

Current status and factors affecting digital transformation at private drug retail establishments in Dong Nai province in 2025

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ABSTRACT

Background: Digital transformation (DT) in our country is currently an urgent requirement for all sectors, including the pharmaceutical industry. There have been studies on the issue of DT in the manufacturing and distribution sectors, but there has not been a study in the drug retail sector. Therefore, identifying the factors that impact the activities DT implementation at private drug retail establishments is essential in the current period. Objectives: To assess the current status and determine the factors influencing the results of DT implementation and the acceptance of DT in private drug retail establishments. Materials and Methods: A convenience sampling method will be used for professional managers or staff at private drug retail establishments in Bien Hoa city, Dong Nai province, surveyed using a cross-sectional descriptive method in April 2025. Results: The DT implementation results and DT acceptance (Dependent variable) of 375 out of 1,200 currently operating private drug retail establishments were evaluated, seven groups of independent variables were identified (1. Characteristics of the survey participants; 2. The role of DT; 3. Competence of professional managers; 4. Competence of employees; 5. Competence of the facility; 6. Legal policies and 7. Customer needs) has been statistically tested to determine the effect on the dependent variable. Conclusion: Based on the research findings, recommendations are made for retailers to enhance their capabilities in the DT process and for regulatory agencies to implement policies for DT activities at private drug retail establishments.

Keywords: digital transformation (DT), private drug retail establishment, influencing factors

1. INTRODUCTION

Digital Conversion or Digital Transformation (DT) is strongly developing globally and particularly in Vietnam. In 2017, Vietnam was already evaluated as a country in the acceleration phase and ranked first in the East Asia-Pacific region in terms of the National Digital Index [1].

In the pharmaceutical retail sector, in implementing Directive No. 23/CT-TTg dated August 23, 2018, of the Prime Minister on strengthening the management and connectivity of drug supply establishments, the Drug Administration of Vietnam (DAV) implemented network connectivity for all drugstores nationwide starting August 2018. Currently, the rate of establishments granted interconnected accounts is 100% [2].

Implementing Decision No. 749/QĐ-TTg dated June 3, 2020, of the Prime Minister approving the "National Digital Transformation Program until

2025, with a vision to 2030" [3] and Decision No. 5316/QĐ-BYT dated December 22, 2020, of the Ministry of Health on the "Digital Transformation Plan for the Health Sector" [4], the DAV Vietnam has developed a digital transformation plan for the pharmaceutical sector for the period 2020 - 2025, with a vision to 2030, following two phases: the first phase of 5 years (2020 - 2025) and the second phase until 2030. Specifically for the first phase, the pharmaceutical sector aims to reach the finish line 2 years ahead of schedule (to be completed by 2023); the second phase aims to finish 5 years ahead of schedule (to be completed by 2025) [5].

The DT of the pharmaceutical industry has developed quite strongly in the manufacturing sector [6] and in the drug supply sector [7], but it remains limited in the retail drug sector. To prepare for the pharmaceutical business using the e-

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commerce method under the regulations of the Pharmacy Law 44/2024 and Decree 163/2025 [8, 9], as well as to meet the strong changes in digital technology, private drug retail establishments need to develop information technology within their premises and participate in implementing the DT program, similar to some other business sectors. To identify the factors affecting the outcomes of DT implementation at private drug retail establishments, in November 2024, I conducted a pilot study on 110 private drug retail establishments across three cities: Bien Hoa, Ba Ria, and Vung Tau. This study successfully identified the model and scales, which were verified for reliability and validity. Based on these results, I will continue to expand the research within Bien Hoa city, covering approximately 1200 operating private drug retail establishments, to further clarify the related factors.

2. SUBJECTS AND RESEARCH METHODOLOGY

2.1. Research Subjects

The drug retailers at private drug retail establishments in Bien Hoa city, Dong Nai province.

