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EXPLORING DOMINANT INDICATORS OF COFFEE AROMA, INTERNET FACILITIES, AND REPEAT PURCHASES IN COFFEE SHOP SUSTAINABILITY: INSIGHTS FROM BANDUNG'S HIGHLANDS

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Abstract

This study investigated the sustainability of highland coffee shops by examining the influence of product quality (X) on business sustainability (Y3) through the mediating roles of store atmosphere (Y1) and consumer loyalty (Y2). Using Structural Equation Modeling and Bootstrapping, the research introduced a serial mediation model rarely applied in coffee agribusiness, particularly in highland settings. Data were collected from consumers of coffee shops in the highlands of Bandung, Indonesia. The results showed that product quality did not have a significant direct effect on sustainability ($p = 0.052$), but exerted a significant indirect effect through Y1 and Y2 ($p = 0.002$). Key indicators with the highest loading factors included coffee aroma (X2), internet facilities (Y1.5), and repeat purchases (Y2.1). These indicators formed a significant causal path: Product → Store Atmosphere → Consumer Loyalty → Sustainability. The study contributed theoretically by expanding experiential marketing and business sustainability literature with a fully mediated latent variable model. From a practical perspective, it recommended improving coffee aroma through selective cultivation, precise roasting, aroma profiling technologies (e.g., GC-MS, e-nose), and optimized brewing. It also encouraged enhancing digital infrastructure such as mesh Wi-Fi, satellite internet, and mobile networks to strengthen the digital store atmosphere and customer loyalty. In addition, strategic branding, employee training, and the integration of coffee tourism were proposed to support long-term sustainability. Overall, the study offered empirical insights and applicable strategies for sustaining highland coffee businesses in a competitive and dynamic market.

Keywords: Coffee Shop Sustainability; Consumer Loyalty; Product Aroma; Store Atmosphere; Highland Entrepreneurship

INTRODUCTION

Business actors considered business sustainability a highly desirable condition, because it secured operational certainty and long-term profitability, thereby enhancing the welfare of both owners and employees. Sustainable businesses also proved more resilient and adaptable to environmental, social, economic, technological, and institutional changes that accompanied ongoing operations (Sołoducho-Pelc & Sulich, 2020). Consequently, both individual and institutional actors strived to achieve sustainability (Barreto Peixoto et al., 2023).

However, not all business actors succeeded in sustaining their ventures, (Nagendrakumar et al., 2022). Many lacked understanding of key variables and leading indicators affecting sustainability, resulting in declining revenue and, in some cases, operational failure or bankruptcy. Real-world instances included: the closure of Starbucks

outlets in Australia; shutdown of Borjo Coffeehouse in the US (Barreto Peixoto et al., 2023); closure of Bean There Coffee Company in South Africa; revenue losses of 50–90% in Indonesian coffee shops; and operational struggles faced by coffee shops in China (Ferreira & Ferreira, 2018). Bankruptcy caused substantial material and intangible losses, making it essential to understand the variables influencing sustainability especially for coffee shop businesses in highland regions. Examples of highland coffee shops studied included Mountain Perks in Whistler, Canada; Highland Roasters in Addis Ababa, Ethiopia [16]; Highland Coffee House in Cusco, Peru; Alpine Brews in Innsbruck, Austria Bernerhof Coffee Shop in Grindelwald, Switzerland; Rocky Mountain Roastery in Breckenridge, USA; and Yellow Truck Coffee in Bandung, Indonesia .

Coffee shops, as modern culinary businesses offering both food and beverage services, proliferated rapidly across highland and lowland areas over the past decade (Ferreira & Ferreira, 2018). Establishing coffee shops in highland areas presented strategic advantages: 1) Quality Coffee Beans Highland climates fostered the growth of high-quality beans; 2) Unique Experience Consumers savored freshly brewed coffee amid scenic highland views; 3) Tourist Appeal Highlands attracted tourists, offering opportunities for coffee consumption in a natural setting; 4) Local Development Coffee shops promoted economic development and local sourcing; 5) Environmental Sustainability Proximity to coffee farms reduced carbon emissions from transport; 6) Coffee Education – Some shops served as educational hubs on cultivation and brewing techniques (Beverland et al., 2024). These benefits supported long-term societal and environmental well-being, but required recognition and analysis of key indicators influencing coffee shop sustainability, informed by prior research (Beverland et al., 2024), (Moalem & Mosgaard, 2021), (Proença et al., 2022). Previous studies revealed: 1) Barreto Peixoto et al. (Barreto Peixoto et al., 2023) highlighted certification, waste management, and by-product valorization; 2) Iannone & Caruso (2023) reported Italian coffee businesses investing in digital and sustainability strategies; 3) Pu et al. (2023) linked e-branding and in-store experience with consumer satisfaction; 4) Proença et al. (Proença et al., 2022) emphasized food safety and certification in coffee chains; 5) Le et al. (2020) demonstrated vulnerabilities in Vietnamese highland coffee systems; 6) Jang & Lee (2019) showed sensory marketing influencing sustainability in Korea; 7) Maciejewski (2019) underscored sustainable consumption values among Polish coffee consumers; and 8) Giraldi-Díaz et al. (2018) documented low-carbon practices in Mexican coffee supply chains.

Despite this literature, research on coffee shop sustainability in highland areas particularly addressing marketing leverage (product quality and store atmosphere) and consumer loyalty as latent constructs—remained limited (Trigkas et al., 2023). Marketing leverage referred to strategic application of business resources to influence purchasing behavior (Trigkas et al., 2023). Consumer loyalty was influenced by product quality, atmosphere, performance, and sustainability, serving as a possible mediator (López-Sanz et al., 2021). Furthermore, highland-based coffee businesses offered distinct development potential (e.g., ecotourism, gastronomic tourism, geographic labeling) needing strategic management (Zuckerman Farkash et al., 2024). However, few prior studies applied latent-variable modeling with measured indicators, consumer loyalty as mediator, or serial mediation frameworks, (Mujianto et al., 2023).

This study addressed these gaps by investigating the influence of product quality and store atmosphere on coffee shop sustainability via sequential mediation through consumer loyalty.Despite the expanding literature on sustainability in coffee shops, this study addressed notable gaps: 1) Few studies explicitly examined coffee shop Sustainability in highland regions with distinct environmental/economic contexts; 2) Limited empirical evidence explored the combined influence of product quality and store atmosphere; 3) Prior research often used observable variables, lacking latent constructs with indicators; 4) Consumer loyalty as a mediator remained underexplored; 5) Serial mediation involving both atmosphere and loyalty was rarely tested.

This study aimed to fill these gaps by examining how product quality influenced sustainability via store atmosphere and loyalty mediation, offering theoretical contributions and practical implications. Therefore, this research contributed valuable theoretical insights (in consumer behavior, experiential marketing, and applied statistics) and practical recommendations for highland coffee shop entrepreneurs. The study, titled *"Exploring the Dominant Indicators of Coffee Aroma, Internet Facilities, and Repeat Purchases in Coffee Shop Sustainability: Insights from Bandung's Highlands"*, held strong relevance.

