

Packaging- and Ingredient-Related Green Knowledge and Green Service Behavior of Sales Employees in Thai Cosmetic Retail: Empirical Evidence from a Nationwide Survey

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Abstract

The global cosmetic retail industry is under mounting pressure from consumers and regulators to substantiate environmental claims and to prevent greenwashing at the point of sale. This study examines the relationships between two dimensions of sales employees' green knowledge—Green Packaging Knowledge (GPK) and Green Ingredient Knowledge (GIK)—and their Green Service Behavior (GSB) in the Thai cosmetic retail sector. Guided by the Theory of Planned Behavior, a quantitative cross-sectional survey was conducted with 245 frontline sales employees of a major Thai cosmetic retail brand, selected through proportional quota sampling across five regions. Data were collected with a validated questionnaire (Cronbach's alpha = .92–.95) and analyzed using descriptive statistics, one-way ANOVA, and Pearson's product-moment correlation. Results showed high overall levels of GPK ($M = 3.68$), GIK ($M = 3.63$), and GSB ($M = 3.67$), with the weakest items concerning recycling-symbol interpretation and greenwashing-risk awareness. Personal factors (age, education, and tenure) produced no statistically significant differences in GSB ($p > .05$). In contrast, GPK was positively and strongly correlated with GSB ($r = .655$, $p < .01$), and GIK showed a very strong positive correlation with GSB ($r = .830$, $p < .01$). The findings indicate that specialized, verifiable green knowledge—rather than demographic characteristics or accumulated tenure—is the key correlate of high-quality green service delivery. Implications include targeted evidence-based training, knowledge-support systems at the point of sale, and transparent communication protocols that reduce greenwashing risk and strengthen customer trust in cosmetic retail.

Keywords Green knowledge; Green service behavior; Cosmetic retail; Greenwashing; Theory of Planned Behavior; Thailand

1. Introduction

The global retail cosmetics industry is being transformed by consumer demand for environmental sustainability and product transparency. Modern consumers increasingly prioritize reliable, verifiable information over advertising claims, especially concerning ingredients, environmental impact, and packaging end-of-life management (McKinsey & NielsenIQ, 2023), making sustainability a core competitive imperative (White, Habib, & Hardisty, 2019). The trend is amplified by tightening regulation: the European Union restricts intentionally added microplastics in cosmetics (Commission Regulation (EU) 2023/2055, 2023) and requires that environmental claims be substantiated and clearly communicated (Directive (EU) 2024/825, 2024), while the U.S. Federal Trade Commission's Green Guides constrain environmental marketing language (Federal Trade Commission, 2012). Scientific evidence on the damage certain sunscreen ingredients cause to aquatic life and coral reefs

(National Oceanic and Atmospheric Administration [NOAA], 2024) further compels reformulation and accurate frontline communication, and Thai national policy likewise emphasizes waste separation and point-of-sale environmental communication (Pollution Control Department [PCD], 2024).

Despite this impetus toward verified green claims, a critical gap persists at the customer interface. The success of sustainable product initiatives hinges on frontline sales employees, the primary communicators of a brand's sustainability value proposition. The core problem addressed here is the risk of greenwashing—conveying a misleading impression of environmental friendliness—stemming from a knowledge deficit among frontline staff (Delmas & Burbano, 2011). Consumers are increasingly alert to greenwashing (Kantar, 2023; Nyilasy, Gangadharbatla, & Paladino, 2014); vague or inaccurate employee communication is perceived as deceptive, reducing satisfaction and brand trust (Ioannou, Kassinis, & Papagiannakis, 2023; Leonidou & Skarmeeas, 2017), and knowledgeable consumers are unwilling to pay premiums for unverifiable claims (Volschenk, Gerber, & Santos, 2022).

In the Thai context, research underscores that the fit between corporate strategy and organizational execution is a decisive driver of business performance (Khan, Saengon, Cheungsirakulvit, & Kanchanathaveekul, 2021)—and environmental commitments succeed or fail at the frontline where strategy is executed. Yet little empirical work has examined the relationship between the two dimensions of sales employees' green knowledge—Green Packaging Knowledge (GPK) and Green Ingredient Knowledge (GIK)—and their Green Service Behavior (GSB) in cosmetic retailing. An earlier conceptual companion study by the present authors developed the framework and analysis plan (Khamfoi & Lert-Asavapatra, 2025); this paper extends that work by reporting the complete empirical findings from a nationwide survey of 245 sales employees.

