformation of the hospital in the pharmaceutical supply chain. Hospitals develop value chains and the development of Vietnam's industry 4.0 trend and international integration[15, 40]. Successful supply chain management can provide hospitals with a new competitive advantage. Trust and commitment are key elements of a successful long-term supply chain relationship [20]. Supply chain performance refers to evaluating supply chain management and includes tangible and intangible factors. The hospital pharmaceutical supply chain has a significant impact on the hospital budget, and it has opportunities to optimize and improve the quality of healthcare[22].

This study provides the relationship between the factors of the pharmaceutical supply chain in hospitals: first, human resource management in the hospital in the pharmaceutical supply chain with pharmacists playing a key role. Pharmacists are drug information specialists, bartenders, educators, and consultants[16]. Pharmacists need to work with other healthcare professionals, including doctors, care managers, nurses, and others, to provide coordinated care for each patient[41]; Second, Total Quality Management creates a supportive environment about the initiatives needed to succeed in hospital service organizations. The medical field is getting more and more attention because it is related to human health [18]; Third, the hospital has a unique

internal supply chain, so it needs more attention and solutions to deal with the special situation of pharmaceutical supply. The benefits can be created by properly managing the pharmaceutical supply chain in the hospital[42]. Supplier relationship management has become an important requirement for hospitals in the modern pharmaceutical supply chain to achieve the highest value[14]; Fourth, The correct use of technology has been advocated as a new strategic perspective on supply chain management [19]. The research results are consistent with the research direction of information technology management, supplier management, customer relationship and logistics management, and the participation of practitioners. The research results are consistent with the conceptual framework with researched issues in information technology management, supplier management, customer relationship, and logistics management, in addition to practitioner involvement[12, 43].

Table 7. Summary of the study results – questions of sections 7-7

Factors and Corresponding Items	Mean	Std.Dev	Factor loadings
Performance pharmaceutical supply chain in hospitals			
Based on your knowledge and experience in pharmaceutical supply and management. You believe that the pharmaceutical supply chain at your hospital is fast and efficient.	3.49	.989	.771
The pharmaceutical supply chain at the hospital always meets the requirements of the drug to the patient	3.22	1.107	.819
You are satisfied with the operation of the pharmaceutical supply chain at the hospital.	3.25	.969	.603
Hospitals/Pharmacy departments always have solutions to improve the optimal pharmaceutical supply chain management	3.35	1.027	.820
The hospital/ Pharmacy Department has a patient satisfaction rating system to help improve pharmaceutical supply chain management	3.22	1.025	.797
The hospital can deliver product pharmaceuticals on time to the final customer	3.21	1.104	.736
Hospital pharmaceutical distribution services constantly are improved	3.21	1.081	.727
The hospital has evaluated suppliers in the pharmaceutical supply chain	3.25	1.031	.686
Cronbach Alpha= .886	3.28	1.042	

Inefficient hospital pharmaceutical supply chains lead to product shortages, product discontinuities, reduced patient safety, poor performance, delivery errors, technology failures that lead to medical emergencies and shortage of goods in the hospital[44]. The pilot study aims to know about the mediating regulatory role of supply chain integration and pharmaceutical supply chain performance in hospitals. Supply chain integration is related and suggested that supply chain integration is the most important factor. Implicit in management for managers should consider end-user issues, partnerships, information infrastructure system integration, and product standardization and leadership to achieve supply chain performance[22]. Supply chain integration leverages internal and external integration[11].

5. Conclusion

As shown in figure 1, preliminary research helped us design a questionnaire with a conceptual framework that identified key issues for the hospital transformation in the pharmaceutical supply chain in Ho Chi Minh City. The outcome of this study is a reliable and tested questionnaire for practitioners or researchers to conduct a larger-scale formal survey. The results also provide the factors related to the transformation of the pharmaceutical supply chain in hospitals. In addition, the study's findings offer insight into a comprehensive set of selection criteria for hospitals participating in the pharmaceutical supply chain and contribute to the supply chain management literature. The study provides detailed information on selective criteria to help hospitals improve healthcare services related to the supply chain management of pharmaceutical. The intelligent pharmaceutical supply chain in hospitals will increase the value chain of hospitals in the healthcare sector along with the development of Vietnam's industry 4.0 trend and international integration[40]. This study also has some limitations that need to be addressed in the future. We mentioned previously that this paper reports the results of the first two phases of a broader study. In addition to the theoretical and managerial implications, this study also has some limitations that need to be addressed in future studies, such as increasing the sample size and analyzing the structural modeling results of the theoretical framework model.

