

Unveiling the Pathways to Sustainable Performance: The Mediating Role of Sustainable Commitment Between Market Competition and Sustainable Knowledge

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ABSTRACT

This study aims to analyze the role of sustainable commitment in mediating the influence of competitive market and sustainable knowledge on sustainable performance among pharmacists in the implementation of sustainable pharmacy. The research employed a quantitative approach with a survey design. The population consisted of pharmacists serving as Heads or Managers of community pharmacies and hospital pharmacies in Bogor City and Bogor Regency. A purposive sampling technique was applied, yielding 124 respondents. Data were collected using a Likert-scale questionnaire and analyzed with Structural Equation Modeling–Partial Least Squares (SEM-PLS) using SmartPLS 4.0. The results reveal that the competitive market has no significant effect on either sustainable commitment or sustainable performance. In contrast, sustainable knowledge positively and significantly affects both sustainable commitment and sustainable performance. Furthermore, sustainable commitment exerts a significant positive influence on sustainable performance. Mediation testing indicates that sustainable commitment does not mediate the relationship between competitive market and sustainable performance. However, it significantly and positively mediates the link between sustainable knowledge and sustainable performance.

INTRODUCTION

The modern pharmaceutical industry has evolved into the backbone of global healthcare, contributing to increased life expectancy and the control of various chronic and acute diseases. The global pharmaceutical industry has experienced rapid growth in the past two decades, with a market value reaching over USD 1.7 trillion in 2024 and projected to exceed USD 2.8 trillion by 2033 (Biospace.com 2025). This growth is driven by technological advances, the increasing need for chronic disease treatments, and innovations in the development of new drugs, including biologics, biosimilars, and artificial intelligence (AI)-based precision therapies (World Economic Forum 2025). In 2020, more than 53 new drugs were launched globally, while more than 9,000 compounds are in clinical development (IFPMA 2022). North America leads the market with a 53.3% share of total global pharmaceutical sales, followed by Europe with 22.7% (European Federation of Pharmaceutical Industry and Associations 2024).

In Indonesia, the pharmaceutical industry shows a positive MAT growth trend of 13.1% driven by ethical drugs, in line with the projected national economic growth of around 5% by 2025, according to the Indonesia Pharmaceuticals Market Report (IQVIA, 2024). Increasing demand for healthcare services, government policies encouraging local production, and strategic international partnerships are the main drivers of this sector's expansion. The Indonesian government is actively reducing dependence on imported raw materials through incentives for local producers and encouraging the development of generic drugs as a key pillar of affordable healthcare access. Companies such as Kalbe Farma and Kimia Farma are expanding production capacity, adopting modern manufacturing technologies, and strengthening supply chains to ensure drug availability amidst global challenges such as exchange rate fluctuations and healthcare cost inflation, according to the Indonesia Pharmaceuticals Market Report (IQVIA 2024). Beyond economic aspects, awareness of sustainability is also increasing in the Indonesian pharmaceutical industry (sustainable performance). Several major companies have aligned their sustainability reports with SDG targets, implemented liquid waste treatment systems, and participated in community-based pharmaceutical waste management programs. However, challenges remain, particularly for medium- and small-scale companies facing limited resources to meet environmental standards and ISO 140014 certification. Collaboration between governments, industry associations, and international organizations is intensifying, including the launch of a digital hazardous waste tracking system and the development of national guidelines for household pharmaceutical waste management (Modern Diplomacy, 2025).

The results of research conducted by the National Research and Innovation Agency (BRIN) and the University of Brighton UK found that Paracetamol was detected at 2 (two) sites, namely at the Angke River estuary (610 ng/L) and the Ciliwung River estuary in Ancol (420 ng/L), both in Jakarta Bay. The high concentration of Paracetamol raises concerns about environmental risks associated with long-term exposure to marine organisms in Jakarta Bay, (BRIN -

Pharmaceutical Waste in Jakarta Bay, nd) From the results of research conducted by the National Research and Innovation Agency (BRIN) and the University of Brighton UK, it is important to conduct an in-depth scientific study to investigate the sources of pollution in 2 sites, namely the Angke River estuary and the Ciliwung River estuary in Ancol, are there any similarities with the findings of research in East Bandung, namely the use of antibiotics in the Upper Citarum Watershed? Therefore, in this study, 15 researchers wanted to know the behavior of retail pharmacy facilities in the Upper Ciliwung River Watershed, namely in the City and Regency of Bogor. How can the role of pharmacists in the implementation of sustainable pharmacy be maximized to improve sustainability, especially in the aspects of distribution, drug consumption and disposal of pharmaceutical waste in retail pharmacy facilities. This research not only fills the literature gap related to sustainable pharmacy in Indonesia, but also provides a real contribution to the development of public policy, the formulation of pharmaceutical profession strategies, and advocacy for changes in community behavior that are more pro-environment.

