Texila International Journal of Management
ISSN: 2520-310X
DOI: 10.21522/TIJMG.2015.09.01.Art002

The Influence of Economic and Technology Factors on Performance Outcomes of Community Pharmacists in Nigeria: A Structural Equation Modeling Study

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Abstract

*Community pharmacists, as healthcare providers, operate within local and global business environments. Therefore, they are not immune from the effects of the business environment on practice performance. However, limited empirical research is available to explore these effects. The study proposes an empirical model to investigate the influence of economic and technological factors on the performance domains of community pharmacists in southwestern Nigeria. A cross-sectional study with self-administered questionnaires to 661 randomly selected community pharmacists. Performance measures were operationalized based on theory into 3 domains: operational, economic, and social performance domains. Study hypotheses were tested by applying factor-based structural equation modeling (SEM) using WarpPLS software. Results showed acceptable internal reliability of constructs and fit of the model to the data. Technology, compared to economic factors, had a significant influence on operational performance (**β**=0.242, p=0.001 vs. **β**=0.067, p=0.055). At the same time, economic factors had a higher influence on economic performance (**β**=0.070, p=0.036 vs. **β**=0.032, p=0.203). Both predictors affected social performance, with economic factors having a relatively stronger impact compared to technological factors. (**β**=0.095, p=0.007 vs. **β**=0.069, p=0.037). Community pharmacists should continue to strengthen economic value for their customers while incorporating relevant technology to improve practice outcomes. Macroeconomic policy by governments to enable community pharmacy practice is also recommended. The study recommends that community pharmacists emphasize the relevance of regular performance assessments to identify areas for improvement. This study adds substantial theoretical and methodological value to the existing literature by using SEM to explore the impact of business environmental factors on disaggregated performance measures of community pharmacists.*

Keywords: *Community pharmacists, Economic, Measures, Nigeria, Performance, Technology, Structural equation modeling.*

Introduction

Management literature shows that the business environment has a significant impact on every business endeavor. They shape the practices, policies, and strategies of entrepreneurs and business owners to secure their adaptability, long-term profitability, and survival as ongoing business concerns or entities [1]. Community pharmacists play a very important strategic, operational role in the management and operations of a community pharmacy [2, 3].

They are critical for delivering pharmaceutical care to patients and society at large. Community pharmacies are business entities providing social and economic value.

Received: 01.12.2022 ***Accepted: 09.12.2022*** ***Published on: 28.02.2023***
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Social value in terms of contribution to medicine access and well-being of the community they serve. Economic value is inherent in the contribution to workforce engagement and the growth of their local economies [4, 5]. However, the community pharmacy as a business entity is influenced by several environmental factors that impact the capacity and survival of the entity. These factors are generic in nature, and they include political, economic, social, technological, and legal or regulatory forces [1]. This invariably suggests that the performance of the community pharmacist who is vested with the responsibility of managing the pharmacy is also affected by these aforementioned factors. Of specific interest are the technological and economic factors; the influence of technological factors is an ever-evolving reality in communication, information sourcing and dissemination, the use of the computer, automated payment and inventory systems as well as e-prescription and telepharmacy [6]. On the other hand, economic factors such as cost of living, disposable income, purchasing power, access to loans and financing, availability of credit, government fiscal policies, bank interest rates, tax rate, and the burden of salaries and wages have a meaningful impact in any business system [7-9]. Performance measurement is essential for estimating the impact, outcome, and value creation for any individual or enterprise [10, 11].

Studies show that three key measurement domains are of relevance in the retail sector where community pharmacists operate. They are financial, economic, and operational performance measures. The estimation of performance measurement is premised on more subjective measures from the perspective of the community pharmacist. Hence, the objective of the study is to empirically investigate the influence of economic and technological indicators on the performance domains of community pharmacists in southwestern Nigeria.