Based on existing literature, product quality and store atmosphere were identified as key strategic marketing levers in highland coffee shop contexts, while consumer loyalty functioned as a mediator linking antecedent variables to business sustainability. The following hypotheses were proposed:

H_1: Product (X) had a direct effect on store atmosphere (Y1).

H_2: Store atmosphere (Y1) had a direct effect on consumer loyalty (Y2).

H_3: Consumer loyalty (Y2) had a direct effect on coffee shop sustainability (Y3).

H_4: Product (X) did not have a direct effect on coffee shop sustainability (Y3).

H_5: Product (X) had an indirect effect on coffee shop sustainability (Y3) through store atmosphere (Y1) and consumer loyalty (Y2).

In this study t was acknowledged that certain limitations existed particularly in sampling methods and measurement indicators which were discussed at the end of the manuscript.

RESEARCH METHODS

The study location was purposively selected in Bandung City, West Java Province, Republic of Indonesia. Bandung is situated at an altitude of approximately 768 meters above sea level, categorizing it as a highland region, with a total area of 168 km² (equivalent to 16,800 hectares) (Tarigan et al., 2016). Geographically, Bandung is located between 5°55′ and 7°30′ South Latitude and 106°20′ and 107°55′ East Longitude (Rustiadi et al., 2021). From a topographical perspective, Bandung City was considered representative of other highland cities around the world where modern coffee shops have been established, such as: 1) Mountain Perks in Whistler City, Canada; 2) Highland Roasters in Addis Ababa, Ethiopia ; 3) Highland Coffee House in Cusco, Peru; 4) Alpine Brews in Innsbruck, Austria; 5) Bernerhof Coffee Shop in Grindelwald, Switzerland; and 6) Rocky Mountain Roastery in Breckenridge, Colorado, United States. Additionally, Bandung City itself was home to several world-class modern coffee shops, including: 1) Starbucks; 2) Coffee Bean & Tea Leaf; 3) J.CO Donuts & Coffee; 4) Tous Les Jours ; and 5) Antipodean Café.

This study was conducted from January 2023 to December 2024, and the data were processed in 2024. The research object specifically focused on the following latent variables: product (X), store atmosphere (Y1), consumer loyalty (Y2), and the sustainability of coffee shops in highland areas (Y3). All four constructs (X, Y1, Y2, and Y3) were considered latent variables, meaning they could not be directly observed and thus required measurement through specific indicators.

To support this process, clear guidance was provided for measuring each variable and its corresponding indicators, which were subsequently operationalized.

Design study: This quantitative study utilized a survey method. The study population consisted of coffee shop consumers in the highland area of Bandung City, although the exact population size was unknown. The sample size was determined based on the requirements of the data analysis method, namely Structural Equation Modeling (SEM), which recommended a minimum sample size of over 200 respondents. A total of 250 samples were obtained, which was considered to enhance the statistical quality of the results.

Sampling was conducted using a convenience sampling technique, with the provision that each consumer only filled out the survey once to avoid duplicate responses, bias, and data inaccuracies. The respondents were asked to objectively assess the coffee shop's conditions, products, and services based on their own experiences and perceptions, through an online questionnaire distributed via Google Forms. Data analysis was performed using Structural Equation Modeling (SEM) and the bootstrapping method, facilitated by the Analysis of Moment Structures (AMOS) software. SEM was employed as a statistical tool to simultaneously assess the influence of exogenous (independent) variables on endogenous (dependent) variables, and to estimate the weights of each indicator in forming the latent constructs Bootstrapping was applied as a robust statistical technique capable of constructing confidence intervals and conducting hypothesis testing, particularly under conditions where classical statistical assumptions were violated due to multivariate non-normality in the data. As mentioned earlier, the indicators for each latent variable (X, Y1, Y2, and Y3) were measured using a five-point Likert scale (5, 4, 3, 2, 1). The scale was operationalized as follows: Scale 5 ("Strongly Agree"): The statement in the questionnaire was strongly consistent with the respondent's perception or real-life experience. Scale 4 ("Agree"): The statement was consistent with the actual situation. , Scale 3 ("Neutral"): The statement was moderately aligned with the facts. Scale 2 ("Disagree"): The statement did not reflect the factual condition. Scale 1 ("Strongly Disagree"): The statement strongly contradicted the factual condition. To fulfill the requirements of SEM analysis, the ordinal data obtained from the Likert scale were transformed into interval scale data using the Method of Successive Intervals (MSI) .

Before conducting the main analysis using the SEM method, validity and reliability tests were performed on the measurement instruments, as both are essential for ensuring data quality (Cheung et al., 2024). Validity and reliability testing played a crucial role in confirming that the instruments measured each variable accurately and consistently, thereby ensuring the reliability and trustworthiness of the research findings. The validity test was assessed based on the Standardized Loading Factor (SLF) values for each indicator, while the reliability test was conducted using the criteria of Average Variance Extracted (AVE) and Composite Reliability (CR).

A research instrument was considered to fulfill the element of validity if the Standardized Loading Factor (SLF) value exceeded 0.50. SLF values were obtained directly from the output of the AMOS SEM analysis (Shek & Yu, 2014). Meanwhile, an instrument was regarded as meeting the criteria for element reliability if the Average Variance Extracted (AVE) value was greater than 0.50, or in some accepted cases, if the AVE value was less than 0.50 but the Composite Reliability (CR) value was at least 0.70. For exploratory research, a CR value ≥ 0.6 is also considered acceptable . Unlike SLF values, AVE and CR values were not directly provided by AMOS output.

After the measurement instruments for each variable were confirmed to be valid and reliable, data analysis was carried out using the Structural Equation Modeling (SEM) method, with the support of the AMOS software application. The results of the SEM analysis were subsequently evaluated using several key goodness-of-fit indices

to determine whether the theoretical model was consistent with the observed primary data . The evaluation was conducted by comparing the resulting model fit values with established benchmark thresholds for each fit index . Table 2 presents the standard cut-off values for assessing the structural model fit. If the model met or exceeded the recommended thresholds, it was considered a good fit; otherwise, it was categorized as not fit. Models that failed to meet the fit criteria were deemed less reliable, and thus required structural modifications to serve as a technical basis for improvement.

Once the model's suitability (Goodness-of-Fit) had been confirmed, hypothesis testing was conducted based on the following criteria: "If the p-value (significance level) was less than 0.05, the null hypothesis (H_0) was rejected, indicating a statistically significant effect from the exogenous to the endogenous variable .

It is important to note that the measurement scale used in this study was based on the Likert scale, which is categorized as an ordinal scale. Therefore, the data were considered non-normally distributed, even after being transformed into an interval scale. To address this issue in hypothesis testing, the bootstrapping method was employed. Bootstrapping is recognized as a robust statistical approach that estimates the sampling distribution of a population characteristic by repeatedly resampling from the existing data without requiring normality assumptions. This technique was particularly useful for constructing confidence intervals and conducting hypothesis testing under conditions where classical statistical assumptions were violated, including in the presence of multivariate non-normality.

RESULTS AND DISCUSSION

1.1. Research Result

The results of the validity and reliability tests are illustrated in Figure 3.