6. Acknowledgement

We would like to thank Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam, for providing time and facilities for this research. I want to thank the main supervisor is Professor Premkumar Rajagopal, for providing time and guidance for this research. This research is part of the Ph.D. project at the School of Business & Management, Malaysia University of Science & Technology, Malaysia.

Reference

- [1] International, K., *Value of Innovation: Unlocking the Potential of the Innovative Pharmaceutical Industry in Vietnam*. <https://home.kpmg/vn/en/home/insights/2020/07/b-lue-sky-report-value-of-innovation.html>, 2020.
- [2] Nguyen, T.A., A. Vitry, and E.E. Roughead, *Pharmaceutical policy in vietnam, in Pharmaceutical policy in countries with developing healthcare systems*. 2017, Springer. p. 75-94.
- [3] Phuong, L.C.M., *How Covid-19 affects the share price of Vietnam's pharmaceutical industry: event study method*. *Entrepreneurship and Sustainability Issues*, 2021. **8**(4): p. 250.
- [4] Mwangi, J., A. Kulane, and L. Van Hoi, *Chronic diseases among the elderly in a rural Vietnam: prevalence, associated socio-demographic factors and healthcare expenditures*. *International journal for equity in health*, 2015. **14**(1): p. 1-8.
- [5] Quan, N.H.K., et al., *COVID-19 Epidemic in Vietnam: A Study on Knowledge, Attitudes and Prevention of Pharmacy Students*. *Asian Journal of Humanities and Social Studies* (ISSN: 2321-2799), 2021. **9**(1).
- [6] Carr, M.B., et al., *Independent community pharmacist interest in participating in community pharmacy research networks*. *Journal of the American Pharmacists Association*, 2011. **51**(6): p. 727-738.
- [7] City, D.o.H.o.H.C.M., *Development of clinical pharmacy, pharmaceutical supply chain in the period of 2021-2025*. <http://www.medinet.hochiminhcity.gov.vn/chuyen-muc/trien-khai-chuong-trinh-hanh-dong-thuc-hien-nghi-quyet-dai-hoi-dang-bo-so-y-te-c1081-42448.aspx>, 2021.