The conceptual model of the study is hinged on the impact of technology and economical business environmental factors on three operationalized domains of performance of community pharmacists in southwestern Nigeria. The three operational performance domains:

1. Economic domain covering profitability, sales revenue, and reduction in overhead and cost of business.
2. Social domain covers collaboration and partnerships, client satisfaction, and customer loyalty.
3. Operations domain covers aspects of operational efficiency, reliable inventory management, and ease of daily work operations.

The hypothetical model follows the basic theory that community pharmacists exert their practice in an environment influenced by external factors, which could be political, economic, social, technological, legal, or regulatory in nature. The study hence tests hypotheses by an empirical investigation of the impact of these factors on the domains of performance, based on the perceptions of community pharmacists. This is depicted diagrammatically in Figure 1.

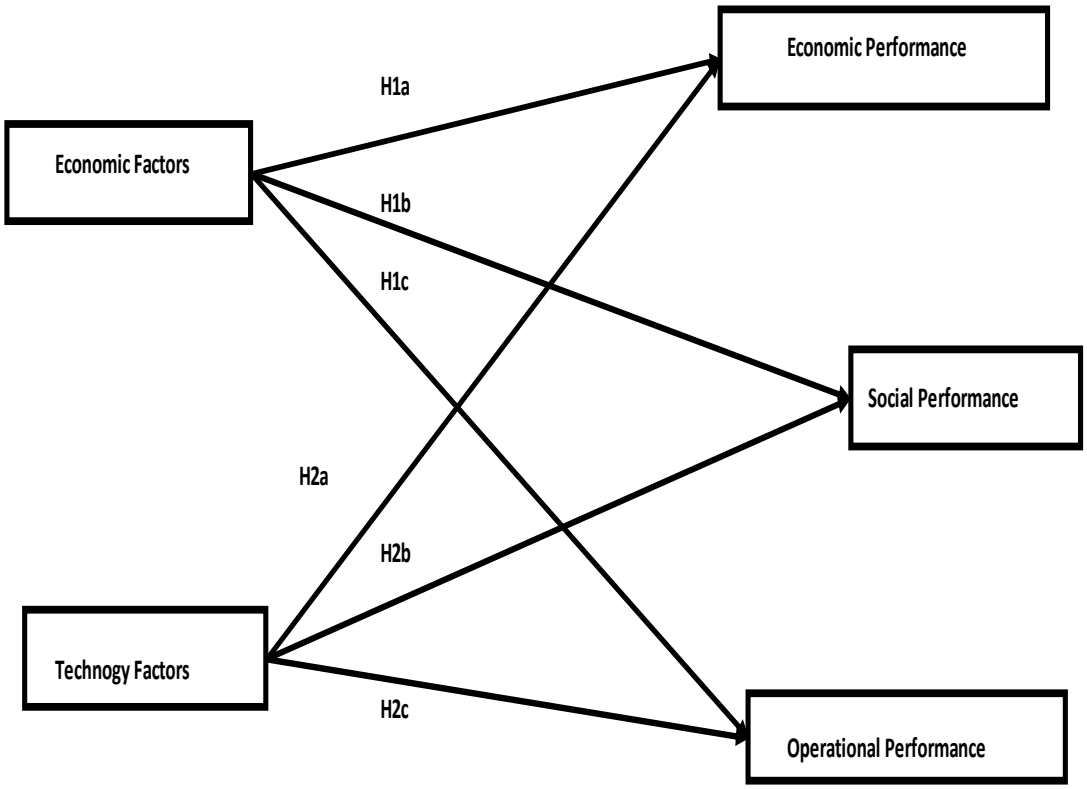

Figure 1. Conceptual Framework Diagram

Literature Review

Theoretical Framework and Hypotheses Development

Performance Measures

In every business enterprise, the attainment of a set performance output is a critical objective to assess the level of success of the management of the business. Due to the multifaceted nature of community pharmacy practice, societal (non-financial) and financial (economic) measures of performance are required [5, 12-14]. Performance measures are broadly composed of three subgroups:

1. Economic performance measures,
2. Societal or social performance measures,
3. Operational performance measures [5].

The economic performance measures evaluate both financial and financial-related indicators such as sales revenue growth, profitability, expense management, and accounting indicators [15]. Social performance refers to the attainment and maintenance of relationships that impact on overall goals of the community pharmacy. They include the impact of collaborative activities, customer satisfaction, loyalty, and supplier and vendor relationships [10-11]. According to [4], community pharmacies are providers of societal value to the local communities they serve. This is evidenced by enhanced customer satisfaction, engagement, and customer loyalty [4]. Operational performance measures relate to how effectively and efficiently the day-to-day pharmacy operations are performed. They include work operations, adoption of technology to enhance operations, as well as accuracy and reliability of inventory and resource management [4, 10-11].

Economic Factors

Micro-, small, and medium-scale businesses are essential components for the growth and productivity of the economy of any country [16]. Therefore, Community pharmacists play a role in the economic growth and value of any economy by way of trade and employment generation. Despite this, the larger economic

climate impacts or affects the operations and productivity of community pharmacies [7-9, 17-19]. Macroeconomic and macroeconomic variables have a key impact on the operational performance of community pharmacists. Macroeconomic factors are relevant at the larger level of the economy as operated by the government. They affect the overall productivity of any given economy, such as the interest rate, monetary policy, price levels, consumer price index, exchange rate, gross domestic savings, foreign direct investment, foreign exchange reserves, employment level, and money supply [20]. Microeconomic factors are the patterns at the individual economic level. Such as purchasing power, consumption, income level, utility, and demand for goods and services [20]. The key economic variables considered in this study include the impact of the local economic situation i.e., exchange rates on procurement prices and costs of medicines and type of medicines to dispense, decreased consumption due to reduced capacity to pay for goods purchased, access to credit finance, incomes levels of consumers and willingness-to-pay or capacity to pay for recommenced medications, the impact of these on consumer behavior and the effectiveness of service provided by the pharmacist [20-22]. In the United Kingdom, a study showed that economic factors such as profit, pressures of excess stock, and product promotion by pharmaceutical marketing companies have a significant influence on the community with actions in particular with pharmacist-owners [23-24].

The relevance of evaluating economic factors is underscored by the scarcity of financial resources for small and medium-scale businesses in resource-constrained developing countries [8, 9]. However, the effect of economic factors on the performance of community pharmacists has not been exhaustively or empirically addressed. Therefore, assessing the impact of economic variables on their operational performance is essential.

H1a: economic factors positively influence the economic performance of community pharmacists.

H1b: economic factors positively influence the social performance of community pharmacists.

H1c: economic factors positively influence the operational performance of community pharmacists.

Technological Factors

The use of technology plays an important role in enhancing the quality, efficiency, effectiveness, and productivity of work operations in practically all professions [6, 25-26]. The use of computerized systems in community practice for inventory management, payment platforms like a point of a sales platform, efficient prescription processing, record keeping, monitoring of daily sales, and business profitability [6, 26-27]. Mobile phones or handheld devices have been used to facilitate communication and disseminate information with their customers [28]. Likewise, findings show that community pharmacists find information technology useful for the efficiency and effectiveness of their operations. These positive effects of technology have been shown to improve the quality of practice [6, 28]. For instance, a community pharmacist who uses the intranet and computer stock tracking software can better monitor expiration and stock levels effectively and efficiently. Hence, this confers a significant competitive advantage compared to non-users [29]. There is an increase in awareness and usage of technology by community pharmacists compared to a study done in Zimbabwe over a decade ago which showed lower awareness and usage rates [30].

A study conducted among managers from several firms in Poland, which assessed the impact of technology use in enhancing cooperation and collaboration, revealed that cooperation among firm owners was low [25]. Furthermore, a literature review study by Dincer & Dincer (2016) showed that the use of

technology in accounting and business transaction management has a significant positive impact on the efficiency and effectiveness of work operations of small and medium-scale enterprises [31]. In this study, the key technological factors were the perceived impact of evolving tele pharmacy and telemedicine, practice on the quality of service of community pharmacists, the effects of payment options via mobile applications on ease of business, electronic prescribing, and the effects on consumers' access to information about medicines via social media platforms [32].

