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Establishing an Instrument for the Assessment of Green Packaging Practices in Small and Medium-Sized Food Service Enterprises

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Abstract
Sustainable packaging has become a key driver of environmental responsibility in the global food service industry. However, tools to measure green packaging practices among small and medium-sized food service enterprises remain limited. This study fills that gap by developing and validating a multidimensional instrument tailored to the specific operations of these enterprises. Using an exploratory sequential mixed-methods approach, qualitative interviews with eight small and medium-sized food service enterprise owners identified core sustainability concepts, which guided the development of a 20-item, four-point Likert scale questionnaire. A sample of 385 small and medium-sized food service enterprise owners, selected using Cochran's formula, was surveyed to test the tool. Exploratory Factor Analysis (EFA) revealed four underlying factors—branding, functions, pricing, and appearance—that explained 51.40% of the total variance. Confirmatory Factor Analysis (CFA) confirmed the model's strength, showing excellent fit indices (CFI = 1.000, TLI = 1.000, RMSEA = 0.010), while Cronbach's alpha coefficients (0.707–0.868) indicated high internal consistency. The findings highlight the dual necessity of integrating sustainability into brand identity while balancing functionality, cost, and visual appeal. This instrument provides a rigorous, empirically validated framework for assessing green packaging practices among small and medium-sized food service enterprises, supporting comparative research across contexts and guiding policy development. Beyond academic value, the instrument offers practitioners practical metrics to align environmental objectives with competitive advantage amid rising consumer demand for sustainable options.

Keywords: Green Packaging, Small and Medium-Sized Food Service Enterprises, Factor Analysis

Introduction

The rise of plastic use in food packaging dates to the mid-20th century, when it became the main material for preserving food and making modern food consumption more convenient (Briley, 2020). In the 1960s, disposable plastic packaging, particularly single-use items such as utensils, cups, and containers, became increasingly common in the global food service industry (Swope, 2020). This change was primarily driven by the increased demand for fast food, take-out, and delivery services, which required cost-effective and efficient methods for storing and transporting food. However, by the 1990s, the environmental impact of plastic waste started to become clear, with scientists and environmentalists warning of the long-term effects of its non-biodegradability (Moshood et al., 2022).

A pivotal moment that underscored the severity of the plastic waste crisis happened in 1997 with the discovery of the Great Pacific Garbage Patch, a huge mass of plastic debris floating in the Pacific Ocean (Hogan, 2023). Since then, the problem of plastic pollution has attracted growing global attention, leading to many legislative efforts to cut plastic use. The European Union, for example, passed directives in 2019 that banned single-use plastics by 2021, and similar measures have been implemented in countries such as Canada and India (Knoblauch & Mederake, 2021). These regulations are not only a response to increasing environmental concerns but also a clear sign that businesses, especially in the food service industry, must adopt more sustainable packaging practices.

Despite global efforts, the food service industry still faces challenges in balancing operational efficiency and sustainability. According to a study by Pålsson & Sandberg (2022), the adoption of green practices, including eco-friendly packaging, remains slow—especially among small and medium-sized food service enterprises—due to perceived higher costs, limited access to sustainable materials, and low consumer awareness. Additionally, food packaging waste continues to make up a large part of global plastic waste, with the World Economic Forum (Thornton, 2020) reporting that nearly 8 million tons of plastic packaging end up in the oceans each year (Williams & Rangel-Buitrago, 2022).

The study addresses these historical and ongoing challenges. Since small and medium-sized enterprises make up most of the food service providers worldwide (Jeong et al., 2021), their role in reducing packaging waste is crucial. However, a study by Prabowo and Soekardi (2023) shows that although consumers are increasingly demanding sustainable packaging, small and medium-sized food service enterprises face obstacles in adopting green packaging into their models. This situation creates an opportunity for the current study to develop a tool for assessing the implementation of green packaging practices, aligning with sustainability goals without damaging the business brand.