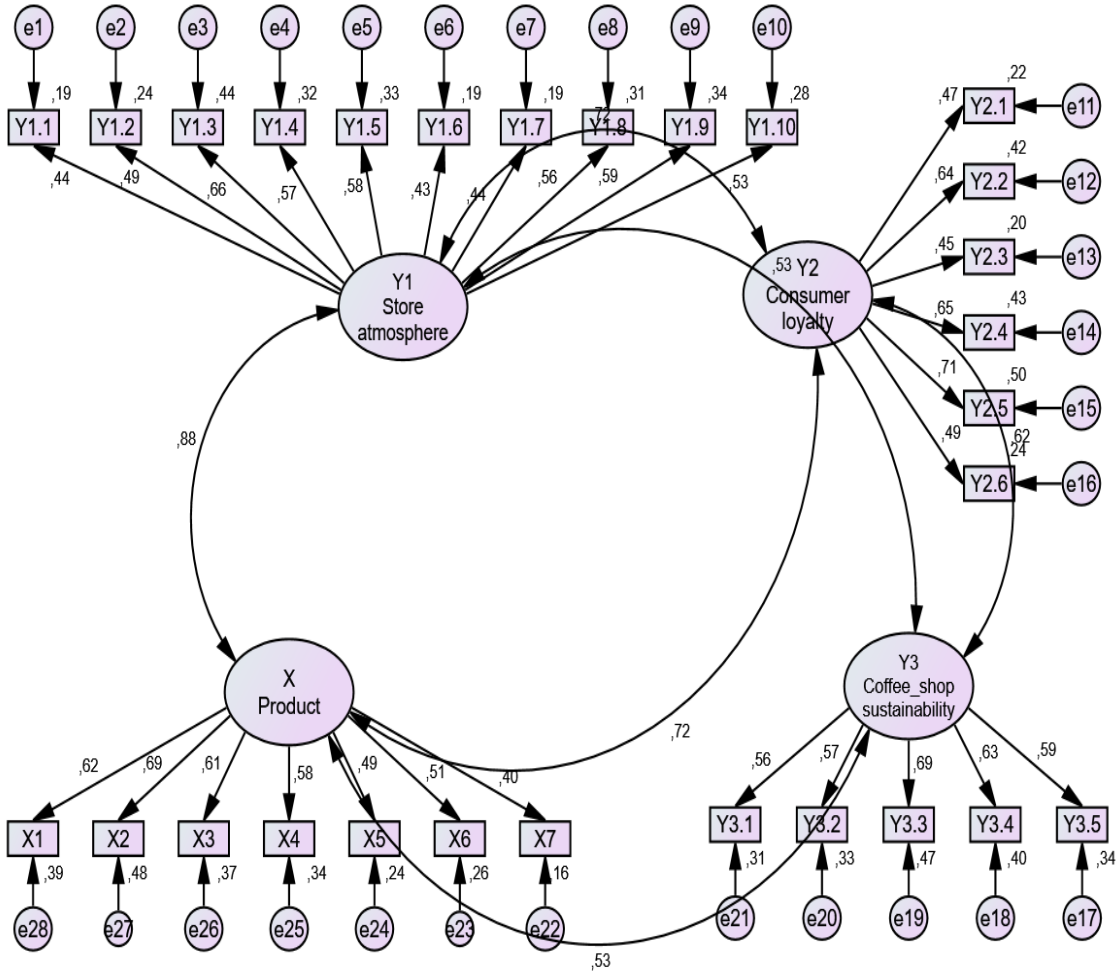

Figure 3. Validity and Reliability Test of the SEM Model on X, Y1, Y2, and Y3
Source: Processed by the author using SEM-AMOS software (2024)

Figure 3 illustrates the loading factor values of each indicator for the variables X (Product), Y1 (Store Atmosphere), Y2 (Consumer Loyalty), and Y3 (Coffee Shop Sustainability). These values were used to assess the validity and reliability of the measurement instruments for each construct. The detailed test results are presented in Table 2.

Table 2. Results of Validity and Reliability Tests of Measurement Instruments for Variables X, Y1, Y2 and Y3

Variable	Indicator	SLF	AVE	CR	Validity	Reliability
1. Product (X)	X1	0.621	**0.37**	**0.74**	Valid	Reliable
	X2	0.689			Valid	Reliable
	X3	0.608			Valid	Reliable
	X4	0.585			Valid	Reliable
	X5	0.495			**Invalid**	**Not Reliable**
	X6	0.513			Valid	Reliable
	X7	0.407			**Invalid**	**Not Reliable**
2. Store atmosphere (Y1)	Y1.1	0.442	**0.34**	**0.75**	**Invalid**	**Not Reliable**
	Y1.2	0.492			**Invalid**	**Not Reliable**
	Y1.3	0.658			Valid	Reliable
	Y1.4	0.567			Valid	Reliable
	Y1.5	0.578			Valid	Reliable
	Y1.6	0.438			**Invalid**	**Not Reliable**
	Y1.7	0.437			**Invalid**	**Not Reliable**
	Y1.8	0.552			Valid	Reliable
	Y1.9	0.585			Valid	Reliable
	Y1.10	0.531			Valid	Reliable
3. Consumer loyalty (Y2)	Y2.1	0.464	**0.45**	**0.71**	**Invalid**	**Not Reliable**
	Y2.2	0.643			Valid	Reliable
	Y2.3	0.436			**Invalid**	**Not Reliable**
	Y2.4	0.606			Valid	Reliable
	Y2.5	0.661			Valid	Reliable
	Y2.6	0.490			**Invalid**	**Not Reliable**
4. Coffee shop sustainability (Y3)	Y3.1	0.560	**0.37**	**0.75**	Valid	Reliable
	Y3.2	0.567			Valid	Reliable
	Y3.3	0.683			Valid	Reliable
	Y3.4	0.633			Valid	Reliable
	Y3.5	0.591			Valid	Reliable

Source: Processed by the author using SEM-AMOS (2024)

SLF = Standardized Loading Factor (λ)
AVE = Average Variance Extracted
CR = Composite Reliability

Table 2 presents several indicator variables that were confirmed to be valid and reliable, including: X1, X2, X3, X4, X6, Y1.3, Y1.4, Y1.5, Y1.8, Y1.9, Y1.10, Y2.2, Y2.4, Y2.5, Y3.1, Y3.2, Y3.3, Y3.4, and Y3.5 5 . These validated indicators were subsequently used for further analysis, particularly in the model suitability test (Goodness-of-Fit). Based on the analysis of these indicator variables using the Structural Equation Modeling (SEM) method—supported by the Analysis of Moment Structures (AMOS) software—the results are illustrated in Figure 4.