Selection criteria: The person completing the interview questionnaire must be the professional manager or an employee at private drugstores and drug establishments within Bien Hoa city, Dong Nai province agrees to participate in the study.

Exclusion criteria

- Hospital pharmacies, clinic pharmacies, and drug counters (As the survey area is a city, the drug counter model is not present).
- The participant has not fully filled out the survey questionnaire.

2.2. Research methodology

2.2.1. Research design

A descriptive cross-sectional study.

2.2.2. Time and location of study

Study time: During April 2025.

Location: The study will be conducted at private drugstores and drug establishments within Bien Hoa City, Dong Nai Province.

2.2.3. Sample size and sampling method

The sample size was determined using the formula for calculating sample size for a descriptive study:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{d^2}$$

In which:

- n: Required sample size.
- Z = 1.96 for a 95% confidence interval.
- p: The expected proportion (proportion of DT implementation at drug retail establishments from the pilot study, $p = 0.59$ [10])
- d: Desired precision (chosen as $d = 0.05$, 5% margin of error).

Substituting the values into the formula:

$$n = \frac{1.96^2 \cdot 0.59 \cdot (1 - 0.59)}{(0.05)^2} \approx 371.6$$

Thus, the minimum required sample size is 372 pharmacists.

2.2.4. Sampling method

Convenient.

2.2.5. Data collection method

Data will be collected online (using Google Forms software) after providing guidance to professional managers and employees on how to complete the questionnaire. If the online results do not reach the calculated sample size, direct sampling will be supplemented.

2.2.6. Statistical error

Since the convenient and online sampling method was used encountered non-response bias. The response rate was low, as many people who received the survey link did not participate, leading to a significant difference between the respondents and the non-respondents.

2.2.7. Research variables

The variables were determined from the pilot study [10], comprising two parts:

+ **Part 1:** Personal information of the research participants, divided into two groups:

Group 1: Independent variables, consisting of the personal characteristics of the participants.

Group 2: Dependent variable, which is the result of DT implementation at the establishment.

+ **Part 2:** The variables using a 5-point Likert scale are groups of factors potentially impacting DT activities at the facility and DT acceptance outcomes.

- Strongly disagree
- Disagree
- Neutral (or Undecided/Neither agree nor disagree)
- Agree
- Strongly agree

The scale consists of 28 independent variables and 3 dependent variables.

2.2.8. Data analysis and statistical methods

Data processing: The Kruskal-Wallis test will be used to determine the relationship between nominal/categorical variables and non-normally distributed quantitative variables.

Spearman's rank correlation coefficient and regression analysis will be used to analyze the relationship among the non-normally distributed quantitative variables.

3. RESEARCH RESULTS

A total of 375 survey responses were collected, including 290 online responses and 85 in-person responses.

3.1. Characteristics of research participants

- The characteristics of the research participants are presented in Table 1:

Table 1. Personal information data of research participants

Personal characteristics		Frequency	Percentage (%)
Age group	20 - 30 age	79	21.1
	31 - 40 age	171	45.6
	41 - 50 age	95	25.3
	> 50 age	30	8
Gender	Male	71	18.9
	Female	304	81.1
Professional qualifications	Intermediate degree	21	5.6
	Associate degree	65	17.3
	Bachelor's degree	275	73.3
	Postgraduate degree	14	3.7
Years of experience in Retail	< 5 years	43	11.5
	> 5 - 10 years	186	49.6
	> 10 - 15 years	101	26.9
	> 15 years	45	12.0
Position at the retail facility	Store manager	309	82.4
	Staff	66	17.6
Information technology (IT) proficiency level	Level 1 (Basic)	94	25.1
	Level 2 (Intermediate)	181	48.5
	Level 3 (Proficient)	98	26.1
Retail format	Pharmaceutical establishment	16	4.3
	Private pharmacy	316	84.3
	Pharmacy chain	43	11.5