LITERATURE REVIEW

Triple Bottom Line (TBL) Concept

The Triple Bottom Line (TBL) concept is a sustainability framework that emphasizes the importance of companies pursuing not only financial gain (profit), but also a balanced social (people) and environmental (planet) responsibility. TBL was developed by John Elkington and has become a primary reference for measuring sustainable business performance across various sectors. Through this approach, organizations are expected to create broad value, not only for shareholders but also for all stakeholders and the surrounding ecosystem (Pereira & Martins, 2021). (John Elkington, *Cannibals With Forks: The Triple Bottom Line of 21st Century Business* | Journal of Business Ethics, n.d.) introduced the TBL model, which consists of three main pillars: profit, people, and planet, which represent a company's responsibility to the economy, society, and the environment, respectively. From this perspective, Elkington argues that a successful company must be able to generate benefits across all three aspects in a balanced manner to achieve long-term sustainability.

Stakeholder Theory

Stakeholder theory was first introduced by R. Edward Freeman in 1984. Stakeholder theory is one of the main foundations of modern strategic management, emphasizing the importance of organizations not only focusing on the interests of shareholders, but also paying attention to and managing relationships with all parties affected by the company's activities, or so-called stakeholders. This theory developed in response to the shareholder primacy paradigm that places financial profit as the company's primary goal (Bridoux & Stoelhorst, 2022). In stakeholder theory, organizations are viewed as networks of relationships between interdependent individuals and groups, where value creation is not only one-way, but multi-directional through collaboration and value exchange between stakeholders (Mahajan et al., 2023).

Theory Resource Based View (RBV)

The Resource-Based View (RBV) theory is one of the most influential approaches in strategic management that emphasizes the importance of a company's internal resources as the main determinant of sustainable competitive advantage. RBV argues that competitive advantage is determined not only by a company's position in the market, but also by the company's ability to optimally manage, develop, and utilize its resources. The resources in question include tangible and intangible assets, such as capital, technology, knowledge, reputation, and organizational capabilities. To be a source of sustainable competitive advantage, these resources must meet the VRIN criteria: Valuable, Rare, Inimitable, and Non-substitutable (Komakech et al., 2025).

Sustainable Development Goal's

Sustainability issues in the pharmaceutical sector are becoming increasingly crucial as global awareness of the importance of responsible production and consumption practices grows. One of the pillars of the United Nations Sustainable Development Agenda, Sustainable Development Goal (SDG) 12: Responsible Consumption and Production, encourages all industrial sectors, including healthcare and pharmaceuticals, to optimize resource efficiency, minimize waste, and adopt more environmentally friendly production and distribution systems. (Goal 12 | Department of Economic and Social Affairs, n.d., 2023)

Sustainable Performance

Sustainable Performance is an organization's ability to achieve economic, social, and environmental goals in a balanced manner, ensuring that business activities do not compromise the needs of future generations. This concept is rooted in the Triple Bottom Line (TBL), which encompasses three pillars: Economic: Profitability, operational efficiency, and long-term growth. Social: Employee well-being, community engagement, and compliance with human rights. Environmental: Carbon emission reduction, waste management, and natural resource conservation. According to the 2021 GRI Standards, sustainable performance is also measured through reporting transparency and organizational accountability to stakeholders (investors, communities, regulators).

Sustainable Commitment

A Sustainable Commitment is a formal promise by an organization or individual to integrate sustainability principles (environmental, social, and economic) into its strategy, operations, and culture, to ensure a long-term positive impact for current and future generations. This commitment goes beyond simply complying with regulations, but is a proactive initiative to create sustainable value through transparency, accountability, and collaboration with stakeholders (Sustainability Commitment - H&M Group, 2022).

Competitive Market

A competitive market is a market structure in which there are many buyers and sellers, so that no single entity has the power to control prices or market conditions. In this market, traded products are homogeneous, market information is perfectly disseminated, and there are no barriers to entry or exit for businesses. An ideal competitive market is often referred to as perfect competition, where prices are determined by the interaction of supply and demand (Zhang et al., 2023).

Sustainable Knowledge

Sustainable knowledge refers to knowledge integrated with sustainability principles (environmental, social, and economic) to drive innovation, decision-making, and responsible business practices. This knowledge encompasses not only a technical understanding of sustainability but also the ability to apply it holistically in local and global contexts. According to Sudhakar (2020), sustainable knowledge is "knowledge developed, organized, and shared to ensure the sustainability of current and future generations through multisector collaboration."

METHODOLOGY

This study used a quantitative approach with a survey design to examine the relationships between variables within the framework of sustainable pharmacy. The study population consisted of pharmacists serving as Heads of Pharmacies or Pharmacy Managers in community pharmacies and hospitals located in Bogor City and Bogor Regency. The sampling technique used was purposive sampling, which selects respondents based on specific criteria. This resulted in a total of 124 respondents deemed relevant to the study's objectives.

Data collection was conducted using a Likert-type questionnaire designed to measure respondents' perceptions of four key variables: competitive market, sustainable knowledge, sustainable commitment, and sustainable performance. The research instrument was developed based on indicators adapted from the literature and previous research, providing a strong theoretical foundation. This process aimed to ensure that the instrument accurately captured the conceptual dimensions.