The study poses four research questions: (1) What are the current levels of GPK, GIK, and GSB among sales employees? (2) Do personal factors (gender, age, education, and tenure) influence GSB? (3) Is GPK significantly associated with GSB? (4) Is GIK significantly associated with GSB? The findings are expected to inform evidence-based, transparent, and legally compliant point-of-sale communication guidelines that reduce greenwashing risk and raise the standard of environmental service in cosmetic retail.

2. Literature Review and Hypothesis Development

2.1 Green Service Behavior (GSB)

Green Service Behavior is the outward manifestation of an organization's environmental commitment at the frontline of customer interaction: the actions demonstrated by sales employees during service delivery that account for and promote environmental sustainability. GSB belongs to the broader family of employee green behavior, encompassing in-role and extra-role workplace behaviors that contribute to sustainability (Norton, Parker, Zacher, & Ashkanasy, 2015; Ones & Dilchert, 2012), and in retail extends beyond policy compliance to proactively recommending environmentally friendly alternatives, instructing on proper packaging disposal, and communicating ingredient information transparently (Daily, Bishop, & Govindarajulu, 2009; Paillé & Boiral, 2013).

In cosmetic retail, GSB is critical for two reasons. First, it links the brand's sustainable value chain to the customer's decision-making process (Grewal, Roggeveen, & Nordfält, 2017). Second, it is the primary frontline defense against perceived greenwashing: when consumers are skeptical of ambiguous claims such as “natural” or “clean,” a salesperson providing

accurate, verifiable, rule-compliant information reduces the perception of deceptive marketing, builds green trust, and mitigates greenwashing attributions (Chen, Lin, & Chang, 2014; Zhang, Li, Cao, & Huang, 2018). Employee green behavior is further shaped by leadership and organizational context (Robertson & Barling, 2013), day-to-day attitudes and affect (Bissing-Olson, Iyer, Fielding, & Zacher, 2013), and green human resource management practices (Dumont, Shen, & Deng, 2017; Kim, Kim, Choi, & Phetvaroon, 2019).

2.2 Green Knowledge as an Antecedent of GSB

Consistent GSB depends fundamentally on green knowledge—the specific, practical, and current understanding required to communicate environmental facts accurately in retail. Environmental knowledge has long been recognized as a foundational, though not sufficient, driver of pro-environmental behavior (Kollmuss & Agyeman, 2002; Stern, 2000). This study conceptualizes green knowledge in two dimensions mapping onto the industry's principal impact areas: packaging and ingredients.

2.2.1 Green Packaging Knowledge (GPK)

GPK is the employee's understanding of the materials, symbols, and practical principles governing environmentally friendly packaging: (a) material knowledge and recyclability—differentiating common resin types (PET, PP, PE) and their recyclability under design-for-recycling criteria such as the APR Design® Guide (Association of Plastic Recyclers [APR], n.d.); (b) end-of-life management—advising customers on preparing packaging for disposal (disassembling pumps, rinsing) and promoting refill and reuse; and (c) symbol and label interpretation—explaining recycling symbols and recycled-content claims, including the pre-/post-consumer distinction (Sustainable Packaging Coalition [SPC], 2023). Consumers' use of eco-labels depends on comprehension and trust, which frontline explanation can strengthen (Gorton, Tocco, Yeh, & Hartmann, 2021).

2.2.2 Green Ingredient Knowledge (GIK)

GIK concerns the chemical components of cosmetic products that affect the environment and health, and the regulatory framework governing their communication: (a) environmental toxicology—restricted microplastics (Commission Regulation (EU) 2023/2055, 2023), reef-associated UV filters (NOAA, 2024), and sustainable alternatives from biobased and biodegradable polymers (Bikiaris, Nikolaidis, & Barmapalexis, 2024); (b) regulatory and claims literacy—distinguishing marketing terms (e.g., “clean formula,” which often lacks legal definition) from legally required disclosures and scientific facts (Directive (EU) 2024/825, 2024; Federal Trade Commission, 2012); and (c) transparency—explaining ingredient labels and suggesting preferable alternatives without exaggeration. GIK establishes credibility in the face of green skepticism; moreover, green purchase intentions do not automatically translate into waste-free buying behavior, heightening the importance of credible point-of-sale guidance (Prakash, Sharma, Kumar, & Luthra, 2024).