- [8] Sbai, N. and A. Berrado. *A literature review on multi-echelon inventory management: the case of pharmaceutical supply chain*. in *MATEC Web of Conferences*. 2018. EDP Sciences.
- [9] Ghadge, A., et al., *The impact of Industry 4.0 implementation on supply chains*. Journal of Manufacturing Technology Management, 2020.
- [10] Tripathi, S. and M. Gupta, *Transforming towards a smarter supply chain*. International Journal of Logistics Systems and Management, 2020. **36**(3): p. 319-342.
- [11] Kaliani Sundram, V.P., et al., *The role of supply chain integration on green practices and performance in a supply chain context. a conceptual approach to future research*. International Journal of Supply Chain Management, 2018. **7**(1): p. 95-104.
- [12] Argiyantari, B., T.M. Simatupang, and M.H. Basri, *Pharmaceutical supply chain transformation through application of the Lean principle: A literature review*. Journal of Industrial Engineering and Management, 2020. **13**(3): p. 475-494.
- [13] Quan, N.H.K. 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 (IJAEM), 2021. **3**(11).
- [14] Muhia, J., L. Waithera, and R. Songole, *Factors affecting the procurement of pharmaceutical drugs: a case study of Narok County referral hospital, Kenya*. Med Clin Rev, 2017. **3**(4): p. 20.
- [15] Quan, N.H.K., *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, 2020. **7**(1): p. 37-48.
- [16] Khan, N., et al., *Doctors' perceptions, expectations and experience regarding the role of pharmacist in hospital settings of Pakistan*. International journal of clinical pharmacy, 2020. **42**(2): p. 549-566.
- [17] Mutahar, A., B. AlDoaies, and A. Abdulaziz, *TQM in Healthcare: Transformation, Challenges, Impact and Measurement*. International Advanced Research Journal in Science, Engineering and Technology, 2017. **4**(5).
- [18] Kristianto, I. and Z.J.H. Tarigan, *The impact TQM System on Supply Chain Performance through Supply Chain Integration and Employee Satisfaction*. Petra International Journal of Business Studies, 2019. **2**(1): p. 8-17.
- [19] Ageron, B., O. Bentahar, and A. Gunasekaran. *Digital supply chain: Challenges and future directions*. in *Supply Chain Forum: An International Journal*. 2020. Taylor & Francis.
- [20] Sun, T.-H., C.-Y. Cheng, and C.-M. Chao, *Society Exchange Characteristics, Service Quality, and Relationship Quality between Hospital and Its Suppliers*. Int. J Sup. Chain. Mgt Vol, 2020. **9**(1): p. 338.
- [21] Esmacilian, B., et al., *Blockchain for the future of sustainable supply chain management in Industry 4.0*. Resources, Conservation and Recycling, 2020. **163**: p. 105064.
- [22] Chang, H.H., Y.C. Tsai, and C.H. Hsu, *E-procurement and supply chain performance*. Supply Chain Management: An International Journal, 2013. **18**(1).
- [23] Maruchek, A., et al., *Product safety and security in the global supply chain: Issues, challenges and research opportunities*. Journal of operations management, 2011. **29**(7-8): p. 707-720.
- [24] Waluyowati, N.P., D. Surachman, and S. Aisjah, *The Utilization of Long-Term Relationship and Supply Chain Performance in Improving SMEs Performance*. American Journal of Theoretical and Applied Business, 2018. **4**(3): p. 79-89.
- [25] Shaw, S., R. Rosen, and B. Rumbold, *What is integrated care*. London: Nuffield Trust, 2011. **7**: p. 1-23.
- [26] Riyadi, S., *The mediating role of technology competences, supply chain technology between supply chain management, total quality management and firms supply chain performance in Indonesian textile sector*. International Journal of Supply Chain Management, 2020. **9**(2): p. 452-459.
- [27] Bekema, C., et al., *Standard of practice for pharmacy technicians to support clinical pharmacy services*. Melbourne: Society of Hospital Pharmacists of Australia, 2019.
- [28] Abuzour, A.S., et al., *Patient prioritisation for hospital pharmacy services: current approaches in the UK*. European Journal of Hospital Pharmacy, 2020.
- [29] Kochan, C.G., et al., *Impact of cloud-based information sharing on hospital supply chain performance: A system dynamics framework*. International Journal of Production Economics, 2018. **195**: p. 168-185.
- [30] Ahmad, F. and B. John, *A fuzzy quantitative model for assessing the performance of pharmaceutical supply chain under uncertainty*. Kybernetes, 2021.
- [31] Moslemi, S., et al., *Integration of neural network and AP-NDEA model for performance evaluation of sustainable pharmaceutical supply chain*. OPSEARCH, 2021: p. 1-42.
- [32] Nong Thi Nhu Mai, H.T.P., *Development of Questionnaire on Supplier Selection Criteria for Textile and Apparel Industry – A Case Study in Vietnam*. International Journal of Supply Chain Management, 2019. **8**(5).
- [33] In, J., *Introduction of a pilot study*. Korean journal of anesthesiology, 2017. **70**(6): p. 601.
- [34] Kulińska, E., D. Maślowski, and M. Dendera-Gruszka, *The Concept of Industry Supply Chains—A Pilot Study*. European Research Studies, 2021. **24**(2B): p. 617-627.
- [35] Johanson, G.A. and G.P. Brooks, *Initial scale development: sample size for pilot studies*.

- Educational and psychological measurement, 2010. **70**(3): p. 394-400.
- [36] Blair, J., et al. *The effect of sample size on cognitive interview findings*. in *Proceedings of the American Statistical Association*. 2006. Citeseer.
- [37] Dworkin, S.L., *Sample size policy for qualitative studies using in-depth interviews*. 2012, Springer. p. 1319-1320.
- [38] Andrade, C., *Understanding the difference between standard deviation and standard error of the mean, and knowing when to use which*. Indian Journal of Psychological Medicine, 2020. **42**(4): p. 409-410.
- [39] Hair, J.F., M. Page, and N. Brunsveld, *Essentials of business research methods*. 2019: Routledge.
- [40] Premkumar Rajagopal, M., J.T.C. Leong, and L.S. Khuan, *The impact of industry 4.0 on supply chain*. Emerging Technologies for Supply Chain Management, 2018. **62**.
- [41] Kristeller, J., *Transition of care: pharmacist help needed*. 2014, SAGE Publications Sage CA: Los Angeles, CA. p. 215-216.
- [42] Regattieri, A., et al., *An innovative procedure for introducing the lean concept into the internal drug supply chain of a hospital*. The TQM Journal, 2018.
- [43] Nsamzinshuti, A. and A.B. Ndiaye, *Development of a conceptual framework for performance measurement of pharmaceutical supply chain within hospital*. International Journal of Applied Logistics (IJAL), 2014. **5**(2): p. 32-49.
- [44] Abu Zwaida, T., C. Pham, and Y. Beauregard, *Optimization of inventory management to prevent drug shortages in the hospital supply chain*. Applied Sciences, 2021. **11**(6): p. 2726.