The data analysis method used is Structural Equation Modeling-Partial Least Squares (SEM-PLS) with SmartPLS 4.0 software. This analysis includes testing the validity and reliability of the research instrument (through outer loading, AVE, and composite reliability), evaluating the structural model (R^2 , f^2 , Q^2 , and model fit test), and testing the hypothesis that includes direct tests and mediation tests. Thus, this methodology allows researchers to obtain a comprehensive picture of the influence of competitive markets and sustainable knowledge on sustainable performance by considering the mediating role of sustainable commitment.

RESEARCH RESULT

PLS Data Analysis Results

Evaluation of Measurement Model or Outer Model

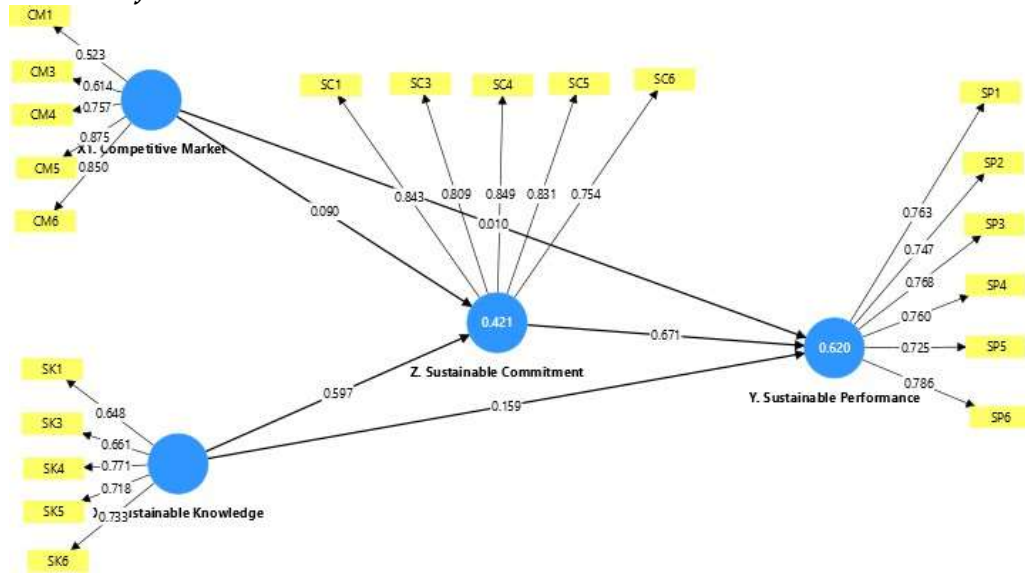


Figure 1. Outer Model

Source: Questionnaire testing results with SmartPLS 4

Table 1. Outer Loading Measurement Results.

Variable	Indicator Code	Outer Loading	Information
Competitive Market (CM)	CM1	0.523	Valid
	CM3	0.614	Valid
	CM4	0.757	Valid
	CM5	0.875	Valid
	CM6	0.850	Valid
Sustainable Commitment (SC)	SC1	0.843	Valid
	SC3	0.809	Valid
	SC4	0.849	Valid
	SC5	0.831	Valid
	SC6	0.754	Valid
Sustainable Knowledge (SK)	SK1	0.648	Valid
	SK3	0.661	Valid
	SK4	0.771	Valid
	SK5	0.718	Valid
	SK6	0.733	Valid
Sustainable Performance (SP)	SP1	0.764	Valid
	SP2	0.747	Valid
	SP3	0.768	Valid
	SP4	0.760	Valid
	SP5	0.725	Valid
	SP6	0.789	Valid

Source: Questionnaire testing results with SmartPLS 4

Based on the results of the outer loadings above, all constructs or indicators produce values > 0.4 so it can be concluded that all indicators pass the

test and can be continued for further testing, namely Average Variance Extracted (AVE).

Validity Test

(a) Convergent Validity Test - Average Variance Extracted (AVE)

Table 2. AVE Measurement Results

Variable	AVE	Information
Competitive Market (CM)	0.542	Valid
Sustainable Knowledge (SK)	0.501	Valid
Sustainable Performance (SP)	0.575	Valid
Sustainable Commitment (SC)	0.669	Valid

Source: Questionnaire testing results with SmartPLS 4

Based on table 2, above, the AVE value for Competitive Market > 0.5, Sustainable Knowledge > 0.5, Sustainable Performance > 0.5, and Sustainable Commitment > 0.5, so it can be concluded that all variable results are valid.

b. Discriminant Validity Test

Table 3. Cross Loading Measurement Results

	Competitive Market	Sustainable Knowledge	Sustainable Commitment	Sustainable Performance
CM1	0.523	0.167	0.160	0.183
CM3	0.614	0.398	0.302	0.234
CM4	0.757	0.414	0.261	0.294
CM5	0.875	0.418	0.331	0.298
CM6	0.850	0.455	0.375	0.303
SK1	0.307	0.648	0.426	0.383
SK3	0.327	0.661	0.441	0.400
SK4	0.325	0.771	0.490	0.407
SK5	0.480	0.718	0.423	0.420
SK6	0.403	0.733	0.491	0.490
SC1	0.310	0.549	0.843	0.651
SC3	0.291	0.519	0.809	0.610
SC4	0.310	0.510	0.849	0.647
SC5	0.282	0.527	0.831	0.703
SC6	0.456	0.529	0.754	0.560
SP1	0.169	0.566	0.645	0.763
SP2	0.192	0.445	0.586	0.747
SP3	0.291	0.385	0.528	0.768
SP4	0.320	0.412	0.552	0.760
SP5	0.390	0.419	0.601	0.725
SP6	0.300	0.461	0.606	0.786