2.3 Theoretical Foundation: Theory of Planned Behavior

The Theory of Planned Behavior (TPB), developed from the Theory of Reasoned Action (Ajzen, 1991; Fishbein & Ajzen, 1975), serves as the theoretical lens. TPB posits that behavior is preceded by intention, predicted by attitude, subjective norms, and perceived behavioral control (PBC); meta-analytic evidence supports its efficacy (Armitage & Conner, 2001), and it has been widely validated for pro-environmental and green consumption behaviors (Han, Hsu, & Sheu, 2010; Paul, Modi, & Patel, 2016; Yadav & Pathak, 2016). Here, TPB explains how green knowledge translates into GSB: knowledge informs beliefs about the outcomes of

performing GSB (attitude); knowledgeable colleagues and environmentally conscious customers create social pressure (subjective norms); and, most critically, specialized knowledge raises PBC—a knowledgeable employee feels competent answering technical questions and handling skepticism, making GSB easier and more likely (Paillé & Boiral, 2013). Conversely, employees lacking GIK lack the confidence to discuss issues such as microplastic restrictions, reducing GSB intention.

2.4 Hypotheses and Conceptual Framework

Based on the theoretical foundation and literature review, the following hypotheses were formulated:

H1: Sales employees with different personal factors (gender, age, education level, and tenure) exhibit statistically significant differences in mean Green Service Behavior (H1.1 age; H1.2 education; H1.3 tenure).

H2: Green Packaging Knowledge of sales employees is positively and significantly associated with their Green Service Behavior.

H3: Green Ingredient Knowledge of sales employees is positively and significantly associated with their Green Service Behavior.

The conceptual framework (Figure 1) positions GSB as the dependent variable and the two knowledge dimensions (GPK and GIK) as independent variables, with personal factors examined as control variables. The framework proposes that by enhancing employees' specific knowledge, cosmetic retail businesses can improve the quality and consistency of green service delivered at the point of sale, an outcome predicted by the increase in perceived behavioral control under TPB.

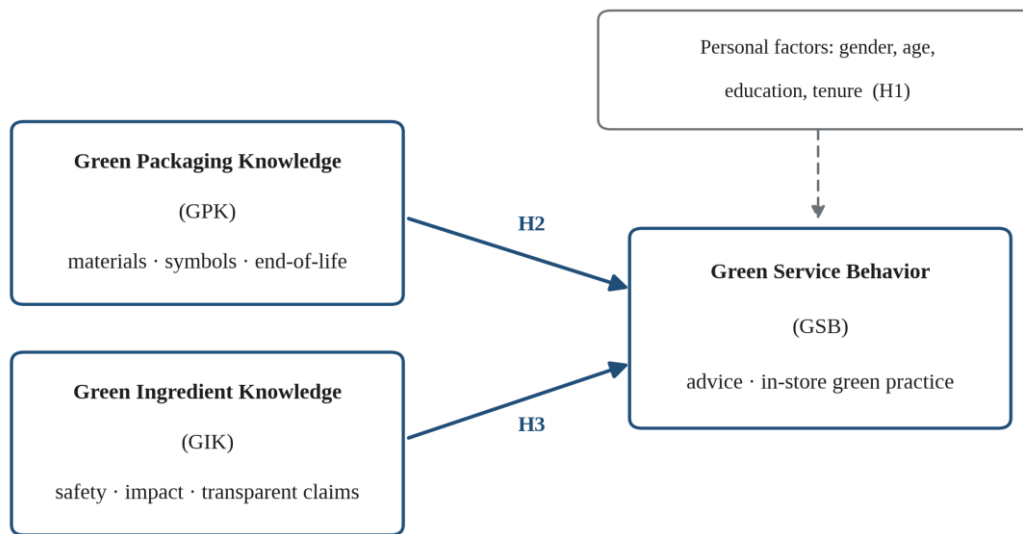


Figure 1. Conceptual framework of the study

3. Methodology

3.1 Research Design

This study employed a quantitative, cross-sectional survey design. A structured, self-administered questionnaire was distributed online, with access restricted to qualified respondents, to ensure consistency and minimize interviewer bias. The study is the empirical continuation of a previously published conceptual framework and analysis plan (Khamfoi & Lert-Asavapatra, 2025).