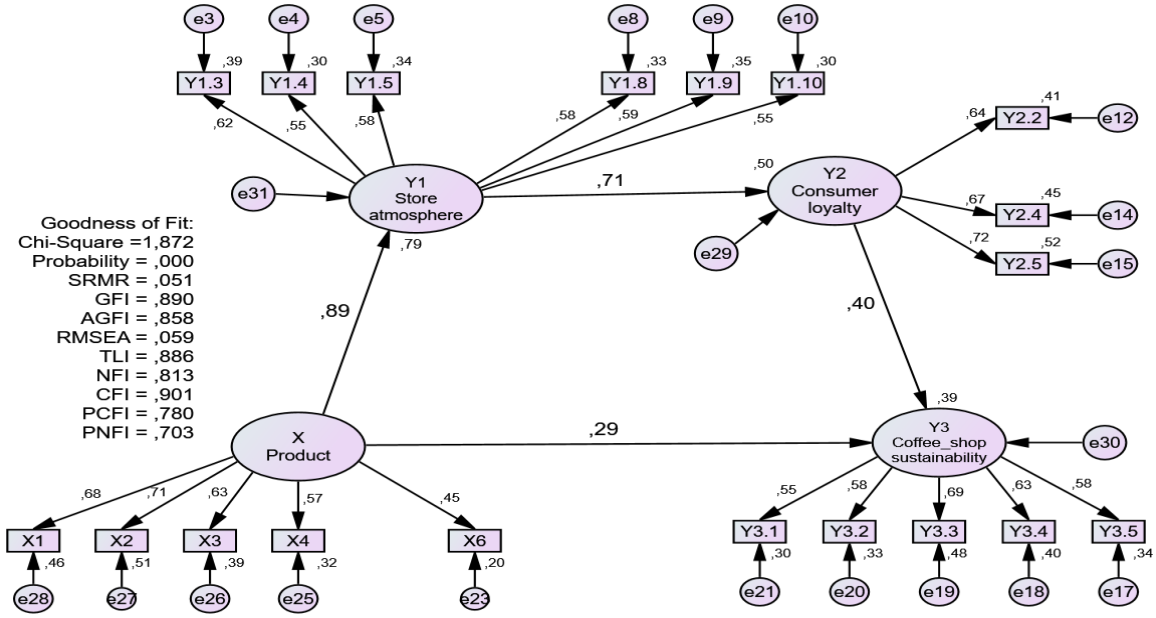

Figure 4. Fit Test Model (Goodness-of-Fit)

Source: Processed by the author using SEM-AMOS software (2024)

Figure 4 presents the results of the model fit test (Goodness-of-Fit), which include the following indices: Chi-Square = 1.872; Probability = 0.000; SRMR = 0.051; GFI = 0.890; AGFI = 0.858; RMSEA = 0.059; TLI = 0.886; NFI = 0.813; CFI = 0.901; PCFI = 0.780; and PNFI = 0.703. These values were compared against established cut-off criteria to determine whether the model adequately fit the observed data. If the model did not meet the fit criteria, the results were evaluated further by referencing the acceptable threshold values for each indicator. A detailed comparison of the fit indices and the standard cut-off values is presented in Table 3.

Table 3. Goodness-of-Fit Indices, Cut-Off Values, and Index Values

No	Goodness-of-fit indices	Cut-off values	Index values	Interpretation
1.	Chi-Square (X^2)	< 2.00	1,872	Good fit
2.	**Probability**	**> 0.05**	**0,000**	**Poor fit**
3.	SRMR	< 0.08	0.051	Good fit
4.	**GFI**	**> 0.90**	**0.890**	**Close fit**
5.	**AGFI**	**> 0.90**	**0.858**	**Close fit**
6.	**RMSEA**	**< 0.05**	**0.059**	**Close fit**
7.	**TLI**	**> 0.90**	**0.886**	**Close fit**
8.	**NFI**	**> 0.90**	**0.813**	**Poor fit**
9.	CFI	> 0.90	0.901	Good fit
10.	PCFI	> 0.5	0.780	Acceptable fit
11.	PNFI	> 0.5	0.703	Acceptable fit

Source: Adapted from the following sources cited in references [110], [112], [113], [114], [115], et al. and data processed by the author using SEM-AMOS (2024)

Table 3 presents several fit indices that fell into the poor fit category, such as Probability and NFI, and others that fell into the close fit category, including GFI, AGFI, RMSEA, and TLI. These results indicated that the structural model initially built did not fully meet the goodness-of-fit criteria. Therefore, model modification was required to improve the overall model fit. Achieving an adequately fitting model was essential to ensure high-quality research results and the reliability of the analysis. To improve model fit, modifications were carried out by removing indicators with large errors based on the Modification Index (MI), starting from the highest to the lowest value. In addition, modification also involved correlating indicator error terms that were theoretically justified, in order to obtain a model that better represented the underlying constructs.

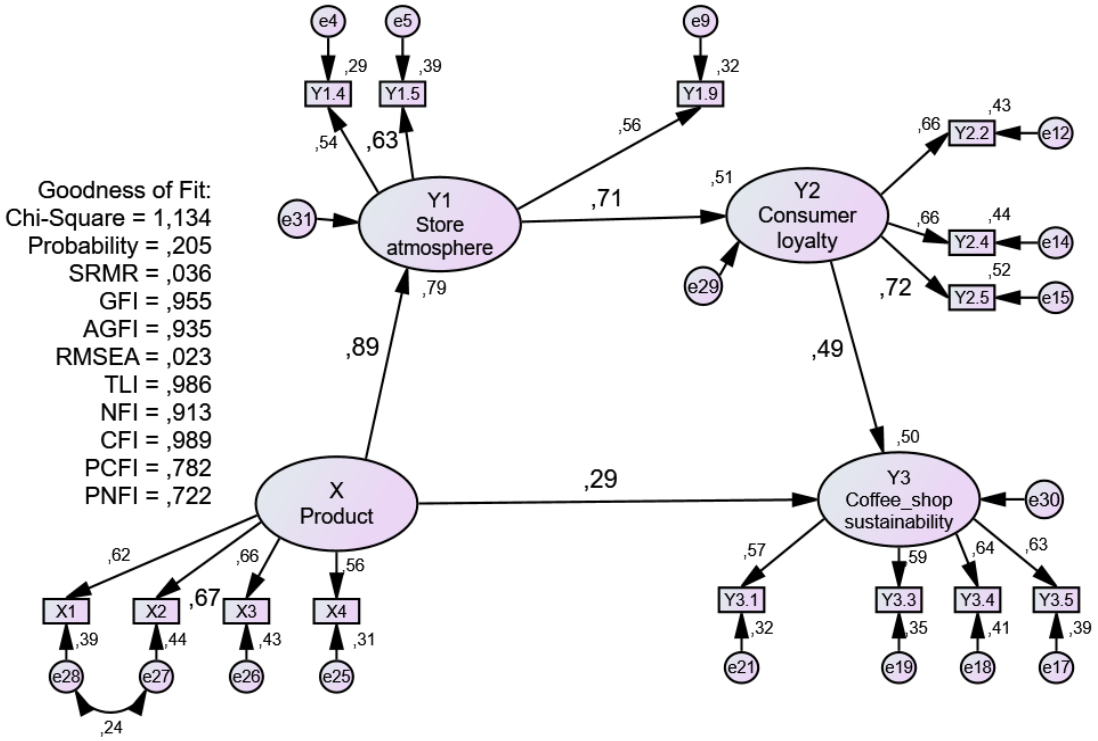

Figure 5. Goodness-of-Fit (GoF) Test Results after Modification

Source: Processed by the author using SEM-AMOS software (2024)

Figure 5 presents the Goodness-of-Fit (GoF) test results following model modification. These results were evaluated by comparing them to the standard fit thresholds (cut-off values) for each fit index, as outlined in Table 4.