Materials and Methods

The study used an exploratory sequential design, a mixed-methods approach that started with a qualitative phase to explore and understand key themes, perspectives, or phenomena. Insights from this phase were then used to develop an assessment where data were collected and analyzed to validate, generalize, or extend the qualitative findings. This sequential process ensured a thorough understanding of the phenomena under study. An interview method was employed to gather initial insights into the topic. The interview guide included sections on the co-participant's background, a greeting, opening questions, content questions, and closing instructions or questions. The content questions asked the eight (8) co-participants or owners of small and medium-sized food service enterprises about the green packaging practices they implement. These owners were selected through purposive sampling, with three (3) from cafes, two (2) from restaurants, two (2) from catering services, and one (1) from a food truck. As decision-makers in business practices, especially regarding packaging choices, they can provide informed insights into green packaging adoption. They also demonstrated a willingness to explore or had already adopted sustainable practices, making them suitable for assessing their green packaging practices and the related business performance. Table 1 displays the results of the content validity test for the interview guide.

The collected interview data went through six (6) steps of thematic analysis: familiarization, initial coding, searching for themes, refining themes, and defining themes. These themes were used for developing the constructs. The results are presented in Table 2. These constructs were used to create a questionnaire with a four-point Likert scale, where 1 indicated Strong Disagree, 2 indicated Disagree, 3 indicated Agree, and 4 indicated Strong Agree. The established questionnaire was distributed to 385 participants who were also owners of small and medium-sized food service enterprises. It was being computed using Cochran's Sample Size Formula with a set confidence level of 95% with a corresponding z-score of 1.96, a standard deviation of 50% (0.5), and a confidence interval of 5% (0.05).

Table 1: Content Validity Result

Criteria	Construct	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	CVI
Ethical Consideration	1. The purpose of the study	1	1	1	1	1	100%
	2. A confidentiality clause is mentioned or stated.	1	1	1	1	1	100%
	3. A choice clause is included.	1	1	1	1	1	100%
	4. The procedures for the conduct of the study are stated.	1	1	1	1	1	100%
	5. The participant (s) are informed of the duration of the study.	1	1	1	1	1	100%
	6. Informed consent is included.	1	1	1	1	1	100%
	Content Validity Index (CVI)						100%
ti on of Q	7. An introduction that allows the interviewer to introduce himself/herself is included.	1	1	1	1	1	100%

	8. Questions are written in the 5W and I h manner.	1	1	1	1	1	100%
	9. Questions are short and can easily be understood by the participants.	1	1	1	1	1	100%
	10. Questions are appropriate to the topic.	1	1	1	1	1	100%
	11. Questions allow storytelling or narration of experiences.	1	1	1	1	1	100%
	Content Validity Index (CVI)						100%
Accuracy/Thoroughness of Questions	12. Questions are open-ended.	1	1	1	1	1	100%
	13. Questions are positively stated.	1	1	1	1	1	100%
	14. Follow-up questions are included.	1	1	1	1	1	100%
	15. Questions are deductively arranged. They are the highest priority for information questions rather than opinion questions.	1	1	1	1	1	100%
	16. Questions are stated in clear/precise, and simple words.	1	1	1	1	1	100%
	17. Entire questions can be covered within an hour.	1	1	1	1	1	100%
	18. The main questions are not more than 10 items for every research question.	1	1	1	1	1	100%
	Content Validity Index (CVI)						100%
	Average CVI						100%

Note. The items were adopted from “Heading to English Music and Songs Enhances Listening Skills” by S. O. Solanon, C. A. Idong, A. E. San Jose, and M. G. Robles Concepcion, 2020, International Journal of New Economics and Social Sciences, 12(2), p 134.

The survey responses were first coded and systematically organized in Microsoft Excel, then saved in CSV (comma-separated values) format to ensure compatibility with statistical software. The dataset was subsequently imported into Jamovi version 2.6.17, a free and open-source platform for statistical analysis. Within Jamovi, the data was cleaned and prepared, allowing the necessary computations and transformations of variables to be carried out for meaningful analysis. The statistical procedures included Exploratory Factor Analysis (EFA) to identify the underlying factor structure, Confirmatory Factor Analysis (CFA) to validate the identified model, and Structural Equation Modeling (SEM) for path analysis to examine relationships among factors. These analyses were performed to determine how the 20 survey items could be grouped into a smaller set of factors that best represent the constructs being measured. Through this process, a reliable and valid assessment instrument for evaluating the green packaging practices of small and medium-sized food service enterprises was developed.