3.2 Population and Sample

The target population comprised all sales employees at the retail storefronts of a single major cosmetic retail brand in Thailand (anonymized), selected because it maintains established environmental policies on both ingredients and packaging. At the time of data collection the brand employed 674 sales employees across 279 branches nationwide (Central 118 branches, East 29, North 37, Northeast 53, South 42; approximately 2–3 employees per branch). The minimum sample size was determined using the chi-square-based formula of Krejcie and Morgan (1970) at a 95% confidence level ($\chi^2 = 3.841$), 5% margin of error, and $p = .50$, yielding 245 respondents. Non-probability quota sampling was employed, with quotas allocated proportionally to the regional distribution of branches and respondents selected by convenience among consenting employees on shift: Central 104, East 25, North 32, Northeast 47, and South 37 (total $n = 245$).

3.3 Research Instrument

The instrument was a four-part structured questionnaire developed from established measures of employee green behavior and green service (Norton et al., 2015; Paillé & Boiral, 2013) and from technical guidance on packaging recyclability and ingredient claims (APR, n.d.; SPC, 2023; NOAA, 2024). Part 1 captured personal factors (gender, age, education, tenure, branch region). Part 2 measured GPK with eight items and Part 3 measured GIK with eight items, both on a five-point understanding scale (1 = do not understand at all to 5 = understand very well). Part 4 measured GSB with seven items on a five-point frequency scale (1 = never to 5 =

consistently). Mean scores were interpreted with an interval width of 0.80: 4.21–5.00 highest, 3.41–4.20 high, 2.61–3.40 moderate, 1.81–2.60 low, 1.00–1.80 lowest. Content validity was confirmed by three subject-matter experts, and a pilot test with 30 employees yielded Cronbach's alpha coefficients (Cronbach, 1951) of .92 (GPK), .95 (GIK), and .93 (GSB), all above the accepted .70 threshold.

3.4 Data Analysis

Descriptive statistics (frequency, percentage, mean, standard deviation) summarized the demographic profile and variable levels. One-way ANOVA examined differences in mean GSB across groups of age, education, and tenure (H1) at the .05 significance level, and Pearson's product-moment correlation tested the GPK–GSB (H2) and GIK–GSB (H3) associations. Correlation magnitudes were interpreted as very high (.80–1.00), high (.60–.79), moderate (.40–.59), low (.20–.39), and very low (.00–.19). Because the realized sample was entirely female, the gender component of H1 could not be tested.

4. Results

4.1 Demographic Profile of Respondents

Table 1 presents the demographic profile of the 245 respondents. All were female (100.0%), reflecting the workforce composition of cosmetic retail storefronts in Thailand. The largest age group was over 25–30 years (35.9%); bachelor's degree holders formed the largest education group (40.8%); and tenure was fairly balanced across the four bands (20.4%–28.2%).

Table 1. Frequency and percentage of respondents' personal factors (n = 245)

Demographic characteristic	Frequency (n)	Percentage
Gender		
Female	245	100.0
Age		
25 years or younger	48	19.6
Over 25–30 years	88	35.9
Over 30–35 years	70	28.6
Over 35 years	39	15.9
Education level		
Upper secondary / vocational certificate	81	33.1
Diploma / high vocational certificate	62	25.3
Bachelor's degree	100	40.8
Higher than bachelor's degree	2	0.8
Tenure		
Less than 2 years	68	27.8
2–5 years	69	28.2
6–9 years	50	20.4

Demographic characteristic	Frequency (n)	Percentage
More than 10 years	58	23.7
Total	245	100.0

4.2 Level of Green Packaging Knowledge

As shown in Table 2, Green Packaging Knowledge was high overall ($M = 3.68$). The highest-rated item was comparing packaging alternatives fairly and transparently while avoiding overclaiming ($M = 4.29$, highest level); the weakest were explaining recycling symbols and resin codes ($M = 3.25$, moderate) and preparing packaging before disposal ($M = 3.40$, moderate), indicating specific technical gaps in symbol literacy and end-of-life preparation.