Table 4. Goodness of Fit Indices and Cut-off Value after Modification

No	Goodness of Fit Indices	Cut-off Value	Before Modification	**After Modification**	Interpretation
1.	Chi Square	< 2.00	1,872	**1,134**	Good fit
2.	Probability	> 0.05	0,000	**0.205**	Good fit
4.	SRMR	< 0.08	0.051	**0.036**	Good fit
5.	GFI	> 0.90	0.890	**0.955**	Good fit
6.	AGFI	> 0.90	0.858	**0.935**	Good fit
3.	RMSEA	< 0.05	0.059	**0.023**	Good fit
7.	TLI	> 0.90	0.886	**0.986**	Good fit
9.	NFI	> 0.90	0.813	**0.913**	Good fit
8.	CFI	> 0.90	0.901	**0.989**	Good fit
10.	PNFI	> 0.50	0.780	**0.782**	Acceptable fit
11.	PCFI	> 0.50	0.703	**0.722**	Acceptable fit

Source: Adapted from the following sources cited in references [110], [112], [113], [114], [115], et al. and data processed by the author using SEM-AMOS (2024)

Table 4 shows that all fit index values after model modification met the required fit standards (cut-off values), indicating that the model was adequately fitted to the empirical data. A well-fitted model allowed for accurate representation of the data, leading to valid results, reliable analysis, and meaningful predictions that provided a strong foundation for offering practical recommendations. Furthermore, the analysis revealed significant influences among the latent variables (X, Y1, Y2, and Y3), which were assessed through hypothesis testing. This hypothesis testing reinforced the findings and enabled the development of robust theoretical and practical recommendations. The hypotheses were tested using the bootstrapping method, with significance determined based on the p-value (ρ) obtained from the bootstrapping output. The detailed test results are presented in Table 5.

Table 5. Hypothesis Testing Results for Model Fit of X, Y1, Y2 and Y3 (after Modification)

Hypothesis	Path between Variables	Estimate (b)	Standardized Estimate (β)	P-values (ρ)	Interpretation
H_1	X → Y1	0.871	0.887	0.002	Significant
H_2	Y1 → Y2	0.876	0.714	0.003	Significant
H_3	Y2 → Y3	0.473	0.489	0.003	Significant
H_4	X → Y3	0.338	0.290	0.052	Not significant
H_5	X → Y3	Through Y1, Y2	0.310	0.002	Significant

Source: Bootstrapping results processed by the author using SEM-AMOS (2024).

Table 5 presents the results of the five hypothesis tests. The findings can be summarized as follows:
H_1: The effect of X on Y1 yielded a p-value of 0.002 (< 0.050), indicating a significant relationship. Thus, the hypothesis stating that the Product variable (X) had a direct effect on Store Atmosphere (Y1) was supported.
H_2: The effect of Y1 on Y2 produced a p-value of 0.003 (< 0.050), confirming that Store Atmosphere (Y1) had a direct effect on Consumer Loyalty (Y2); therefore, this hypothesis was supported.
H_3: The effect of Y2 on Y3 resulted in a p-value of 0.003 (< 0.050), indicating that Consumer Loyalty (Y2) had a direct effect on Coffee Shop Sustainability (Y3), thereby supporting the third hypothesis.
H_4: The direct effect of X on Y3 showed a p-value of 0.052 (> 0.050), suggesting a non-significant relationship. Thus, the hypothesis stating that Product (X) did not directly influence Coffee Shop Sustainability (Y3) was supported.
H_5: The mediated effect of X on Y3 through Y1 and Y2 revealed a p-value of 0.002 (< 0.050), indicating a significant indirect influence. Therefore, the hypothesis stating that Product (X) influenced Coffee Shop Sustainability (Y3) indirectly through Store Atmosphere (Y1) and Consumer Loyalty (Y2) was supported.
All variables analyzed in this study were latent variables, and their relationships were examined through structural paths. Furthermore, to assess the strength of each construct, the significance of individual indicators was evaluated by analyzing their respective loading factor values, as presented in Table 6.

Table 6. Significance of Loading Factor for Indicator Variables X, Y1, Y2 and Y3

No.	Variables Latent (Construct)	Indicator		Factor Loading Value		P-value (ρ)
		Symbol	Information	Non-Standard	Standardized	
I. 1	X (Product)	X1	Good Taste	1.128	0.621	***
2	**X (Product)**	**X2**	**Fragrant Aroma**	**1.212**	**0.665**	***
4	X (Product)	X3	Availability Stock	1.211	0.655	***
3	X (Product)	X4	Variance Product	1,000	0.561	N/A
II. 5	Y1 (Store Atmosphere)	Y1.4	Security Environment	1,000	0.538	N/A
6	**Y1 (Store Atmosphere)**	**Y1.5**	**Available Internet Facilities**	**1.191**	**0.627**	***
7	Y1 (Store Atmosphere)	Y1.9	Online Marketing	1.045	0.564	***
III. 8	Y2 (Consumer Loyalty)	Y2.2	Loyal	1.000	0.656	N/A
9	Y2 (Consumer Loyalty)	Y2.4	Promotion Matters Positively	1.006	0.660	***
10	**Y2 (Consumer Loyalty)**	**Y2.5**	**Purchase More Lots**	**1.098**	**0.719**	***
IV. 11	Y3 (Coffee Shop Sustainability)	Y3.1	Get Profit	0.887	0.567	***

No.	Variables Latent (Construct)	Indicator		Factor Loading Value		P-value (ρ)
		Symbol	Information	Non-Standard	Standardized	
12	Y3 (Coffee Shop Sustainability)	Y3.3	No, there is Damage to the Environment	0.929	0.593	***
13	Y3 (Coffee Shop Sustainability)	Y3.4	Implementation Technology	0.996	0.639	***
14	Y3 (Coffee Shop Sustainability)	Y3.5	Institutional Support	1.000	0.626	N/A

Source: Processed output by the author using SEM-AMOS software (2024)

Table 6 presents the loading factor values, both standardized (λ) and unstandardized, for ten indicators (71.4%). These values were found to be significant, with p-values indicated by *** ($p < 0.001$). In contrast, four indicators (28.6%)—namely X4, Y1.4, Y2.2, and Y3.5—were marked as N/A, which stands for "Not Applicable." This notation means that their p-values were not calculated or reported because each of these indicators served as the reference indicator for their respective latent variables: Product (X4), Store Atmosphere (Y1.4), Consumer Loyalty (Y2.2), and Coffee Shop Sustainability (Y3.5). As noted by Bollen et al. (Bollen et al., 2024), reference indicators are fixed at a constant value of 1.000 during structural equation modeling (SEM) to establish the scale of the latent construct. Consequently, their associated p-values are not computed. Therefore, all observed indicators, including those set as references, can be considered valid and significant. These findings confirmed that the measurement instrument was both valid and reliable across all latent variables: X (Product), Y1 (Store Atmosphere), Y2 (Consumer Loyalty), and Y3 (Coffee Shop Sustainability).