Table 2: List of Developed Constructs

List of Constructs			
C1. The business uses biodegradable materials (e.g., sugarcane, bagasse, compostable straws, paper cups) to reduce plastic pollution.	C6. The business utilizes minimalist and eco-friendly designs (e.g., simple, natural, earth-toned designs) to emphasize sustainability.	C11. Sustainability is a core brand value, and the business itself is environmentally responsible through packaging.	C16. The business balances the higher cost of green packaging with budget-friendly strategies.
C2. Efforts are made to minimize packaging waste using reusable or recyclable materials.	C7. Recycling symbols, eco-friendly palettes, and labels are incorporated into the packaging.	C12. Packaging includes eco-friendly logos and awareness messages to reinforce sustainability.	C17. Customers are educated about why sustainable packaging may lead to slightly higher pricing.
C3. The business promotes eco-friendly practices through packaging choices and customer incentives (e.g., discounts for reusable packaging).	C8. Packaging balances aesthetic appeal with eco-friendliness, ensuring biodegradable materials remain visually appealing.	C13. Green branding is used to engage and connect with eco-conscious consumers.	C18. Minimalist packaging is used to reduce unnecessary materials and lower production costs.
C4. Packaging is designed for functionality and convenience, such as stackable or easy-to-use containers.	C9. Customization and creativity are applied in packaging designs (e.g., transparent, compact packaging).	C14. Social media and promotional efforts (e.g., eco-friendly events, recycling incentives) are leveraged to reinforce sustainable branding.	C19. Incentives or discounts are offered to customers who return packaging or use reusable containers.
C5. The business considers customer awareness in packaging choices to support sustainable initiatives.	C10. Packaging enhances brand identity while maintaining environmental responsibility.	C15. The business ensures that its packaging communicates its commitment to environmental sustainability.	C20. Cost considerations do not compromise the quality and sustainability of packaging materials.

Results and Discussion

A. Exploratory Factor Analysis

In Table 3, the descriptive statistics show generally high mean scores across all 20 items, ranging from 3.19 (C19) to 3.46 (C2) on a four-point Likert scale. This indicates that respondents mostly agree with the statements about green packaging practices. Standard deviations between 0.68 and 0.85 suggest relatively low variation in responses, reflecting a strong consensus among participants. The negative skewness values for all items (from –0.832 to –1.324) indicate responses are skewed toward the higher end of the agreement scale, confirming participants' positive attitude toward green packaging practices. Most kurtosis values are slightly positive, implying responses tend to cluster around the mean score. The Shapiro-Wilk test results ($p < 0.001$) suggest non-normality, which is common for ordinal survey data and does not prevent the use of factor analysis when the sample size is sufficient.

The EFA in Table 4 identified four distinct but related factors representing different aspects of green packaging practices. Items C14, C13, C12, C11, C15, and C10 load strongly on Factor 1, which focuses on branding. It reflects how small and medium-sized food service enterprises incorporate eco-friendly symbols, sustainability messaging, and promotional activities to reinforce their environmental commitment and strengthen brand identity. Factor 2, comprising C3, C2, C4, C1, and C5, focuses on functions that emphasize the practical use of sustainable materials, waste reduction, and design functionality, aligning with customer awareness and eco-conscious behaviors. Factor 3, including C17, C16, C19, C20, and C18, pertains to pricing, highlighting how businesses manage cost implications, educate consumers about price changes, balance expenses without sacrificing quality, and adopt cost-saving practices such as minimalist packaging and return incentives. Factor 4, comprising C6, C7, and C8, addresses appearance, focusing on design elements that maintain visual appeal while following eco-friendly principles, such as minimalist styles, natural colors, and visible sustainability symbols. The communalities range from 0.37 to 0.704, indicating that most items share a significant amount of variance with their respective factors. The extraction method ("minimum residual" with oblimin rotation) is appropriate given the expectation of factor correlation, as shown in Table 6.

Table 3: Descriptive Output for the Twenty Items of the Assessment of Green Packaging Practices