Table 2. Mean, standard deviation, and level of Green Packaging Knowledge ($n = 245$)

Item	Mean	S.D.	Level
1. Understands differences among basic packaging materials (e.g., PET, PP, PE, paper, glass)	3.62	1.044	High
2. Understands how color, opacity, stickers/labels, and components affect recyclability	3.59	1.043	High
3. Can read and explain recycling symbols and resin codes to customers	3.25	1.108	Moderate
4. Knows how to prepare packaging before disposal (e.g., removing caps/pumps, rinsing residue)	3.40	1.095	Moderate
5. Can explain waste-reduction concepts to customers (reuse, refill, refill sizes)	4.10	0.920	High
6. Understands recycled-content claims and pre-consumer vs. post-consumer distinction	3.48	1.096	High
7. Knows local recycling constraints and can advise on proper sorting and disposal	3.73	1.061	High
8. Can compare packaging alternatives fairly and transparently, avoiding overclaiming	4.29	0.866	Highest
Overall Green Packaging Knowledge	3.68		High

4.3 Level of Green Ingredient Knowledge

Table 3 shows that Green Ingredient Knowledge was also high overall ($M = 3.63$). Employees rated themselves highest on reading and explaining basic ingredient labels ($M = 3.98$); the lowest-rated items were awareness of the greenwashing risks of vague communication ($M = 3.40$, moderate) and citing credible sources when asked in depth ($M = 3.42$), signaling that claims literacy and source citation are the priority development areas.

Table 3. Mean, standard deviation, and level of Green Ingredient Knowledge ($n = 245$)

Item	Mean	S.D.	Level
1. Knows examples of evidence-backed environmentally friendly ingredients	3.79	0.994	High
2. Understands the microplastics issue in cosmetics and its environmental impact	3.51	1.070	High

Item	Mean	S.D.	Level
3. Can distinguish “marketing terms” from legal requirements/scientific evidence	3.70	1.047	High
4. Understands certain sunscreen ingredients' impact on marine ecosystems and can explain it simply	3.70	1.012	High
5. Can read basic ingredient labels and explain them to customers	3.98	0.900	High
6. Can give examples of alternative ingredients that reduce environmental impact	3.52	1.038	High
7. Knows the risks of vague communication that may be perceived as greenwashing	3.40	1.041	Moderate
8. When asked in depth, can cite credible information sources for customers	3.42	1.109	High
Overall Green Ingredient Knowledge	3.63		High

4.4 Level of Green Service Behavior

As reported in Table 4, Green Service Behavior was high overall ($M = 3.67$). The most frequent behavior was verifying product information thoroughly before informing customers when unsure ($M = 3.97$); the least frequent was explaining which packaging items are recyclable and how to prepare them before disposal ($M = 3.35$, moderate)—mirroring the packaging-knowledge gaps in Table 2. Figure 2 summarizes the item-level means across the three constructs.

Table 4. Mean, standard deviation, and level of Green Service Behavior ($n = 245$)

Item	Mean	S.D.	Level
1. Can explain which packaging items are recyclable and how to prepare them before disposal	3.35	1.200	Moderate
2. Recommends waste-reducing options to customers (refill, reuse, refill sizes)	3.76	1.125	High
3. Communicates environmental information clearly and verifiably, avoiding exaggeration	3.58	1.148	High
4. Explains ingredient information in an easy-to-understand way with examples	3.78	0.999	High
5. When unsure, studies manuals or product information thoroughly before informing customers	3.97	0.909	High
6. Gives customers accurate advice about environmentally friendly ingredients	3.76	0.964	High
7. Advises customers on managing packaging waste at home (separating, rinsing, sorting)	3.46	1.236	High
Overall Green Service Behavior	3.67		High