The results presented in Table 1 indicate the following: In terms of age: Individuals in the 31 - 40 age group accounted for the highest proportion (45.6%). In terms of gender: Females constituted the majority in the role of professional managers or staff at retail pharmaceutical establishments (81.1%). In terms of professional qualifications and position at the retail facility: Since the

survey was distributed online, the majority of respondents possessed a bachelor's degree or higher and held the position of professional manager at the facility (73.3% - 82.4%). In terms of years of experience in retail activities, those who had been working for > 5 - 10 years accounted for the highest percentage (49.6%). In terms of IT proficiency level: Individuals at

level 2 (Intermediate) represented the highest proportion (48.5%). In terms of retail format: The private pharmacy format accounted for the

highest proportion (84.3%).

In terms of the results of DT implementation at the facilities are presented in Table 2:

Table 2. Results of digital transformation implementation at the facilities

Components of DT in private drug retail establishments		Frequency	Percentage (%)
Regulated drug management software	Yes	375	100
	No	0	0
Establishment showcase software	Yes	206	54.9
	No	169	45.1
Barcode scanning software	Yes	80	21.3
	No	295	78.7
Customer relationship management (CRM) software	Yes	159	42.4
	No	216	57.6
Percentage of managed customers.	≤ 20%	0	0
	21 - 40%	199	53.1
	41 - 60%	108	28.7
	61 - 80%	64	17.1
	81 - 100%	4	1.1

The results presented in Table 2 indicate the following:

Among the five criteria selected in the pilot study for determining DT outcomes, only the criterion software for regulated drug management achieved a 100% rate. The rates for other achieved outcome criteria remain quite low: The rate for establishment showcase software was 54.9%; the

rate for barcode scanning software was 21.3%; the rate for CRM software was 42.4%; and the highest percentage of managed customers was in the range of 21 - 40% of customers (at a rate of 53.1%). This result indicates that the implementation of DT in retail drug establishments is still limited.

The acceptance of DT in private drug retail establishments is presented in Table 3.

Table 3. Results of DT acceptance at the facilities

Variable	Total mean score of the scale
Our facility has the capacity to DT to better serve our customers.	4.32
Our facility is implementing DT to prepare for e-commerce-based pharmaceutical business operations.	3.95
Our facility is confident in successfully implementing DT	4.18

The results presented in Table 3 indicate the following:

The rate of DT acceptance at private retail drug establishments is quite high. The average scores on the 5-point Likert scale for the variables Our facility has the capacity to implement DT to better serve customers and confident in successfully implementing DT both exceeded 4 (4.32 and 4.18, respectively). However, the item regarding implementing to prepare for e-commerce-based pharmaceutical business operations still sees many individuals feeling uncertain, resulting in an

average score below 4 (3.95).

3.2. Determining the impact of factor groups on digital transformation (DT) implementation and DT acceptance outcomes at the facility

3.2.1. Correlation between research participant characteristics and DT implementation outcomes

The Kruskal-Wallis Test was used to determine the correlation between nominal/categorical variables (characteristics) and non-normally distributed quantitative variables (DT implementation outcomes). The results are presented in Table 4.

Table 4. Determining the correlation between personal characteristics and DT implementation at the facility

Personal characteristics	DT implementation results (p-value)	DT acceptance outcome (p-value)
Age group	p = 0.594 (p > 0.05)	p = 0.446 (p > 0.05)
Gender	p = 0.961 (p > 0.05)	p = 0.686 (p > 0.05)
Professional qualifications	p = 0.103 (p > 0.05)	p = 0.049 (p < 0.05)
Years of experience in retail	p = 0.449 (p > 0.05)	p = 0.219 (p > 0.05)
Position at the retail facility	p = 0.196 (p > 0.05)	p = 0.123 (p > 0.05)
IT proficiency level	p < 0.01 (p < 0.05)	p < 0.01 (p < 0.05)
Retail format	p < 0.01 (p < 0.05)	p < 0.01 (p < 0.05)

The results from Table 4 indicate the following:

There is a statistically significant relationship between two characteristics - IT proficiency level and retail format - and both the DT implementation outcome and the DT acceptance outcome (p-values were all < 0.01); The characteristic professional qualifications is related only to the DT acceptance outcome (p = 0.049).