Construct	N	Mean	Standard Deviation	Min	Max	Skewness		Kurtosis		Shapiro-Wilk	
						Skewness	SE	Kurtosis	SE	W	p
C1	385	3.41	0.713	1	4	-1.047	0.124	0.6806	0.248	0.744	<0.001
C2	385	3.46	0.680	1	4	-1.244	0.124	1.6015	0.248	0.715	<0.001
C3	385	3.34	0.800	1	4	-1.046	0.124	0.4421	0.248	0.762	<0.001
C4	385	3.37	0.761	1	4	-1.067	0.124	0.5998	0.248	0.753	<0.001
C5	385	3.36	0.775	1	4	-0.988	0.124	0.2331	0.248	0.759	<0.001
C6	385	3.38	0.705	1	4	-1.016	0.124	0.8604	0.248	0.751	<0.001
C7	385	3.30	0.765	1	4	-0.916	0.124	0.3982	0.248	0.779	<0.001
C8	385	3.43	0.754	1	4	-1.324	0.124	1.4909	0.248	0.721	<0.001
C9	385	3.28	0.795	1	4	-0.971	0.124	0.5015	0.248	0.781	<0.001
C10	385	3.45	0.706	1	4	-1.286	0.124	1.6737	0.248	0.718	<0.001
C11	385	3.39	0.752	1	4	-1.215	0.124	1.2789	0.248	0.739	<0.001
C12	385	3.28	0.769	1	4	-0.832	0.124	0.1354	0.248	0.788	<0.001
C13	385	3.30	0.775	1	4	-0.978	0.124	0.5712	0.248	0.776	<0.001
C14	385	3.36	0.769	1	4	-1.072	0.124	0.6220	0.248	0.755	<0.001
C15	385	3.38	0.755	1	4	-1.120	0.124	0.8612	0.248	0.749	<0.001
C16	385	3.31	0.765	1	4	-0.946	0.124	0.4483	0.248	0.775	<0.001
C17	385	3.24	0.795	1	4	-0.835	0.124	0.1430	0.248	0.796	<0.001
C18	385	3.28	0.814	1	4	-1.029	0.124	0.5511	0.248	0.775	<0.001
C19	385	3.19	0.852	1	4	-0.851	0.124	0.0497	0.248	0.803	<0.001
C20	385	3.29	0.822	1	4	-1.037	0.124	0.4851	0.248	0.772	<0.001

Some studies have shown alignment with the four (4) factors, which are branding, functions, pricing, and appearance, each grounded in meaningful constructs. For instance, Branca et al. (2024) systematic literature review emphasizes the importance of sustainable packaging cues and consumer perception, which align closely with both branding and appearance. Krah et al. (2019) found that eco-label visibility can mitigate trade-offs between usability and sustainability, supporting functions and appearance. Nohekhan and Barzegar (2024) show that green marketing strategies significantly enhance brand awareness in food exporters, lending support to branding. Restaurantware (2025) highlights that cost benefits and economies of scale make green packaging financially viable over time, reinforcing pricing. The role of social media in elevating green branding and purchase intentions, underlining the branding (Saleena et al, 2025).

As shown in Table 5, the four-factor model explains 51.40% of the total variance, which is sufficient for social science research given the complexity of behavioral constructs. Factor 1 accounts for the largest portion (15.94%), followed closely by Factor 2 (15.32%), with Factors 3 and 4 explaining 12.05% and 8.09%, respectively. This indicates that branding and functions are the most significant aspects of green packaging practices according to the participants.

The inter-factor correlations shown in Table 6 are all positive and range from moderate to high (0.497–0.734), confirming that the four identified factors are related but still distinct. The strongest correlation occurs between Factor 1 (branding) and Factor 2 (functions), indicating that organizations engaging in sustainable branding also tend to adopt eco-friendly material strategies. The lowest, though still notable, correlation is between Factor 3 (pricing) and Factor 4 (appearance), suggesting these areas are more independent.

Table 4: Factor Loadings for the Twenty Items of the Assessment of Green Packaging Practices (EFA)