Source: Questionnaire testing results with SmartPLS 4

Based on table 3, the cross-loading values for the external loads of the indicators on the related constructs are greater than their cross-loads (i.e., their correlations) on other constructs, so it is concluded that there is no problem with its discriminant validity. The second discriminant validity test is by using the Fornell-Larcker Criterion measurement, which was introduced by Fornell and Larcker in 1981. The AVE of each construct is compared with the squared inter-

construct correlation (as a measure of shared variance) of the same construct and all constructs measured reflectively in the structural model. It is said to have no discriminant validity problem if the shared variance for all model constructs cannot be greater than its AVE (Hair et al., 2019). The results of the Fornell-Larcker Criterion measurement are as follows:

Table 4. Fornell-Larcker Criterion Measurement Results

	Competitive Market	Sustainable Knowledge	Sustainable Performance	Sustainable Commitment
Competitive Market	0.737			
Sustainable Knowledge	0.522	0.708		
Sustainable Performance	0.362	0.596	0.758	
Sustainable Commitment	0.401	0.644	0.777	0.818

Source: Questionnaire testing results with SmartPLS 4

Based on the results of the Fornell-Larcker Criterion measurements, in table 4, it was found that the shared variance for all models was not greater than the AVE, so it can be concluded that there is no problem in the validity of the discrimination.

Reliability Test

Table 5. Composite Reliability Measurement Results

Variable	Composite Reliability	Information
Sustainable Knowledge	0.833	Reliable
Competitive Market	0.851	Reliable
Sustainable Performance	0.890	Reliable
Sustainable Commitment	0.910	Reliable

Source: Questionnaire testing results with SmartPLS 4

Based on the reliability test data in table 5, the results for all variables have values above 0.7 and below 0.95, so it can be concluded that all variables in this study are reliable with a reliability level between satisfactory and good (0.7 – 0.9).

Variance Inflation Factor (VIF)

Table 6. Results of Variance Inflation Factor (VIF) Measurement

Connection	VIF value
CM -> SP	1,387
CM -> SC	1,374
SK -> SP	1,990
SK -> SC	1,374
SC -> SP	1,726

Source: Questionnaire testing results with SmartPLS 4

Based on the results of the VIF measurements in table 6, all construct relationships have a value <3, it can be concluded that there is no multicollinearity in the construct relationships.

Path Coefficients (β)

Table 7. Results of Path Coefficient Measurements (β)

Variable	Path Coefficients Values
CM -> SP	0.010
CM -> SC	0.090
SK -> SP	0.159
SK -> SC	0.597
SC -> SP	0.671

Source: Questionnaire testing results with SmartPLS 4

From Table 7 the following conclusions are obtained:

- The direct influence between Competitive Market and Sustainable Performance is positive and is 0.010, which means that if there is a one unit increase in Competitive Market, Sustainable Performance will increase by 1%.
- The direct influence between Competitive Market and Sustainable Commitment is positive and is 0.090, which means that if there is a one unit increase in Competitive Market, Sustainable Commitment will increase by 9%.
- The direct influence between Sustainable Knowledge and Sustainable Performance is positive and is 0.159, which means that if there is an increase of one unit of Sustainable Knowledge, Sustainable Performance will increase by 16%.
- The direct influence between Sustainable Knowledge and Sustainable Commitment is positive and is 0.597, which means that if there is an increase of one unit of Sustainable Knowledge, Sustainable Commitment will increase by 60%.
- The direct influence between Sustainable Commitment and Sustainable Performance is positive and is 0.671, which means that if there is a one unit increase in Sustainable Commitment, Sustainable Performance will increase by 67%.

Coefficient of Determination/R-squared (R²) Test

Table 8 Measurement Results of the Coefficient of Determination/R-squared (R²)

Variable	R Square
Sustainable Performance	0.620

Source: Questionnaire testing results with SmartPLS 4

The results of the Coefficient of Determination/R-squared (R²) measurement in Table 8 conclude that the independent variables in this study influence Sustainable Performance by 62% and are categorized as having moderate predictive power. Sustainable Performance is still influenced by 38% of the other independent variables.

Effect Size Test (f^2)Table 9. Effect Size Measurement Results (f^2)

Variable	Effect Size Value	Effect Size Category
CM -> SP	0.000	-
CM -> SC	0.010	-
SK -> SP	0.033	Currently
SK -> SC	0.449	Big
SC -> SP	0.685	Big

Source: Questionnaire testing results with SmartPLS 4

The results of the effect size (f^2) measurement in Table 9 illustrate that Competitive Market has a predictive ability that does not affect Sustainable Performance or Sustainable Commitment. Sustainable knowledge has moderate predictive power on Sustainable Performance and has strong predictive power on Sustainable Commitment. Sustainable Commitment has a large predictive power on Sustainable Performance.