The characteristics of age group, gender, years of experience in retail, and position at the retail

facility were not related to either group of DT outcomes.

3.2.2. Determine the correlation between the factor groups and the results of DT implementation and the results of DT acceptance at the facility

Using Spearman's rank correlation coefficient method to determine the correlation between the factors and the results of DT implementation and DT acceptance at the facilities, the results are presented in Table 5:

Table 5. Determination of the correlation coefficient between the factor groups and the DT implementation at the facility

Factor groups	Total mean score of the scale	DT implementation results		DT acceptance outcome		Standard deviation
		p - value	correlation coefficient	p - value	correlation coefficient	
The roles of DT	3.99	p < 0.01	0.809	p < 0.01	0.575	0.523
Competence of professional managers	4.06	p < 0.01	0.609	p < 0.01	0.59	0.446
Competence of employees	3.99	p < 0.01	0.644	p < 0.01	0.524	0.492
Competence of the facility	4.04	p < 0.01	0.552	p < 0.01	0.573	0.544
Legal policies	3.67	p < 0.01	0.445	p < 0.01	0.320	0.647
Customer needs	4.07	p < 0.01	0.408	p < 0.01	0.438	0.628
DT Acceptance outcome	4.15	p < 0.01	0.755			0.480

The results in Table 5 show that: There is a statistically significant correlation between the mean scores from the Likert scale of the factor groups and the results of DT implementation and DT acceptance at the facilities. The Spearman correlation coefficients range from moderate to high. A high correlation also exists between the two outcome groups: DT implementation results and DT acceptance results. The positive correlation coefficients indicate a direct relationship. A small

variance value indicates that the data values are close to each other and clustered around the mean.

3.2.3. Determine the regression equation between the factor groups and the results of DT acceptance at the facility

Using the regression test to determine the impact of the factor groups on the DT acceptance results at the facility, the results are presented in Tables 6 and 7 as follows:

Table 6. Basic parameters of the regression equation

The values	DT Acceptance outcome	Statistical significance
The sig. value of the F-test	< 0.01	The regression model is appropriate.
Adjusted R-squared	0.624	62.4% of the variance in the dependent variable is explained by the independent variables.
Durbin - Watson statistic result	1.927	The result falls in the range of ≈ 2 , thus not violating the assumption of first-order serial autocorrelation.

Table 7. Regression equation results

Factor groups	DT acceptance outcome		
	Beta value	Sig value	Value VIF
Constant	0.494	0.003	-
The roles of DT	0.425	0.000	2.137
Competence of professional managers	0.116	0.005	1.654
Competence of employees	0.145	0.000	1.654
Competence of the facility	0.185	0.000	1.845
Legal policies	-0.004	0.235	1.228
Customer needs	0.153	0.000	1.400

Based on the regression coefficients, the regression equation for the factor groups affecting the results of DT acceptance at the facilities is as follows:

$$Y = 0.494 + 0.425 * F_{\text{roles}} + 0.185 * F_{\text{facility}} + 0.153 * F_{\text{customer}} + 0.145 * F_{\text{employees}} + 0.116 * F_{\text{managers}} + \varepsilon$$

The results of the regression equation show that: Regarding the results of DT acceptance, among the six factor groups in the research model, one factor group, namely 'Legal policies,' does not affect the outcome. The positive constant indicates that the impact of the factor groups on DT acceptance results is in a direct direction. The result of the Variance inflation factor (VIF) value being less than 2.5 indicates that multicollinearity is not an issue.