Factor Loadings	Factor				Uniqueness	Communality
	1	2	3	4		
C14. Social media and promotional efforts (e.g., eco-friendly events, recycling incentives) are leveraged to reinforce sustainable branding.	0.698				0.434	0.566
C13. Green branding is used to engage and connect with eco-conscious consumers.	0.661				0.385	0.615
C12. Packaging includes eco-friendly logos and awareness messages to reinforce sustainability.	0.620				0.419	0.581
C11. Sustainability is a core brand value, and the business itself is environmentally responsible through packaging.	0.585				0.535	0.465
C15. The business ensures that its packaging communicates its commitment to environmental sustainability.	0.431				0.558	0.442
C10. Packaging enhances brand identity while maintaining environmental responsibility.	0.430				0.567	0.433
C3. The business promotes eco-friendly practices through packaging choices and customer incentives (e.g., discounts for reusable packaging).		0.852			0.296	0.704
C2. Efforts are made to minimize packaging waste using reusable or recyclable materials.		0.635			0.466	0.534
C4. Packaging is designed for functionality and convenience, such as stackable or easy-to-use containers.		0.599			0.410	0.59
C1. The business uses biodegradable materials (e.g., sugarcane, bagasse, compostable straws, paper cups) to reduce plastic pollution.		0.548			0.370	0.63
C5. The business considers customer awareness in packaging choices to support sustainable initiatives.		0.446			0.506	0.494
C9. Customization and creativity are applied in packaging designs (e.g., transparent, compact packaging).					0.575	0.425
C17. Customers are educated about why sustainable packaging may lead to slightly higher pricing.			0.767		0.403	0.597
C16. The business balances the higher cost of green packaging with budget-friendly strategies.			0.750		0.419	0.581
C19. Incentives or discounts are offered to customers who return packaging or use reusable containers.			0.515		0.587	0.413
C20. Cost considerations do not compromise the quality and sustainability of packaging materials.			0.420		0.630	0.37
C18. Minimalist packaging is used to reduce unnecessary materials and lower production costs.			0.407		0.533	0.467
C6. The business utilizes minimalist and eco-friendly designs (e.g., simple, natural, earth-toned designs) to emphasize sustainability.				0.595	0.473	0.527
C7. Recycling symbols, eco-friendly palettes, and labels are incorporated into the packaging.				0.425	0.627	0.373
C8. Packaging balances aesthetic appeal with eco-friendliness, ensuring biodegradable materials remain visually appealing.				0.423	0.525	0.475

Note: 'Minimum residual' extraction method was used in combination with an 'oblimin' rotation.

Table 5: Summary of Factor Statistics Including Variance Explained

Factor	SS Loadings	% of Variance	Cumulative %
1	3.19	15.94	15.90
2	3.06	15.32	31.30
3	2.41	12.05	43.30
4	1.62	8.09	51.40

Table 6: Inter-Factor Correlations Among the Four Extracted Factors

Factor	1	2	3	4
1	-	0.734	0.633	0.571
2		-	0.593	0.564
3			-	0.497
4				-

Table 7: Model Fit Indices of the Four-Factor Solution

RMSEA (90% CI)			TLI	BIC	Model Test		
RMSEA	Lower	Upper			χ^2	df	p
0.0503	0.0408	0.0600	0.948	-461	229	116	<0.001

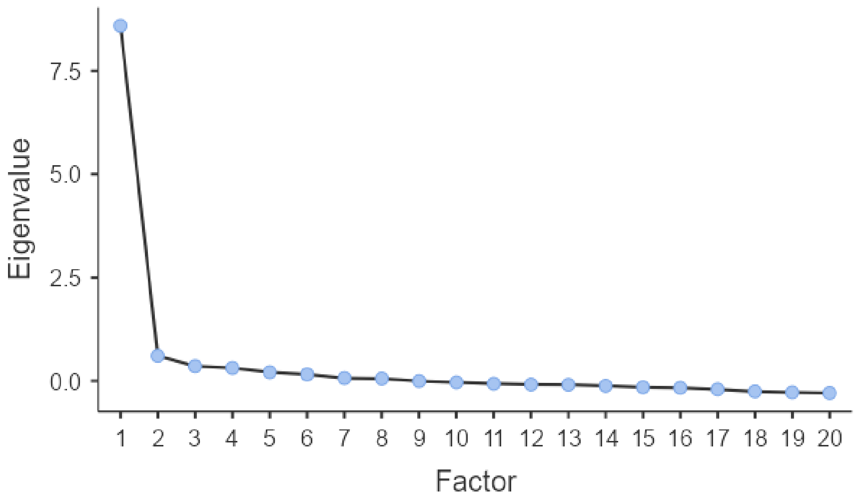
The model fit statistics in Table 7 support the adequacy of the four-factor structure. The Root Mean Square Error of Approximation (RMSEA) value of 0.0503 (90% CI: 0.0408–0.0600) indicates a good fit, as it falls below the conventional cutoff of 0.06. The Tucker-Lewis Index (TLI) of 0.948 further suggests strong model performance. Although the chi-square test is significant ($p < 0.001$), this is expected with large samples and does not necessarily indicate poor fit when other indices are satisfactory. The negative Bayesian Information Criterion (BIC) value (–461) suggests that the four-factor solution is more parsimonious than a null model.