Predictive Relevance Test (Q^2)Table 10. Predictive Relevance Measurement Results (Q^2)

Variable	Q^2	Criteria
Sustainable Performance (Y)	0.276	Has predictive value good relevance
Sustainable Commitment (Z)	0.324	

Source: Questionnaire testing results with SmartPLS 4

Q square (Q^2) is one of the important indicators in evaluating research models based on Partial Least Squares Structural Equation Modeling (PLS-SEM), especially to measure the model's predictive ability towards the tested dependent variable. In this study, the Q square value for Sustainable Performance (Y) was recorded at 0.276, while for Sustainable Commitment (Z) it was 0.324. Both values exceed the minimum threshold of 0.02, as recommended in contemporary PLS-SEM analysis method literature, indicating that the constructed model has good predictive relevance to the analyzed research data.

A Q-square value in the range of 0.15 to 0.35 is typically interpreted as a medium to high prediction category. Thus, the Q-square values of 0.276 for the Sustainable Performance variable and 0.324 for Sustainable Commitment confirm that this research model is capable of explaining and predicting the dynamics of the relationship between the main variables quite reliably in the real world. These results demonstrate that the model you built is not only statistically fit but also provides a realistic picture of sustainability behavior, commitment, and performance in the pharmacy/pharmacist environment – a reflection that is highly relevant amidst today's challenges of sustainable pharmacy.

Model Fit Test

Table 11. Fit Model Measurement Results

Parameter	Measurement
SRMR	0.089

Source: Questionnaire testing results with SmartPLS 4

Measurements are based on Table 11. In assessing the feasibility of the structural model in this study, the SRMR (Standardized Root Mean Squared Residual) indicator was used, where the measurement results showed a value of 0.089. This value is slightly above the conservative threshold commonly used internationally (<0.08), but based on recent studies in the SEM-PLS literature, especially by Hair and Cho et al. (2020), it can still be considered a suitable model in a social context and multidimensional variables such as the pharmaceutical sector in Indonesia. I consider tolerance for SRMR values close to 0.08 is considered reasonable, especially when research data is faced with complex and heterogeneous realities. Furthermore, SmartPLS documentation (2024) recommends that researchers do not dogmatically fixate on a single absolute number, but rather prioritize the appropriateness of the overall model, including composite validity and construct reliability. Therefore, I consider the model I tested to be methodologically acceptable and to provide an adequate analytical basis for further interpretation of the relationships between variables in the study, while still considering limitations and caution in scientific decision-making (Cho, 2024).

Hypothesis Testing

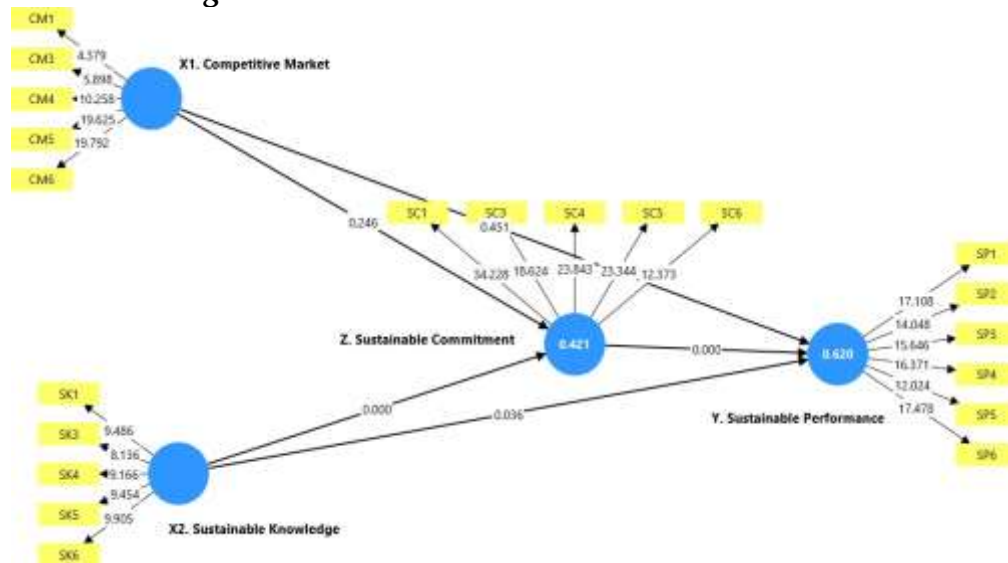


Figure 2. Bootstrapping model of hypothesis testing

Table 12. Hypothesis Test Results and Mediation

Variables	Original sample (O)	T statistics (O/STDEV)	P values	Results
Direct Influence				
X1. Competitive Market -> Z. Sustainable Commitment	0.090	0.686	0.246	Not significant Reject H1
X2. Sustainable Knowledge -> Z. Sustainable Commitment	0.597	6,421	0.000	Significant Receive H2
Z. Sustainable Commitment -> Y. Sustainable Performance	0.671	7,847	0.000	Significant Receive H3