4. DISCUSSION

With a total of nearly 1,200 private drug retail establishments in Bien Hoa city, Dong Nai province, the data collection using the online sampling method yielded only 290 participants; the author must interview 85 more establishments to meet the calculated sample size. This result shows the limited participation of retailers in public health activities. Furthermore, while the GPP (Good Pharmacy Practice) standards in our country do not require retail facilities to perform this task, the global GPP standards do have such a requirement [11]. This is also an issue that needs attention.

4.1. Characteristics of research participants

In addition to the typical characteristics in qualitative research, such as age group, gender,

professional qualifications, Years of experience in Retail, position at the retail facility, and retail format, this study, which relates to technology in retail facilities, incorporated the characteristics of the IT proficiency level of the professional manager or staff into the research during the pilot study. The results regarding the IT proficiency level at private pharmaceutical retail facilities in Bien Hoa city showed a difference compared to the pilot study, where level 3 was higher (53.4% compared to 26.1% in this study).

Regarding the results of DT implementation at the facility, the characteristic of drug management software compliance with regulations was self-assessed by 100% of facilities as appropriate, which is consistent with the general assessment results of the DVA. However, to fully implement DT, other software types are needed, and the achievement rate is not yet high.

4.2. Impact of factor groups on DT implementation results and DT acceptance results at the facility

4.2.1. Relationship between the characteristics of the research participants and the DT implementation results

Since there are no previous studies on DT in retail pharmacies, the results identifying the relationship between the personal characteristics of the research participants and the pilot study results [10] also show some differences. For DT implementation results: In the pilot study, three characteristics were found to be related: Position at the retail facility, IT proficiency level, and retail format. In this study, only two characteristics remain: IT proficiency level and retail format. For DT acceptance results: In the pilot study, three characteristics were also related: Professional qualification, position at the retail facility, and IT proficiency level. In this study, there are also three related characteristics: Professional qualification, IT proficiency level, and retail format. The characteristic of IT proficiency level shows a clear relationship with the DT activities at the facility. This result is consistent with the research by Phuong Van Thinh and Bui Thi Lan Anh when assessing the practical barriers to DT in the pharmaceutical industry, which include insufficient formal training in digital technology [6] and a lack of personnel with both pharmaceutical expertise and IT knowledge [12], and

The characteristic of facility type also indicates that chain pharmacies pay more attention to information technology compared to private pharmacies and other drug facilities, this result is also consistent with the assessment of author Phuong Van Thinh when assessing data connectivity in chain pharmacies compared to other types of drug retail [6].

4.2.2. Determining the correlation between factor groups and DT implementation results at the facility and DT acceptance results

The results of the correlation analysis show that the correlation coefficients between the groups of factors and the DT implementation results are all at a medium to high level. Notably, the factor group concerning the roles of DT has a positive and strong correlation (Spearman coefficient = 0.809) and is statistically significant ($p < 0.01$). Successfully implementing this factor group would enable the organization to enhance its business operations. This result aligns with the findings of Ahmad Almeman [12]. Regarding the correlation results between the groups of factors and the results of DT acceptance, the legal and policy factor group showed a low correlation (Spearman coefficient = 0.320), yet it is statistically significant ($p < 0.01$). This outcome also corresponds with the study by Nguyen Van Dung and Hoang Le Mai [14], when stating the legal framework is not yet synchronous: Small establishments face difficulties in applying regulations related to the digitization of the pharmaceutical industry (e.g., electronic drug records, traceability) due to the complexity and lack of detailed guidance appropriate for their scale.