1.2. Discussion of Research Results

The discussion was based on the five proposed hypotheses—H1, H2, H3, H4, and H5. As a result, the analysis was directed and in-depth, leading to meaningful and insightful findings. These findings generated valuable contributions to both theoretical and practical knowledge, particularly in the areas of sustainable business practices, marketing strategy, and consumer behavior within the highland coffee shop context.

H_1: Influence the direct variable X on Y1

Figure 5 and Table 5 presented the direct influence of variable X (Product) on Y1 (Store Atmosphere), with a regression coefficient (b) of 0.871, a standardized coefficient (β) of 0.887, and a p-value (ρ) of 0.002 (< 0.05). These results indicated that the direct effect of X on Y1 was both positive and significant, meaning that a 100% increase in X led to an 87.1% increase in Y1, assuming all other variables remained constant. The positive association also implied that any change in X would be followed by a corresponding positive change in Y1. However, this relationship was classified as inelastic, since the proportional change in Y1 was smaller than that in X. Such inelasticity highlighted a strategic consideration for coffee shop managers in highland areas: efforts should be made to enhance elasticity so that investments in product-related aspects (X) yielded more productive outcomes. This finding was supported by the synergistic contribution of several product indicators—taste, aroma, availability, and variety—which collectively created a satisfying consumer experience. These attributes helped establish a perception of high product quality, enhanced sensory appeal, and reflected professional management. As a result, they contributed to the development of an inviting and engaging store atmosphere in highland coffee shops, thereby encouraging consumer loyalty and repeat purchases.

The above argument was consistent with several previous studies: (1) Francioni et al. (Francioni et al., 2018) explained that high-quality coffee drinks, particularly in aroma and taste, attracted more consumers.

It is important to note that Product (X) was a latent variable. Therefore, to identify the most significant and contributing indicators, factor loading values were used as a reference [43], [128]. Based on Figure 5 and Table 6, the highest loading factor for the latent variable X was 0.67, associated with X2, namely the indicator "fragrant aroma". This result suggested that coffee shop consumers in highland areas placed high value on aroma as a defining quality of their coffee beverages. The aroma of coffee served as a key sensory attribute that determined the overall drinking experience. A fresh, distinctive, and pleasant aroma enhanced coffee enjoyment, often leaving a stronger first impression than taste itself. Aroma also reflected the quality of coffee beans. Highland-grown beans were often regarded as premium or specialty coffees, and were highly appreciated by consumers seeking authenticity. The aroma originated from various volatile compounds that emerged during roasting and brewing processes, thereby producing a rich and distinctive scent that contributed to an elevated store atmosphere more tranquil, memorable, and enjoyable in the highland context.

Quality coffee beans offered a more complex, fragrant, fresh, distinctive, and unique aroma due to geographical and climatic factors, including altitude, soil type, temperature, soil quality, and overall climate conditions. The higher the plantation location, the greater the intensity and complexity of the coffee's aroma. Highland soil, which was generally organic, contributed a distinct and complex aroma profile. Lower air temperatures at high altitudes

promoted the formation of specific chemical compounds that enhanced the intensity and complexity of coffee aroma. Moreover, the relatively stable climate in highland regions allowed coffee beans to develop more uniformly, resulting in higher-quality beans with fresher and more distinctive aromas. The superior quality of highland-grown coffee beans could not be replicated by those cultivated in lowland regions. Consequently, to maintain quality and enhance consumer trust, several countries implemented labeling, classification, and chemical traceability systems that certified the geographical origin of coffee beans. These systems had been successfully adopted in various countries, including the European Union, Colombia, Indonesia, Thailand, Peru, Switzerland, Ecuador, and Ethiopia.

The importance of a fragrant aroma as an indicator in attracting both new and returning consumers to visit and purchase coffee drinks in highland coffee shops had been well recognized. Accordingly, continuous efforts were required to maintain or enhance the aromatic quality of coffee beverages. These efforts included the following strategies: 1) Selecting coffee plant varieties with genotypes that produced richer, more complex, and unique aromas such as Arabica, which was generally more suitable than Robusta; 2) Cultivating coffee under shade conditions to improve both bean quality and productivity; 3) Harvesting fully ripe coffee cherries, characterized by a red coloration, to optimize flavor and aroma development; 4)Processing raw coffee beans properly, following dry processing methods to preserve volatile compounds; 5) Milling coffee beans with attention to grind size, roast level, and brewing ratio; 6) Roasting coffee beans at lower temperatures with longer extraction times to preserve aromatic compounds; 7) Brewing coffee at an optimal temperature of 90 to 96°C for 2–4 minutes to release its full aroma profile; 8) Storing coffee beans in capsule packaging made entirely from aluminum to maintain freshness for up to 46 weeks; Applying transcriptome technology to analyze gene expression related to aromatic compounds, thereby enabling targeted interventions to enhance coffee aroma; and Utilizing analytical techniques such as Gas Chromatography-Mass Spectrometry (GC-MS) and electronic nose (e-nose) systems to identify volatile compounds and obtain a deeper and more cost-effective understanding of coffee aroma profiles. These strategies aimed to ensure the consistent quality of fragrant coffee, contributing meaningfully to a pleasant and inviting store atmosphere in highland locations an environment perceived by consumers as calm, aromatic, and enjoyable.

H_2: Influence direct variable Y1 to Y2

Figure 5 and Table 5 presented the direct influence of variable Y1 (Store Atmosphere) on Y2 (Consumer Loyalty), with a regression coefficient (b) value of 0.876, a standardized regression coefficient (β) of 0.714, and a p-value (ρ) of 0.003 (< 0.05). These results indicated that the direct effect of Y1 on Y2 was positive and statistically significant (Hair Jr et al., 2021; Kwak, 2023; Lee et al., 2018; Wellek, 2021). Specifically, a 100% increase in units of Y1 resulted in an 87.6% increase in units of Y2, assuming that other variables remained constant. This relationship reflected a condition of inelastic change, where the proportionate change in Y2 exceeded that of Y1. Such a finding suggested that the utilization of Y1 (Store Atmosphere) resources in highland coffee shops had not yet reached optimal productivity, necessitating intensified efforts to enhance their effectiveness.

Store atmosphere served as a strategic component in highland coffee shops, as it was the first aspect perceived directly by consumers before making a purchase or consuming coffee. It encompassed various elements, including the layout of tables and chairs, ambient music, seating comfort, environmental security, interior design, internet access, parking facilities, cashless payment systems, online marketing integration, restroom cleanliness, and the scenic natural mountain view. These elements collectively synergized in a positive manner, contributing to a pleasant and memorable experience for consumers.

These experiences included: 1) Sensory experience: the harmonious combination of background music, coffee aroma, interior design, instagrammable decoration, and natural highland beauty created an enjoyable sensory experience that made consumers feel more comfortable and impressed (Motoki et al., 2021). 2) Consumer experience of being appreciated and cared for: the availability of internet facilities, comfortable seating arrangements, a safe environment, spacious parking, and clean restrooms collectively fostered a welcoming atmosphere. These conditions made consumers feel valued and motivated to spend extended time at the coffee shop. As a result, many customers used coffee shops for various activities, such as completing tasks, meeting friends or relatives, holding discussions, enjoying high-quality mountain coffee, socializing in communities, or gathering with family. 3) Brand recognition experience: the unique and consistently maintained store atmosphere helped consumers easily remember the brand identity of highland coffee shops. This contributed to brand recognition and differentiation from coffee shops located in the lowlands. 4) Perceived professionalism experience: a unique, enjoyable, and consistent store atmosphere led many consumers to perceive that highland coffee shops were professionally managed, emphasizing high-quality products and services (Carvalho et al., 2016; Ge et al., 2021).