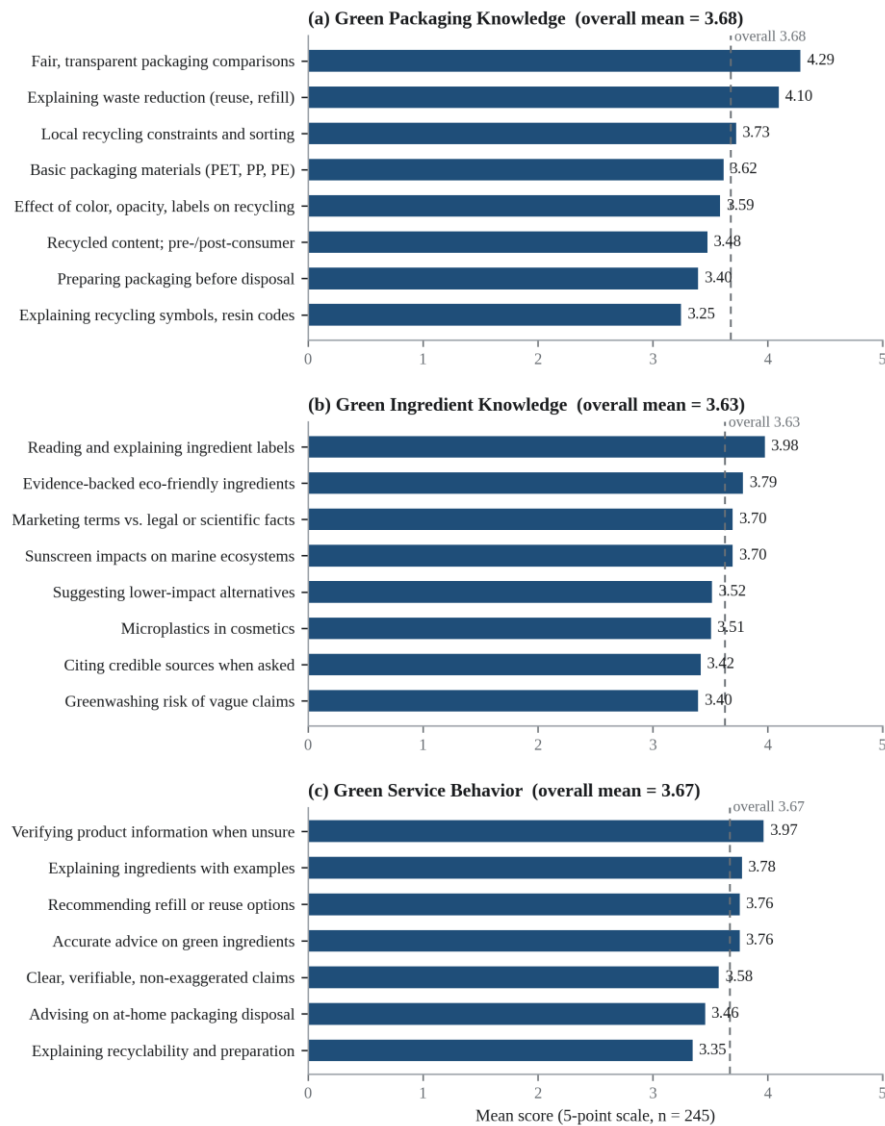


Figure 2. Item-level means of (a) Green Packaging Knowledge, (b) Green Ingredient Knowledge, and (c) Green Service Behavior (n = 245)

4.5 Hypothesis Testing

H1: Personal factors. Because the entire sample was female, the gender component of H1 could not be tested. One-way ANOVA results (Table 5) show no statistically significant differences in mean GSB by age ($F = .096$, $\text{Sig.} = .962$), education level ($F = 1.619$, $\text{Sig.} = .185$), or tenure ($F = 1.815$, $\text{Sig.} = .145$); all Sig. values exceed .05, so hypotheses H1.1–H1.3 were rejected.