Table 8: Kaiser-Meyer-Olkin (KMO) Measures of Sampling Adequacy

Overall	0.951
C1	0.955
C2	0.957
C3	0.954
C4	0.940
C5	0.962
C6	0.938
C7	0.939
C8	0.955
C9	0.971
C10	0.956
C11	0.956
C12	0.947
C13	0.965
C14	0.953
C15	0.948
C16	0.927
C17	0.931
C18	0.964
C19	0.938
C20	0.950

In Table 8, the overall KMO value of 0.951 exceeds the recommended threshold of 0.90, indicating superb sampling adequacy. Individual item KMOs also exceed 0.92, confirming that each variable shares substantial variance with the others and is appropriate for inclusion in the factor analysis. On the other hand, Bartlett's test yielded a Chi-Square (χ^2) value of 3,787 (df = 190, $p < 0.001$), confirming that the correlation matrix is not an identity matrix and that the variables are sufficiently interrelated to justify factor analysis. Meanwhile, the initial eigenvalues indicate that only Factor 1 has an eigenvalue substantially greater than 1 (8.59), with subsequent values dropping sharply: Factor 2, 0.61; Factor 3, 0.36; and Factor 4, 0.31. However, the decision to retain four factors was supported by parallel analysis and the scree plot (Figure 1), which indicated a clear point of inflection after the fourth factor.

Figure 1: Scree Plot of Eigenvalues for the Twenty Items Green Packaging Practices Assessment



The scree plot in Figure 1 shows a steep decline from Factor 1 to Factor 4, followed by a gradual flattening of the curve, consistent with Cattell's scree test criterion for factor retention. This visual evidence supports the four-factor solution, aligning with both theoretical expectations and statistical fit indices.

B. Confirmatory Factor Analysis

All standardized factor loadings in Table 9 ranged from 0.442 to 0.639 and were statistically significant at $p < 0.001$, indicating that each observed indicator contributed meaningfully to its respective latent construct. Factor 1 demonstrated moderate to strong loadings (0.442–0.599), reflecting the robustness of branding items. Factor 2 exhibited the highest loading (C3 = 0.639), suggesting that functional eco-friendly design elements were the most salient predictors of function. Factors 3 and 4 likewise achieved satisfactory loadings above the typical minimum practical significance threshold of 0.40 (Hair et al., 2020), confirming convergent validity. These results provide empirical support for the hypothesized four-dimensional model of green packaging practices.

As seen in Table 10, the factor covariances were all positive, high, and statistically significant ($p < 0.001$), ranging from 0.758 to 0.864. The strongest covariance was observed between Factor 1 and Factor 2 (0.864), indicating a strong interrelationship between branding and functions. This suggests that the enterprises that excel in conveying sustainability messages often also implement functional green design features, reinforcing the multidimensional yet interconnected nature of green packaging practices. The relatively lower, though still substantial, covariance between Factor 3 and Factor 4 (0.761) reflects that pricing and appearance are moderately associated but remain distinct.

Table 9: Standardized Factor Loadings for the Four-Factor Model (CFA)

Factor	Indicator	Estimate	SE	Z	p
Factor 1	C14	0.562	0.0350	16.1	<0.001
	C13	0.599	0.0344	17.4	<0.001
	C12	0.584	0.0344	17.0	<0.001
	C11	0.498	0.0354	14.1	<0.001
	C15	0.508	0.0353	14.4	<0.001
	C10	0.442	0.0337	13.1	<0.001
Factor 2	C3	0.639	0.0350	18.3	<0.001
	C2	0.492	0.0310	15.9	<0.001
	C4	0.572	0.0341	16.8	<0.001
	C1	0.565	0.0313	18.1	<0.001
	C5	0.548	0.0356	15.4	<0.001
Factor 3	C17	0.580	0.0373	15.5	<0.001
	C16	0.547	0.0361	15.2	<0.001
	C19	0.553	0.0413	13.4	<0.001
	C20	0.500	0.0405	12.3	<0.001
	C18	0.569	0.0386	14.7	<0.001
Factor 4	C6	0.469	0.0348	13.5	<0.001
	C7	0.474	0.0388	12.2	<0.001

	C8	0.539	0.0369	14.6	<0.001

Table 10: Factor Covariances in the Confirmatory Factor Analysis

Factor		Estimate	SE	Z	p
Factor 1	Factor 1	1.000[a]			
	Factor 2	0.864	0.0222	39.0	<0.001
	Factor 3	0.799	0.0299	26.8	<0.001
	Factor 4	0.823	0.0345	23.9	<0.001
Factor 2	Factor 2	1.000[a]			
	Factor 3	0.758	0.0325	23.3	<0.001
	Factor 4	0.836	0.0329	25.4	<0.001
Factor 3	Factor 3	1.000[a]			
	Factor 4	0.761	0.0407	18.7	<0.001
Factor 4	Factor 4	1.000[a]			