Several studies have assessed the level of adoption and utilization of technology in community pharmacy practice [6, 26, 28]. However, research on the evaluation of the impact or influence of technology on the performance domains of a community pharmacist is scarce.

H2a: Technological factors positively influence the economic performance of community pharmacists.

H2b: Technological factors positively influence the social performance of community pharmacists.

H2c: Technological factors positively influence the operational performance of community pharmacists.

Materials and Methods

Study Population and Design

The sample population consisted of approximately 3000 community pharmacists in the Southwestern part of Nigeria which is made geographically of six states namely: Lagos, Ogun, Oyo, Osun, Ekiti, and Ondo states [33]. Selection criteria were based on potential participants having at least a minimum of 1 year of community pharmacy practice experience. A cross-sectional, self-reported quantitative study that used structured questionnaires administered to 661 community pharmacists in Nigeria using simple random sampling. Data collection took place between July to October 2022

Sample Size Determination and Sampling

To achieve an optimal sample size adequate for a structural equation modeling (SEM) study, the inverse square root method was adopted [34]. It is based on the given probability that the ratio of the path coefficient and standard error is greater than the critical value of a test statistic for a pre-determined significance level [34]. The computation assumed statistical power of 0.8, a p-value of 5%, and a path coefficient threshold of 0.1 which gave an estimated value of 619 required to achieve valid SEM results. However, to achieve the generalizability of the results, a larger sample population of 661 was obtained.

Measurement of Variables

The constructs and their indicator or measurement items were developed from extant literature. The independent variables, Technology, and economic factors, were measured on a 4-point Likert scale of strongly agree (4), agree (3), disagree (2), and strongly disagree (1). The criterion or outcome variables, and performance domains were measured on a 5-point Likert scale of very good (5), above average (4), average (3), below average (2), and very poor (1).

Technology factors (TechF) were measured by 8 items: 1] the use of computers and automated systems improves my work (TF1), 2] communication with people at work is positively influenced by technology use (TF2), 3] technology use enables efficient inventory tracking (TF3), 4] technology use enables me to track sales revenue and profitability (TF4), 5] the adoption of telepharmacy is beneficial to my practice (TF5), 6] most clients access drug information on the internet before consulting me (TF6), 7] I readily adopt new ways of doing things due to technology (TF7), 8] technology use enhances my access to information (TF8). [6, 25-26, 28, 31].

Economic factors (EconF) were measured by 11 items: 1] medicine procurement cost has skyrocketed in the past year (EF1), 2] I feel government policies are favorable to business

growth (EF2), 3] my profit margins have been positively affected by the economy (EF3), 4] tax cut/exemptions for community pharmacist would improve profitability (EF4), 5] I have improved access to bank loans (EF5), 6] I enjoy favorable credit facility from my suppliers (EF6), 7] most clients complain of reduced capacity to pay because of the economy (EF7), 8] I find it inconvenient to pay cash on delivery for products supplied (EF8), 9] the exchange rate in Nigeria has affected drug prices significantly (EF9), 10] Interest rates from bank loans have been considerate (EF10), and 11] I pay wages and salaries conveniently and on time (EF11). [7-9, 15, 17-19].

Performance (PerF) was operationalized into three domains: a] Economic performance (econPerf) measured by 3 items: 1] sales revenue growth in the past 1 year (PM1), 2] improved profitability in the past 1 year (PM2), and 3] reduction in expenses and overhead costs in the last one year (PM3). [4, 15].

b] Social Performance (SocPerf) was measured by 3 items: 1] improved collaboration with professional colleagues (PM4), 2] improved customer satisfaction (PM8), and 3] improvement in customer loyalty in the past 1 year (PM9) [4, 10-11].

c] Operational performance (operPerf0 was measured by 3 items; 1] improved work operations due to technology use (PM5), 2] improvement in inventory management operations (PM6), and 3] enhanced work processes and daily workflow (PM7). [5, 10-11].