Table 5. One-way ANOVA of Green Service Behavior by age, education level, and tenure

Source of variance	SS	df	MS	F	Sig.
Age					
Between groups	.245	3	.082	.096	.962
Within groups	204.956	241	.850		
Total	205.201	244			

Source of variance	SS	df	MS	F	Sig.
Education level					
Between groups	4.055	3	1.352	1.619	.185
Within groups	201.147	241	.835		
Total	205.202	244			
Tenure					
Between groups	4.535	3	1.512	1.815	.145
Within groups	200.667	241	.833		
Total	205.202	244			

H2 and H3: Knowledge–behavior relationships. Pearson's correlation results (Table 6 and Figure 3) show that GPK is positively correlated with GSB at a high level ($r = .655$, Sig. = .000), supporting H2, and GIK at a very high level ($r = .830$, Sig. = .000), supporting H3; both are significant at the .01 level (two-tailed).

Table 6. Pearson correlation coefficients between green knowledge dimensions and Green Service Behavior ($n = 245$)

Variable pair	r	Sig.	Interpretation
Green Packaging Knowledge ↔ Green Service Behavior	.655**	.000	High
Green Ingredient Knowledge ↔ Green Service Behavior	.830**	.000	Very high

Note. ** Correlation is significant at the .01 level (2-tailed).

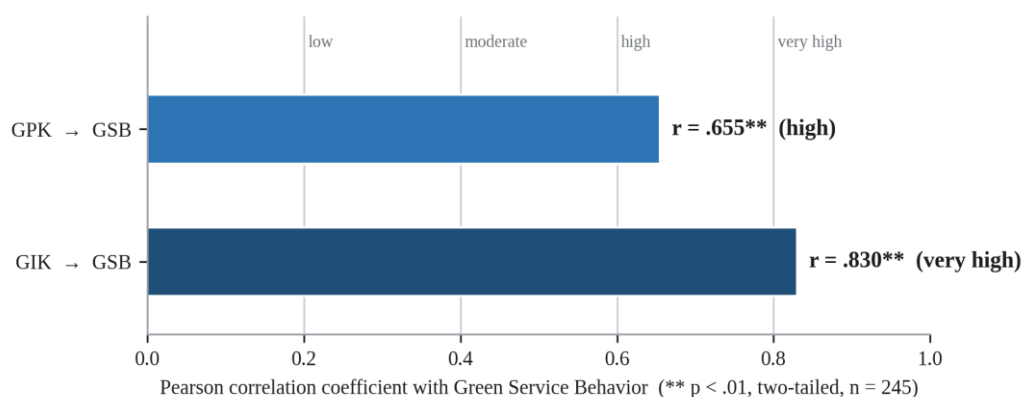


Figure 3. Strength of the correlations between green knowledge dimensions and Green Service Behavior

5. Discussion

5.1 Personal Factors and Green Service Behavior

The finding that age, education, and tenure produce no significant differences in GSB indicates that green service behavior is not primarily determined by demographic characteristics—consistent with Kollmuss and Agyeman's (2002) argument that knowledge, rather than demographic attributes, forms the foundation of pro-environmental behavior, and with TPB's

emphasis on attitude, norms, and perceived behavioral control as proximal determinants of action (Ajzen, 1991). Notably, the absence of a tenure effect suggests that packaging- and ingredient-related green knowledge is specialized knowledge requiring systematic training rather than accruing automatically through experience (Daily et al., 2009; Kim et al., 2019); green-service capability must be built deliberately, not assumed to develop with seniority.

5.2 Green Packaging Knowledge and Green Service Behavior

GPK showed a high positive correlation with GSB ($r = .655, p < .01$): employees who better understand packaging materials, recycling symbols, and end-of-life management display more frequent and higher-quality green service behavior. This aligns with evidence that accurate frontline explanation of eco-labels strengthens consumer comprehension and trust (Gorton et al., 2021), with evidence that stated green intentions require credible enabling support to become waste-reducing behavior (Prakash et al., 2024), and with industry guidance that transparent, verifiable communication of recyclability is central to credibility (APR, n.d.; SPC, 2023). Notably, the weakest GPK item (interpreting recycling symbols and resin codes, $M = 3.25$) corresponds directly to the weakest GSB item (explaining recyclability and preparation, $M = 3.35$), suggesting that closing this specific technical gap offers the clearest route to improving observable service behavior.