X1. Competitive Market -> Y. Sustainable Performance	0.010	0.124	0.451	Not significant Reject H4
X2. Sustainable Knowledge -> Y. Sustainable Performance	0.159	1,801	0.036	Significant Reject H5
Indirect Influence				
X1. Competitive Market -> Y. Sustainable Performance	0.060	0.727	0.234	Not significant Reject H6
X2. Sustainable Knowledge -> Y. Sustainable Performance	0.401	4,058	0.000	Significant Receive H7

Source: Questionnaire testing results with SmartPLS 4

In testing H1, the relationship between competitive market and sustainable commitment was not significant (t statistic 0.686; p 0.246). This implies that the intensity of market competition, in the context of the study respondents, is not yet strong enough to drive sustainability commitment. Perhaps, competition in the pharmaceutical industry is still focused on commercial aspects, so behavioral change towards sustainability commitment has not yet become a strategic priority. Conversely, H2 found a positive and significant effect of sustainable knowledge on sustainable commitment (t statistic 6.421; p 0.000). This finding confirms the power of knowledge as a primary driver of commitment – the greater the understanding and insight of sustainability that pharmacists possess, the greater the institution's dedication to implementing sustainability principles.

The sustainability of institutional performance is also inseparable from the role of sustainable commitment. In H3, sustainable commitment was proven to have a significant effect on sustainable performance (t statistic 7.847; p 0.000). This clearly reflects that concrete actions and collective commitment have a positive impact on long-term outcomes, both socially, environmentally, and economically. However, in H4, competitive markets were not proven to have a direct effect on sustainable performance (t statistic 0.124; p 0.451). This means that market competition alone cannot guarantee sustainable performance improvements without knowledge capital or strong commitment.

DISCUSSION

The Influence of Competitive Market on Sustainable Commitment

Based on the results of my statistical tests, the relationship between competitive market and sustainable commitment was insignificant. This suggests that the intensity of market competition in the pharmacy environment, as well as the pressure to outperform competitors, has not automatically driven a commitment to sustainability among pharmacists, particularly those in managerial positions and those responsible for pharmacies. The demographic data of the respondents, the majority of whom had more than five years of experience and worked in urban areas with diverse market characteristics, reinforces the suspicion that competitive practices in the pharmaceutical sector are still more oriented toward commercial aspects than toward sustainable innovation. This phenomenon aligns with research findings over the past five years in various business sectors, including a study by Ahsan & Khawaja (2024),

which showed that competitive pressure alone is insufficient to drive commitment transformation. sustainability If No accompanied by with strengthening internal, education, or consistent organizational support. Other studies have found that organizational culture and leadership play a far more significant role in building organizational commitment than simply perceptions of competition. In the pharmaceutical context, adoption of sustainable commitment is driven by other factors, such as social awareness, internal training programs, and strengthening company values, rather than solely external pressure from the market or competitors. From an indicator perspective, market competitiveness is measured based on perceptions of the level of competition, demands for innovation, and the dynamics of external change. On the other hand, sustainable commitment is not simply about being ready to follow trends, but rather stems from beliefs and concrete practices – from waste management and energy efficiency to involvement in green pharmacy programs.

The Influence of Sustainable Knowledge on Sustainable Commitment

The second hypothesis in this study, namely the influence of sustainable knowledge on sustainable commitment, was proven to show a positive and significant relationship based on the test results. This finding consistently strengthens the idea that in-depth knowledge of sustainability principles and practices is the main capital for the emergence of institutional commitment towards a more environmentally friendly and responsible pharmacy. The demographic data in this study, where the majority of respondents were pharmacist managers and responsible persons with a high level of education and more than five years of work experience, further emphasizes that a strong knowledge base plays a central role in the internalization of sustainable values and behaviors in the workplace.

A deeper interpretation of the results of this hypothesis test aligns with recent international studies that emphasize the strategic role of knowledge in building sustainability commitment. As demonstrated by (Vodă et al., 2023), increased sustainability literacy among pharmacists increases the likelihood of integrating concrete actions into daily practice, from medical waste management to promoting responsible medication use. A multi-country study by (Bader & Eltahla, 2023) and research on green practices in pharmacy (Martínez-Falcó et al., 2024) also highlight that when pharmacists have a good understanding of sustainability issues – whether acquired through training, workshops, or higher education curricula – their adoption of sustainability behaviors and commitments significantly increases.

The Influence of Sustainable Commitment on Sustainable Performance

The third hypothesis in this study, namely the influence of sustainable commitment on sustainable performance, was strongly confirmed based on the results of statistical tests that showed a significant relationship between the two variables. This finding is very meaningful because it provides empirical evidence that the sustainability commitment embedded in institutions and individuals, in this case, pharmacist managers and those in charge, truly plays a central role in

realizing the holistic sustainability performance of pharmacies. Quantitatively, the magnitude of the influence found is not just a statistical figure, but a concrete reflection of the transformation of organizational culture towards greener, more ethical, and long-term oriented practices.