Legend: [a] Fixed parameter

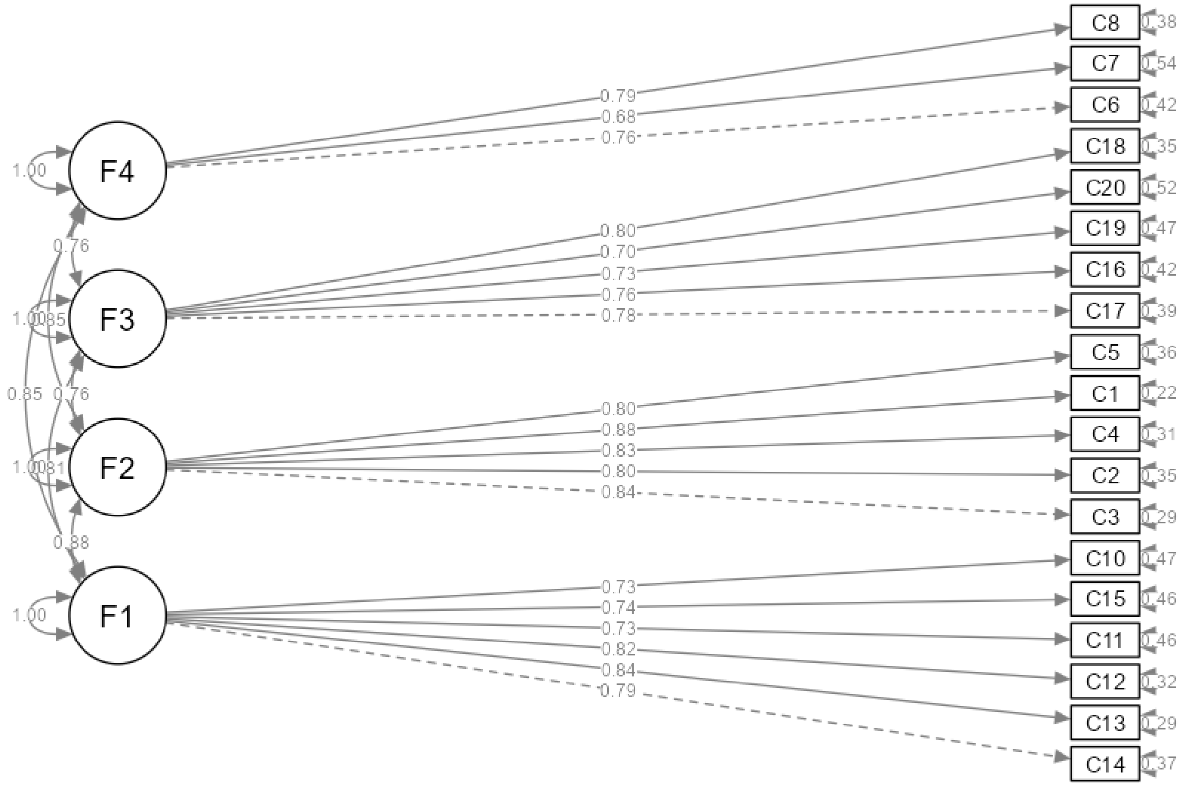
Table 11: Model Fit Indices for Structural Equation Models

Index	Criteria	Model
CMIN/df	< 2.00 / < 3.00	151/146 = 1.03
p-value	> 0.05	0.368
CFI	> 0.95	1.000
TLI	> 0.95	1.000
GFI	> 0.95	0.966
SRMR	< 0.08	0.039
RMSEA	<0.03 (superior); <0.05 (good); < 0.08 (mediocre)	0.010

In Table 11, the Chi-square value ($\chi^2 = 312$, df = 146, $p < 0.001$) in the test of exact fit was statistically significant, which is common in large samples due to the test's sensitivity (Alavi et al., 2016). While the p-value indicates some deviation from exact fit, the CFA yielded excellent model fit indices measures: Comparative Fit Index (CFI) = 0.952 and TLI = 0.944 exceeded the 0.90 benchmark and approached the stricter 0.95 criterion (McNeish & Wolf, 2023). The Root Mean Square Residual (SRMR) value (0.0364) fell well below the 0.08 threshold, while the RMSEA (0.0544, 90% CI = 0.0461–0.0627) indicated a good fit, as values below 0.06 are considered ideal. The Akaike Information Criterion (AIC) and BIC values provide a baseline for model comparison in potential future refinements with values 13569 and 13818, respectively. Collectively, these indicators confirm that the four-factor CFA model adequately represents the observed data. This demonstrated that the model fit the data well, aligning with recommendations to rely on multiple fit indices rather than chi-square alone.