Data Analysis

Descriptive statistics were obtained using Statistical Package for Social Sciences version 25 [35]. Factor-based structural equation modeling (SEM) was executed using WarpPLS version 8.0 [36]. The significance level was set at 5%. Dependent and independent variables or constructs were developed from theory as reflective latent variables.

Abbreviations

EconF =economic factors, PerF =Performance, TechF =technology factors, EconPerf =economic performance, SocPerf =social performance, OperPerf =operational performance

Results

Demographic Profile of Participants

A total of 661 completed responses were obtained out of 750 questionnaires administered, constituting a response rate of 88.1%. Respondents were predominantly male, 55.4% (n=366) and 44.5% (n=295) female. Most respondents were aged between 20 to 40 years (66.6%, n=440) and those between 41 to above 50 years (33.4%, n=221). Ownership status showed 49.5% (n=327) sole ownership, 14.2% (n=94) partnership model, and 36.3% (n=240) pharmacists-managers. Also, years of community pharmacy practice were 77.6% (513) had 1 to 20 years of experience, and 14.2% (94) had above 20 years of experience.

Figure 2 depicts the relationship existing between the dependent and independent variables in the study (EconF and TechF hypothetically predicting econPerf, SocPerf, and OperPerf respectively.

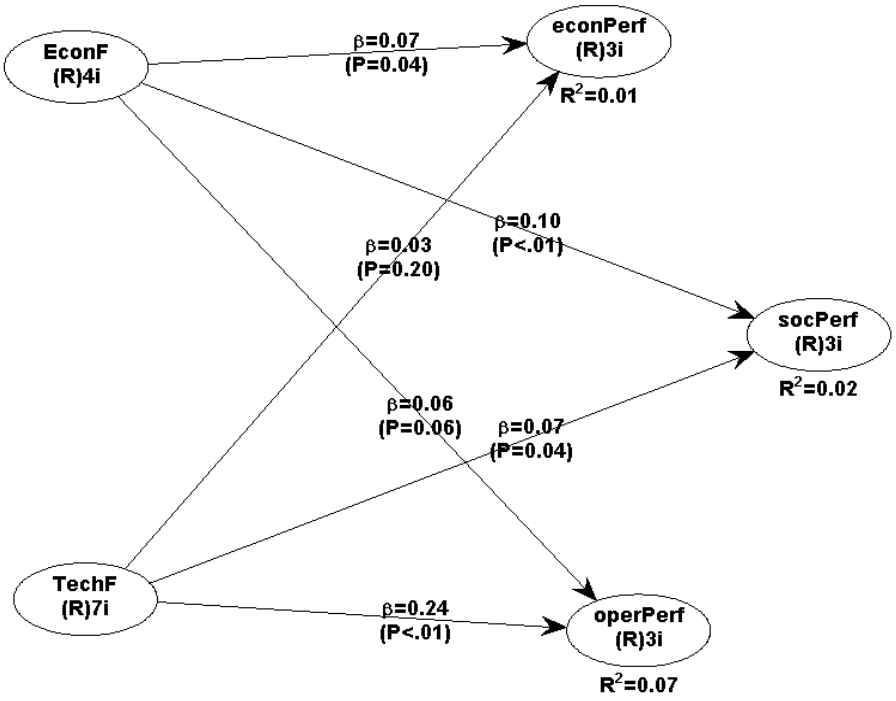

Figure 2. Structural Model Diagram of the Study

Table 1 shows the factor loadings of the indicator or measurement items for the constructs ranging from 0.448 to 0.836. However, EF1, EF3, EF4, EF7, EF8, EF9, and EF11 were excluded from EconF because they had loadings lower than 0.4. The measures of construct reliability (CR, True composite, and Cronbach) lie in an acceptable range of 0.6 to 0.7 [37]. The AVE values ranged between 0.333 and 0.692. Although the acceptable range is 0.5, the presence of acceptable CR values of constructs is considered a robust measure of internal reliability when AVE measures are violated [38]. The multicollinearity concern between constructs was eliminated with VIF values between 1.032 and 3.233, which is below the baseline of ±5 [39].