This discussion has been further strengthened by international studies over the past five years. Research by (Ahsan & Khawaja, 2024) emphasizes the central role of green innovation and organizational commitment in improving sustainability performance in the pharmaceutical and healthcare sectors, particularly when management support for green initiatives aligns with sustainability values at the individual and team levels. Another study by (Iqbal et al., 2025) in healthcare organizations demonstrated that sustainable management practices supported by a high level of internal commitment have a positive impact not only on achieving environmental targets but also on aspects of innovation, adaptability, and creativity at work, all of which ultimately contribute directly to sustainable performance. A sustainable performance evaluation model in pharmaceuticals using the Sustainability Balanced Scorecard (SBSC) framework, as reported by (Hermundsdottir & Aspelund, 2021a) and a study in the Chinese pharmaceutical sector, also emphasize the importance of balance and synergy between individual commitment, internal policies, and the adoption of environmentally friendly strategies to achieve and maintain sustainable performance consistently.

The Influence of Competitive Markets on Sustainable Performance

Regarding the fourth hypothesis, namely the influence of the competitive market relationship on sustainable performance, the results of statistical tests from the attached data show an insignificant relationship, with a t-statistic of only 0.124 and a p-value of 0.451. Practically, this implies that the intensity of market competition in the real world, where the majority of respondents in this study were Heads of Pharmacies and responsible persons with long work experience, is not strong enough to directly drive the sustainability performance of pharmacies. In the Indonesian context, the dynamics of competition in the pharmaceutical industry currently still rely more on commercial dimensions such as price, product availability, and sales volume than on sustainable business model innovation or environmental leadership. This finding is in line with many recent studies that highlight that a competitive market without a foundation of values, organizational culture, and internal sustainability strategies cannot immediately drive real changes in the institution's sustainable performance.

The above interpretation is supported by various Scopus-indexed studies over the past five years, such as the results of research by (Olczyk et al., 2022b), which underscores that the relationship between competitive pressure and sustainable performance is strongly influenced by internal mediation factors such as organizational commitment, green innovation initiatives, and visionary leadership support. Meanwhile, research by (Tarnovskaya, 2023c) also found that competitive advantage and sustainable performance tend to go hand in hand only when companies actively integrate sustainability strategies into internal business structures and processes, rather than simply driven by market

pressures. In the pharmaceutical context in developing countries, a study by (Bader & Eltahla, 2023) confirms that the adoption of sustainable performance is more determined by strengthening the learning ecosystem and interprofessional collaboration, rather than simply responding to increasingly fierce business competition.

The Influence of Sustainable Knowledge on Sustainable Performance

The fifth hypothesis, concerning the influence of sustainable knowledge on sustainable performance, presents findings that are not only statistically valuable but also rich in meaning for the development of sustainable practices in the pharmacy environment. The results of the tests conducted indicate that an increase in sustainability knowledge among pharmacists, particularly those in managerial and responsible positions, has been proven significant in driving the achievement of institutional sustainability performance. This finding confirms that sustainability literacy is not merely theoretical capital, but a vital foundation for the development of innovation, operational efficiency, and the successful adoption of sustainable pharmacy principles in daily practice.

This interpretation is supported by various international studies indexed by Scopus. Studies by (Tarnovskaya, 2023c) and (Gomez-Trujillo et al., 2023) confirm that pharmaceutical companies with high levels of sustainability knowledge tend to be able to build integrated sustainability performance evaluation systems oriented towards synergies between economic, environmental, and social aspects. Meanwhile, a review by (Bader & Eltahla, 2023) and research by (Ahsan & Khawaja, 2024) demonstrate that knowledge sharing and strengthening internal competencies are key to achieving sustainable performance across various industries, including the pharmaceutical sector. Sustainability knowledge is also a key driver in green innovation and social collaboration processes, ultimately enhancing competitive advantage and institutional reputation in the eyes of the public and regulators.

The Influence of Sustainable Commitment in Mediating the Relationship Between Competitive Market and Sustainable Performance

The sixth hypothesis in this study highlights the role of sustainable commitment as a mediating variable between competitive markets and sustainable performance, a mechanism often assumed to be crucial in modern strategic management literature. However, the test results in this study indicate that this mediation effect has not been proven significant, as evidenced by the t-statistic value of 0.727 and the p-value of 0.234, far from the standard statistical significance threshold. Practically, this means that the sustainable commitment formed in pharmacy institutions, particularly among managers and pharmacists in charge, has not been able to transform competitive market pressures or dynamics into substantial sustainable performance achievements.