4.2.3. Determining the regression equation between factor groups and DT acceptance results at the facility

To further clarify the roles of the factors affecting the DT acceptance results, a regression equation was performed. The results indicated that the legal and policy factor group had no statistically significant impact, while the remaining five factor groups were all related to DT acceptance at pharmaceutical retail establishments. This finding aligns with the assessment of several authors who stated that the legal framework for

DT in the Pharmaceutical industry is still incomplete [6, 7, 12]. This result is also consistent with the reality that regulatory agencies have not provided support or training to pharmaceutical retail establishments regarding DT, meaning the establishments are currently self-transforming to adapt to the general changes in society. Among the affecting factor groups, the factor Roles of DT ranked first, demonstrating that the perception of DT's role is highly crucial. This perception gives the organization the resolve to implement DT and deploy future online pharmaceutical business operations. The customer needs factor group also strongly impacts the DT acceptance results of the research participants. This finding is similar to several international studies by Amber Zerafa [15] and a group of authors [16], where the DT activities of facilities were closely linked to customer needs. The limited role of the professional manager suggests a current weakness in the role of professional managers at retail pharmacies in our country. This result differs from the study by Amber Zerafa [15], where the role of the professional manager was decisive for the success of DT at the facility. The remaining two factor groups, competence of the facility and competence of employees, should also be given

attention as they are factor groups that have a strong impact on DT acceptance at the facility.

5. CONCLUSIONS

From the results of 375 survey questionnaires collected from private drug retail establishments in Bien Hoa City, Dong Nai province, in April 2025, the study identified several factor groups that impact DT activities at these private retail pharmacies. Although the degree of impact on DT implementation results and DT acceptance results varies, the findings show that the successful implementation of DT at retail facilities requires: Awareness of the role of DT, all resources at the facility, especially the IT platform, the contribution of management policies, and customers.

Limitations of the study

The study was conducted in April 2025; thus, it could not yet evaluate the results of online pharmaceutical business or the correlation between digital transformation and adherence to professional regulations. Convenience and online sampling methods also have the limitation of increasing the risk of bias and reducing the generalizability of the results. Addressing these limitations will be the focus and methodological direction for future research.

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Trịnh Hồng Minh

TÓM TẮT

Đặt vấn đề: Chuyển đổi số (CĐS) ở nước ta hiện nay đang là yêu cầu cấp thiết đối với tất cả các lĩnh vực trong đó có ngành dược. Đã có các nghiên cứu về vấn đề CĐS trong lĩnh vực sản xuất, phân phối nhưng chưa có nghiên cứu trong lĩnh vực bán lẻ thuốc, vì vậy việc đánh giá thực trạng và xác định các nhân tố tác động đến hoạt động CĐS tại các cơ sở bán lẻ thuốc tư nhân là cần thiết trong giai đoạn hiện nay. **Mục tiêu:** Đánh giá thực trạng và xác định được các nhân tố tác động đến kết quả thực hiện CĐS và sự chấp nhận CĐS tại các cơ sở bán lẻ thuốc tư nhân. **Đối tượng và Phương pháp nghiên cứu:** Sử dụng phương pháp chọn mẫu thuận tiện đối với người quản lý chuyên môn hoặc nhân viên tại các cơ sở bán lẻ thuốc trên địa bàn thành phố Biên Hòa, tỉnh Đồng Nai, thực hiện bằng phương pháp mô tả cắt ngang trong tháng 4/2025. **Kết quả:** Đã đánh giá được kết quả thực hiện CĐS và sự chấp nhận CĐS (nhân tố phụ thuộc) của 375/1200 cơ sở bán lẻ thuốc tư nhân đang hoạt động, 7 nhóm nhân tố độc lập (1. Đặc điểm của người tham gia khảo sát; 2. Vai trò của CĐS; 3. Năng lực của người quản lý chuyên môn; 4. Năng lực của nhân viên; 5. Năng lực của cơ sở; 6. Chính sách pháp lý và 7. Nhu cầu của khách hàng) đã được kiểm định để xác định sự tác động đến biến phụ thuộc. **Kết luận:** Từ kết quả nghiên cứu có những kiến nghị cho

người bán lẻ nâng cao khả năng trong tiến trình thực hiện CDS tại cơ sở và các cơ quan quản lý có những chính sách cho hoạt động CDS tại các cơ sở bán lẻ thuốc.

Từ khóa: chuyển đổi số (CDS), cơ sở bán lẻ thuốc tư nhân, nhân tố tác động

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