When tested through Structural Equation Modeling, the model achieved an exceptional fit as seen in Table 11: Chi-Square Minimum Discrepancy Function (CMIN) / degrees of freedom (df) = 1.03, p = 0.368, CFI = 1.000, TLI = 1.000, Goodness of Fit Index (GFI) = 0.966, SRMR = 0.039, and RMSEA = 0.010. All indices met or exceeded recommended thresholds, with CFI and TLI achieving perfect values, indicating that the hypothesized structural relationships among the four factors were strongly supported by the data. The superior RMSEA value (< 0.03) highlights the model's parsimonious and precise representation of the constructs.

Figure 2: Path Diagram of the Four-Factor Confirmatory Factor Analysis Model



The path diagram in Figure 2 visually depicts the four latent variables, branding (F1 or Factor 1), functions (F2 or Factor 2), pricing (F3 or Factor 3), and appearance (F4 or Factor 4), and their corresponding observed indicators. The standardized loadings shown in the diagram confirm the statistical results in Table 9, while the bidirectional arrows among factors reflect the high covariances presented in Table 10. This visual representation reinforces the multidimensional yet highly interconnected structure of green packaging practices in small and medium-sized food service enterprises.

C. Reliability Test

Reliability analysis in Table 12 revealed Cronbach's α values ranging from 0.707 to 0.868 across the four factors, all exceeding the 0.70 benchmark for acceptable internal consistency (Zakariya, 2022). Factor 2 (Functions) achieved the highest α = 0.868, with strong item-rest correlations (0.643–0.752), indicating high internal homogeneity. Factor 4 (Appearance) had the lowest α = 0.707, though still within acceptable limits, suggesting moderate consistency. No item demonstrated an improvement in α if deleted, supporting the retention of all items in the final measurement model. These findings affirm that the instrument is reliable for assessing green packaging practices across multiple dimensions.

Table 12: Scale Reliability Statistics

Factor	Construct	Item-rest Correlation	If Item Dropped Cronbach's α	Cronbach's α
1	C14	0.684	0.824	0.856
	C13	0.700	0.821	
	C12	0.692	0.822	
	C11	0.615	0.837	
	C15	0.601	0.839	
	C10	0.565	0.845	
2	C3	0.752	0.825	0.868
	C2	0.668	0.847	
	C4	0.695	0.839	
	C1	0.707	0.837	
	C5	0.643	0.853	
3	C17	0.658	0.754	0.809
	C16	0.644	0.759	
	C19	0.572	0.780	
	C20	0.532	0.792	
	C18	0.581	0.777	

4	C6	0.500	0.648	0.707
	C7	0.523	0.620	
	C8	0.554	0.579	

Conclusion and Recommendations

The study identified four interconnected factors that define green packaging practices: branding, functions, pricing, and appearance. Branding acts as a strategic driver, with sustainability messages and eco-friendly symbols boosting consumer trust. Functions emphasize the operational aspect, where biodegradable materials, waste reduction, and easy-to-use designs combine environmental responsibility with practicality. Pricing highlights the importance of balancing cost pressures with sustainability goals through budget-friendly strategies and educating consumers. Appearance focuses on the role of simple, eco-conscious aesthetics in strengthening environmental values without losing visual attractiveness. Together, these factors form an integrated framework where environmental commitment, economic factors, and consumer perception work together harmoniously.

Businesses should adopt comprehensive green packaging practices that combine authentic branding with functional design, cost savings, and attractive visuals. Branding must be based on proven, sustainable practices, while functional features should improve both usability and environmental impact. Pricing should highlight the benefits of sustainability and motivate consumers to participate in eco-friendly efforts. Visual design needs to consistently reflect environmental responsibility to build brand trust. Future research might explore how these factors influence consumer purchasing choices and examine their relevance across different industries and cultures.

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