The social dynamics in these findings demonstrate that the intensity of market competition, while clearly perceived by professional pharmacists, is more often responded to through short-term business adaptation strategies or operational efficiencies, rather than strengthening more integrated sustainability values and programs. Demographic data indicates that the majority of

respondents are pharmacists with considerable work experience, but daily routines and institutional agendas still prioritize commercial targets over sustainability innovation. This condition aligns with global research over the past five years that highlights the ineffectiveness of sustainable commitment as a catalyst for change without the support of a more inclusive organizational design and proactive leadership involvement. For example, (Martínez-Falcó et al., 2024) showed that the impact of competitive markets on sustainable performance tends to be weak if sustainability values are low only approached administratively, not as part of the work culture and strategic vision of each individual in the organization.

The Influence of Sustainable Commitment in Mediating the Relationship Between Sustainable Knowledge and Sustainable Performance

The seventh hypothesis of this study, the influence of sustainable commitment in mediating the relationship between sustainable knowledge and sustainable performance, demonstrates a highly significant organizational social dynamic in the real world. Based on the attached data, the statistical test results show a t-value of 4.058 with a p-value of 0.000, confirming the strong and significant mediating effect of sustainable commitment in the path of influence from sustainable knowledge to sustainable performance in pharmacy institutions. This finding reflects that the sustainability knowledge possessed by pharmacists, especially at the managerial and responsible levels, not only has a direct impact on institutional performance but is also cultivated and strengthened through the institution's collective commitment to sustainable practices.

These findings are highly relevant to the literature of the past five years, such as research by (Tegegne et al., 2024), which emphasizes that sustainable knowledge is indeed the foundation, but sustainable commitment is the primary catalyst that translates knowledge into tangible changes at the institutional performance level. Multi-country studies confirm that organizations with work environments that support knowledge transfer, team synergy, and strengthened institutional commitment, whether through reward systems, human resource development, or internal regulations, are able to build higher and more consistent sustainability performance. Similarly, in the pharmaceutical sector, strong knowledge internalization and organizational commitment can lead to increased efficiency, better waste management, and the development of environmentally friendly service innovations that are increasingly appreciated by the public and regulators.

CONCLUSIONS

The findings show that the competitive market does not significantly affect either sustainable commitment or sustainable performance, indicating that competition in the pharmacy sector is still dominated by commercial aspects rather than sustainability values. In contrast, sustainable knowledge has a strong and significant effect on both commitment and performance, proving that knowledge is a key foundation for building sustainability practices. Moreover, sustainable commitment has a direct positive impact on sustainable performance,

demonstrating that internalized values and daily practices are crucial in achieving long-term sustainability. While the competitive market does not directly influence performance, sustainable knowledge enhances it significantly, and its effect is further strengthened through the mediating role of sustainable commitment. Overall, the results emphasize that strengthening internal knowledge and commitment is more effective than relying on external competitive pressures to improve sustainability in pharmacy institutions.

RECOMMENDATIONS

Pharmacy institutions are directed towards strengthening internal ecosystems that truly support the absorption of sustainable values and practices. Considering that research results show that the intensity of market competition is not yet sufficient to trigger the emergence of sustainability commitments and performance, this should serve as a warning to management to no longer be solely oriented towards commercial targets. Factor loading analysis shows that several indicators with the lowest values come from independent variables, such as the industry in which the Company operates is highly competitive (CM 1) and Innovation is needed to survive in the current market (CM 3). These findings indicate that the Competitive Market cannot yet be a driver of behavior that supports Sustainable Performance.

In addition, the research results also confirm that Sustainable Commitment is proven to be a catalyst to encourage Sustainable Performance, this can be seen from the results of the analysis of very strong loading factors such as the Company is committed to long-term sustainability (SC 1), Has a strategic plan for corporate sustainability (SC 4) and Allocates resources for green environmental and social programs. Thus, as an alternative, Company/Pharmacy policies can be focused on building a collaborative and innovative work culture, as well as the preparation of a concrete sustainability roadmap, for example, through regular training programs on pharmaceutical waste management, the formation of a special sustainable pharmacy team, and incentives for staff who actively bring change in the field of sustainability.

With the majority of respondents having higher education and more than five years of experience, it is highly recommended that institutions leverage this collective expertise through joint discussion forums, writing sustainability SOPs based on actual experience, and providing space for pharmacists' active participation in developing organizational strategies and policies. Policy recommendations should also be based on concrete internal performance evaluations, not just surveys or administrative documentation.

ADVANCED RESEARCH

This study contributes to the academic literature on the role of sustainable commitment in mediating the influence of competitive markets and sustainable knowledge on sustainable performance. The researchers acknowledge limitations in the scope of variables and research design, which do not cover all key determinants of sustainability. This study primarily highlights the role of knowledge and commitment, but does not address soft skills such as transformational leadership, digital readiness, or interprofessional engagement,

which can significantly impact the successful adoption of sustainable pharmacy. Another limitation stems from the geographic scope and the predominance of respondents in a single urban area, which may not necessarily reflect the needs and dynamics of rural areas or smaller institutions. Future research is recommended to consider expanding research objectives, cross-sectoral collaborative approaches, and further exploration of variables such as organizational learning, technology-based innovation, or the influence of external networks, such as communities and local governments, to ensure richer, more nuanced, and more contextualized research results in response to the evolving dynamics of sustainability in the pharmaceutical sector.

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