Table 1. Factor Loadings, Reliability, Collinearity Measures of Constructs

Constructs	Factor loading	VIF	CR	Cronbach	TCR	AVE
Technology Factors (TechF)						
TF1	0.673	1.14	0.811	0.788	0.847	0.383
TF2	0.536					
TF3	0.721					
TF4	0.707					
TF5	0.555					
TF7	0.535					
TF8	0.573					
Economic Factors (EconF)						
EF2	0.621	1.032	0.662	0.649	0.792	0.333
EF5	0.551					
EF6	0.448					
EF10	0.655					
Performance Measures						

Economic Performance (econPerf)						
PM1	0.806	1.658	0.806	0.777	0.873	0.585
PM2	0.847					
PM3	0.622					
Social Performance (SocPerf)						
PM4	0.531	3.784	0.738	0.724	0.848	0.492
PM8	0.793					
PM9	0.75					
Operational Performance (OperPerf)						
PM5	0.823	3.233	0.871	0.833	0.900	0.692
PM6	0.836					
PM7	0.836					

*VIF=variance inflation factor, CR=composite reliability, TCR=true composite reliability, AVE=average variance extracted, Cronbach alpha=α

The Heterotrait Monotrait (HTMT) criterion, as shown in Table 2, reveals values of constructs lying between the best value of <0.85 and the acceptable limit of <0.90. This shows that all constructs are indeed measuring different concepts or things [40].

Table 2. Discriminant Validity of Model (Heterotrait Monotrait Criterion)

Construct	EconF	TechF	EconPerf	SocPerf	OperPerf
EconF					
TechF	0.192	-	-	-	-
EconPerf	0.099	0.09	-	-	-
SocPerf	0.131	0.123	0.664	-	-
OperPerf	0.061	0.271	0.535	0.117	-

Assessment of Fit of Model

The quality of the model was evaluated using several model fit parameters: a) standardized squared root mean residual (SRMR) value of 0.072 which is within the cutoff value of 0.08. Also, b) a square mean average residual (SMAR) value of 0.061 which lies within the limit of 0.1. Finally, c) average full collinearity variance inflation factor (FCVIF) was 2.169, which is acceptable as it lies within the range of =<3.3 and 5 [41, 42].

Table 3. Path Analysis of the Structural Model (Hypotheses Testing)

Path	coefficient (β)	p-value	Hypothesis	Inference
EconF ----> EconPerf	0.070	0.036	H1a: supported	direct effect
EconF ----> SocPerf	0.095	0.007	H1b: supported	direct effect
EconF ----> OperPerf	0.062	0.055	H1c: not supported	no effect
TechF----> EconPerf	0.032	0.203	H2a: not supported	no effect
TechF ----> SocPerf	0.069	0.037	H2b: supported	direct effect
TechF ----> OperPerf	0.242	0.001	H2c: supported	direct effect

Table 3 shows the path coefficients and significance levels of the hypothesized direct relationships. Direct effects were obtained for EconF on EconPerf and SocPerf (p<0.05 and 0.01, respectively. At the same time, direct effects were obtained for TechF on SocPerf and

OperPerf ($p<0.05$ and 0.01, respectively). No significant direct effect was achieved from EconF and TechF on OperPerf and EconPerf, respectively.

Discussion

The study using structural equation modeling explored the perception of community pharmacists on the influence of TechF and EconF on the performance domains of community pharmacists. The study attempts to assess the effects of environmental factors on the performance of community pharmacists using a structural model (depicted in Figure 1).