These experiences contributed to the formation of positive, memorable impressions that enhanced consumer satisfaction. Satisfied consumers, having enjoyed the atmosphere of the coffee shop, were likely to make repeat purchases, invite friends or relatives (reflecting experiential marketing), and recommend the coffee shop to others [51]. These findings confirmed that store atmosphere played a vital role in fostering consumer loyalty by delivering an authentic, impactful, and positive experience in highland coffee shops.

The above argument aligned with the results of several studies Dhisasmito and Kumar (Dhisasmito & Kumar, 2020) concluded that store atmosphere significantly influenced coffee shop consumer loyalty in Jakarta, Indonesia. Since Y1 (Store Atmosphere) is a latent variable, identifying the most influential and significant indicators required examining the factor loading values. Based on Figure 5 and Table 6, the highest loading factor value for Y1 was 0.627, corresponding to the indicator Y1.5—availability of internet facilities. These results indicated that consumers of coffee shops in the highlands considered the availability of internet facilities as a crucial component of their overall experience. This finding reflected a broader interpretation of store atmosphere in the Industry 4.0 era, which extended beyond the physical environment to include consumers' digital experiences. Consumers in highland coffee shops increasingly expected seamless integration of digital technologies.

The integration of digital tools—such as social media marketing (Instagram, Facebook, WhatsApp, Twitter), augmented reality (AR), virtual reality (VR), Internet of Things (IoT), Mailchimp, mobile ordering and payment systems, digital menu boards, and loyalty applications—expanded the concept of store atmosphere to include digital experiences that shaped how consumers interacted with and perceived a brand or product. Through the application of digital technology, highland coffee shops optimized various operational aspects more practically and efficiently, including production, promotion, ordering, purchasing, interaction, payment, and customer service (Cui et al., 2023). Moreover, many consumers used the coffee shop space to engage in personal or professional activities. Therefore, the implementation and integration of digital technology contributed to enhanced consumer experiences (experiential marketing), encouraging repeat visits and the sharing of positive experiences with others (Urdea et al., 2021). These conditions confirmed that the availability of internet facilities was a key indicator supporting consumer loyalty in highland coffee shops.

Recognizing the importance of internet facility availability in supporting the integration of digital technologies and the operationalization of coffee shops in highland areas, several efforts were required to improve the quality and functionality of internet services. These efforts included:1) Utilizing satellite technology, specifically by employing satellite internet services to provide connectivity in remote highland regions, thereby ensuring easier access to the internet; 2) Developing broadband infrastructure, through collaborations with Internet Service Providers (ISPs) to expand broadband coverage in highland areas, either by extending fiber optic cables or installing additional wireless towers to ensure stable internet connectivity; 3) Advocating for government-supported programs aimed at increasing internet access in highland regions; 4) Implementing mesh Wi-Fi networks, which enabled strong and consistent wireless internet coverage throughout coffee shop facilities in the highlands; 5) Utilizing 4G LTE or 5G networks, especially in areas where mobile broadband was available, to provide high-speed internet access without the need for wired connections; and 6) Investing in high-quality internet equipment, including routers, modems, and signal boosters, to ensure reliable and uninterrupted connectivity in highland coffee shop operations.

H_3: Influence direct variable Y2 to Y3

Figure 5 and Table 5 present the direct influence of variable Y2 (Consumer Loyalty) on Y3 (Coffee Shop Sustainability), with a marked regression coefficient (b) of 0.473, a standardized regression coefficient (β) of 0.489, and a p-value (ρ) of 0.003. These results indicate that the direct influence of variable Y2 on Y3 was positive and significant (Hair Jr et al., 2021; Kwak, 2023; Lee et al., 2018; Wellek, 2021), indicating that a 100% increase in Y2 led to a 47.3% increase in Y3, assuming that other variables remained constant. The resulting changes were inelastic, as the proportional increase in Y2 exceeded that in Y3.

This finding was significant because Y2 (Consumer Loyalty) represented consumer behaviors and attitudes that demonstrated high levels of commitment to purchasing products from highland coffee shops. This loyalty was reflected in various actions, such as making regular purchases, buying in larger quantities, recommending the coffee shop to others, and purchasing product line extensions like specialty coffee, espresso-based beverages, packaged beans, brewing equipment, branded mugs, and merchandise (e.g., t-shirts, bags, accessories, and hats). Such consumer loyalty contributed to higher, stable, and sustainable income streams for coffee shops. Moreover, consumer loyalty helped build a strong brand reputation, attracted new customers, improved operational efficiency, and supported the professional management of the business. Accordingly, the opportunity for coffee shops in highland regions to survive, grow, and remain sustainable is greatly enhanced, both now and in the future. Loyal consumers, therefore, played a key role in sustaining highland coffee shop businesses.

Remember that Y2 (Consumer Loyalty) is a latent variable; therefore, Given that Y2 (Consumer Loyalty) is a latent variable, to identify the most contributing and significant indicators, one can examine the factor loading values the factor loading values must be examined to determine which indicators contribute most significantly. Based on Figure 5 and Table 6, the highest loading factor value for the latent variable Y2 is 0.719, which is found in Y2.5, the indicator of "increasing repeat purchase". As shown in Figure 5 and Table 6, the indicator with the highest loading factor (0.719) for the latent variable Y2 was Y2.5, which represents "increased repeat purchase." This result indicates that the condition of Y2 (Consumer Loyalty) in coffee shops in the highlands is predominantly explained by the indicator "increased repeat purchase". This finding suggests that consumer loyalty in highland coffee shops was predominantly driven by increased repeat purchases. The indicator reflected a strong

commitment to purchasing coffee products from highland shops (Kim et al., 2020). Such loyalty emerged from consumer satisfaction with product quality, a pleasant store atmosphere, excellent service, and the availability of extended product lines, which met their expectations or desires (Yum & Yoo, 2023). Hence, it is reasonable that consumers made purchases in larger quantities, particularly because of the high quality of original highland coffee—a defining factor in mountainous regions. In addition to brewed coffee, extended product lines such as lattes, espressos, and cappuccinos also contributed to repeat purchases. Moreover, consumers often purchased additional merchandise to take home, such as packaged coffee beans or ground coffee, branded mugs or tumblers, and t-shirts featuring mountain coffee shop designs. Furthermore, consumers promoted the coffee shop to family members, friends, colleagues, and guests, thereby increasing visits and customer traffic to highland coffee shopsa. An increase in repeat purchases has positively influenced the stability and growth of revenue or operational profits for coffee shops in the highlands. The profits generated can be utilised to improve the welfare of employees, owners, coffee farmers, and surrounding communities. Moreover, these profits can be reinvested in various strategic activities aimed at sustaining and increasing repeat purchases in highland coffee shops, including: 1) Enhancing the aroma quality of signature highland coffee by sourcing optimally ripened coffee beans harvested at the right time; 2) Developing product innovations by incorporating local and traditional ingredients to create unique and innovative beverages that appeal to consumers; 3) Expanding the product line, including merchandise offerings related to the highland coffee experience; 4) Strengthening brand image and consumer loyalty by highlighting product uniqueness, scenic natural settings, consistent quality and service, special treatment for loyal customers, and engaging social media content that enhances recognizability and consumer interest; 5) Investing in employee development, particularly baristas, through training and education to improve their skills and enhance service quality to consumers; 6) Upgrading and enhancing coffee shop facilities through repairs and renovations to create a more comfortable, visually appealing, and engaging store atmosphere that attracts new and returning consumers; 7) Leveraging opportunities in coffee education and tourism by offering experiential programs where consumers can learn firsthand about coffee cultivation, harvesting, and processing—while enjoying the scenic beauty of the highlands. Such programs offer memorable experiences that enhance consumer engagement and loyalty.