From the study, the perceived impact of EconF on SocPerf is stronger than that of TechF. This implies that customer satisfaction and loyalty are strengthened when community pharmacists dispense products at affordable and customer-friendly purchase rates. Invariably, when products procured by the retailer are not adversely affected by high-interest rates and poor credit conditions, the pricing of the products would not be weighty or prohibitive to the final buyer. Hence, this scenario means that community pharmacists are obligated to mitigate the negative effects of economic factors for the benefit of the consumer. Hence, governments and regulatory bodies should provide support for the drug distribution network by providing tax cuts, supportive policy frameworks, improving access to foreign exchange, encouraging local manufacturing, and price monitoring [8-9, 20].

Furthermore, TechF had a positive direct effect on SocPerf, which suggests that the adoption of information technology and devices in community practice improves customer engagement, ease of communication, and speed of transactions. This invariably strengthens customer satisfaction and loyalty [4-6]. The positive impact of TechF on OperPerf is expected because technology use improves inventory management systems, speed of daily work operations, and overall efficiency. This finding aligns with [2], who affirmed the positive benefits of community pharmacists' appreciation of the impact of technology on work operations [2]. Hence, hypothesis H2c is supported. Comparatively, the study revealed that EconF had a stronger impact on SocPerf ($\beta=0.095$, $p=0.007$) compared to TechF ($\beta=0.069$, $p=0.037$). This is because when cost factors are properly managed, it improves affordability to the final consumer as well as procurement of technology-based factors to enhance operations. Thus, affirms the relative importance of the right economic environment for enhanced performance of community pharmacists. The non-significant path showing the hypothesized influence of technology factors on economic performance domains presents some practice implications. Firstly, it suggests that community pharmacists do not have the appropriate technology use attitude to improve the profitability of their practice. Secondly, the finding suggests that technology does not play a direct role in financial performance. This is because technology use plays a very significant role in improving work operations and communication with clients. Hence, it indirectly adds value to the performance of community pharmacists.

Practical Implications of the study

The study outcomes present a couple of implications: 1] there is a need for regulatory bodies to develop a framework for self-assessments of the performance of community pharmacists. This has the potential to create more awareness about the need to evaluate success on a holistic basis. 2] governments should ensure optimal economic conditions for the retail sector, especially community pharmacies. Thereby supporting cost reduction for the final consumer or customer accessing medicines. Macroeconomic policies such as improved foreign exchange, tax support, and fiscal policies support access to loans at attractive rates. 3] Public perception by the customer is improved when they access medicines at favorable purchase prices from retail outlets. Therefore, community pharmacists

must work on obtaining products at the best access or cost prices to ensure the availability of medicines at affordable prices. Finally, minimizing overall operational costs through the optimization of technology is needed. For instance, proper use of technology to update and monitor inventory minimizes business loss due to stock out and the expiration of products. Proper updation of customer lists and communication also helps minimize dispensing errors, increase patronage, and enhance value creation.

Limitations of the Study

The study was limited to southwestern Nigeria; hence generalizability should be done with caution. The results of the study might be different if the study is extended beyond the South-west of Nigeria. Also, the study was limited to only two independent variables, which are technological and economic factors. These variables might not be enough to fully explain the variation in the performance of pharmacists. Not minding these limitations, the outcomes and conclusions of the study remain valid. This means that the limitations do not in any way affect the dependability and generalizability of the conclusions of the study.

Conclusion

The study empirically tested the effects of technology and economic factors on performance using structural equation modeling. Compared to the existing literature on the subject, this is arguably the first pharmacy practice paper to empirically explore the direct causal effects of technology and economic factors on the performance of community pharmacists. Study outcomes suggest that community pharmacists continue to improve technology input and improved economic value for customers who would positively impact performance. Macroeconomic policy by governments to enable community pharmacy practice is also recommended. The study recommends that community pharmacists emphasize the relevance of regular performance assessments to identify areas for improvement. This study adds substantial theoretical and methodological value to the existing literature by using SEM to explore the impact of business environmental factors on disaggregated performance measures of community pharmacists.

Conflict of Interest

The Authors have none to declare.

Acknowledgements

The Authors wish to appreciate the support of the Chairpersons of the State Associations of Community Pharmacists in southwestern Nigeria with regard to access to their members for data collection. The assistance of data assistants is deeply appreciated.

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