H_4: Variable X does not directly influence Y3

Figure 5 and Table 5 show the direct influence of variable X (Product) on Y3 (Coffee Shop Sustainability), with a p-value (ρ) of 0.052 (> 0.05), indicating a non-significant effect. Thus, variable X does not directly influence Y3. This finding contradicts previous research results Ferreira & Ferreira (Ferreira & Ferreira, 2018) explained that product-related variables, such as coffee drinks, play a significant role in supporting the sustainability of coffee shops in China.

These findings highlight the need for a mediator variable to bridge the relationship between X and Y3 and explain the indirect influence of X on Y3. In this study, the proposed mediator variables are Y1 (Store Atmosphere) and Y2 (Consumer Loyalty), based on previous research findings suggesting that X (Product)—with its unique taste and aroma—affects the sensory experience, thereby creating a more pleasant store atmosphere (Y1) for consumers. Furthermore, a pleasant store atmosphere (Y1) significantly influences consumer loyalty (Y2) in coffee shops. Therefore, Y1 and Y2 help explain the indirect influence of X on Y3. In summary, Y1 and Y2 act as mediator variables forming a sequential mediation path—also known as serial mediation—where X influences Y1, which then influences Y2, and ultimately affects Y3.

H_5: Variable X has an indirect effect on Y3 through Y1 and Y2

Figure 5 and Table 5 show that variable X (Product) does not have a direct effect on Y3, but has an indirect effect through Y1 and Y2, as explained below: 1) The influence of X on Y1 is positive and significant, indicated by a standardized regression coefficient (β) of 0.887 and a p-value of 0.002 (< 0.05); 2) The direct influence of Y1 on Y2 is positive and significant, with a standardized regression coefficient (β) of 0.714 and a p-value (ρ) of 0.003 (< 0.05); 3) The direct influence of Y2 on Y3 is also positive and significant, indicated by a standardized regression coefficient (β) of 0.489 and a p-value (ρ) of 0.003 (< 0.05); 4) Meanwhile, the direct influence of X on Y3 is not significant, as indicated by a p-value (ρ) of 0.052 (> 0.05). These results suggest that X influences Y3 indirectly, through the mediator variables Y1 and Y2, rather than directly. However, to confirm whether Y1 and Y2 function as mediating variables, it is necessary to conduct a statistical mediation test as previously noted.

To test the significance of the two mediators—Y1 and Y2—in the context of serial mediation (X → Y1 → Y2 → Y3), the bootstrapping method is applied. The primary objective of the bootstrapping test is to determine the significance of the indirect effect of the independent variable (X) on the dependent variable (Y3) through more than one mediating variable. The results of this bootstrap test are presented in Table 7.

Table 7. Bootstrap Test Results for Mediator Variables Y1 and Y2

Path between Variables	Standardized Indirect Effects (β*)	P-values (ρ)	Interpretation
X ⟶ Y1 ⟶ Y2	0.634	0.002	Significant

Path between Variables	Standardized Indirect Effects (β*)	P-values (ρ)	Interpretation
Y1 → Y2 → Y3	0.349	0.003	Significant
X → Y1 → Y2 → Y3	0.310	0.002	Significant
X → Y3	0.290	0.052	No significant

Source: Bootstrapping results processed by the author using SEM-AMOS (2024).

Table 7 shows that the two mediator variables, Y1 and Y2, are significant, as indicated by a p-value (ρ) of 0.002 (< 0.05). This result confirms that Y1 and Y2 serve as significant mediators that connect the independent variable (X) with the dependent variable (Y3). Thus, the hypothesis stating that variable X has no direct effect on Y3, but instead exerts an indirect effect through Y1 and Y2, is supported. This research identifies a mediation chain, also known as serial mediation, a phenomenon that has rarely been examined in previous studies related to coffee agribusiness.

The identification of serial mediation highlights a critical phenomenon that enhances the theoretical and empirical understanding of the relationships among variables in a logical, gradual, and structured sequence. Thus, serial mediation offers valuable insights for entrepreneurs in designing strategic policies or implementing targeted interventions in real-world contexts to enhance the sustainability of coffee shops. In relation to these findings, Hair et al. (Hair Jr et al., 2021) explain that serial mediation occurs when the influence of an independent variable (X) on a dependent variable (Y3) is transmitted indirectly through two or more mediator variables (e.g., Y1 and Y2) that are sequentially related. In this case, the effect of X on Y3 passes first through Y1 and then through Y2.

These findings provide empirical support for theoretical frameworks suggesting that Y1 and Y2 act as mediators in transmitting the influence of X to Y3. This form of serial mediation describes a hierarchical process in which each mediator transmits influence to the next, offering deeper insight into the mechanisms that connect the independent variable (X) to the dependent variable (Y3). Hence, analyzing mediator variables becomes essential in research aimed at understanding and intervening in complex behavioral or systemic processes. A deeper understanding of serial mediation contributes meaningfully to the enrichment of academic literature in fields such as coffee agribusiness, consumer behavior, experiential marketing, business sustainability, and applied statistics. Moreover, it helps identify key indicators of strategic variables—particularly those with the highest loading factors—allowing stakeholders to formulate targeted interventions and strategic policies that enhance the sustainability of coffee shops in highland regions globally.

This result is in harmony with previous research findings, as follows: Ibrahim (Ibrahim et al., 2021) indicated the occurrence of serial mediation involving brand trust and brand loyalty as mediators in the relationship between social media marketing activities and the intention to visit, based on reposted content on the Facebook pages of coffee shops in North Cyprus.

CONCLUSION

Based on the results of the research and its discussion, it can be concluded that the product variable had a direct effect on store atmosphere, store atmosphere had a direct effect on consumer loyalty, and consumer loyalty had a direct effect on coffee shop sustainability in highland areas. However, the product variable did not have a direct effect on coffee shop sustainability, thereby indicating a serial mediation effect. The most dominant indicators contributing to each variable were aroma (product), internet facilities (store atmosphere), and repeat purchases (consumer loyalty). These findings contributed significantly to the advancement of knowledge in the fields of consumer behavior, experiential marketing, business sustainability, and applied statistics.

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