5.3 Green Ingredient Knowledge and Green Service Behavior

GIK exhibited the strongest association in the study—a very high positive correlation with GSB ($r = .830, p < .01$). Employees who understand environmentally preferable ingredients, the microplastics restriction, sunscreen impacts on marine ecosystems, and transparent claim-making are substantially more likely to deliver green service. This accords with evidence that transparency-enhancing employee conduct reduces greenwashing attributions (Chen et al., 2014; Zhang et al., 2018) and with the importance of knowledge about microplastics and sustainable ingredient alternatives for customer-facing communication (Bikiaris et al., 2024). The stronger coefficient for GIK is plausibly explained by the nature of cosmetic retail interactions: customers ask most often and most directly about what is in the product, so ingredient knowledge anchored in scientific and legal evidence (Commission Regulation (EU) 2023/2055, 2023; NOAA, 2024) translates most visibly into confident, high-quality service. Under TPB, both knowledge dimensions raise perceived behavioral control, strengthening intention and behavior (Ajzen, 1991; Armitage & Conner, 2001), consonant with research on green trust as a driver of customers' brand evaluations (Chen, 2010) and on the organizational shaping of employee pro-environmental behavior (Robertson & Barling, 2013).

Taken together, the empirical pattern confirms the framework advanced in the authors' earlier conceptual work (Khamfoi & Lert-Asavapatra, 2025): specialized green knowledge, rather than demographic profile, is the operative correlate of green service delivery. The findings also align with evidence from Thai business contexts that the fit between strategy and operational capability is what converts strategy into performance (Khan et al., 2021); the frontline sales employee is precisely where corporate environmental strategy meets the customer, and knowledge is the enabling resource for that encounter.

6. Managerial Implications

The findings suggest four actionable imperatives for cosmetic retail management. First, targeted, evidence-based training: retailers should implement specialized training structured around the two knowledge dimensions, prioritizing the items with the lowest means—recycling-symbol and resin-code literacy, packaging preparation for disposal, greenwashing-

risk awareness, and source citation—and conveying verifiable scientific and regulatory facts rather than vague marketing language, which bolsters perceived behavioral control and reduces greenwashing risk (Delmas & Burbano, 2011). Second, uniform capability building: because age, education, and tenure do not differentiate GSB, training should cover all employee groups equally rather than being targeted by demographic profile. Third, green human resource management integration: green service indicators (e.g., refill conversion, accuracy of ingredient advice) should be recognized and rewarded in performance appraisal, cultivating a green organizational culture that reinforces the subjective norms supporting GSB (Dumont et al., 2017; Kim et al., 2019; Renwick et al., 2013). Fourth, systemic support at the point of sale: in-store recycling and refill stations, accessible product fact sheets, and standardized regulatory summaries give employees the resources to convert knowledge into action—addressing TPB's control dimension and echoing the finding that employees already consult product information when unsure (highest GSB item, $M = 3.97$).

7. Limitations and Future Research

This study employed a cross-sectional design within a single (anonymized) cosmetic retail brand in Thailand, which constrains causal inference and generalizability; the all-female sample precluded testing gender differences; and GSB was self-reported, which may invite social desirability bias. Future research should employ longitudinal or intervention designs to track the impact of targeted training; extend the model to other retail sectors and brands; incorporate additional predictors such as environmental attitudes, green leadership, and green organizational climate (Norton et al., 2015; Robertson & Barling, 2013); apply qualitative methods such as in-depth interviews or point-of-sale observation; and test causal structures linking green knowledge, GSB, and customer outcomes such as green trust and loyalty using structural equation modeling (Chen, 2010).

8. Conclusion

Drawing on a nationwide survey of 245 frontline sales employees in Thai cosmetic retail, this study establishes empirically that specialized green knowledge—in both packaging and ingredients—is strongly and positively associated with green service behavior, whereas demographic characteristics are not. Green Ingredient Knowledge shows the strongest association ($r = .830$), followed by Green Packaging Knowledge ($r = .655$), and all three constructs stand at high overall levels with identifiable weak points in symbol literacy, disposal preparation, and claims literacy. Investing strategically in verifiable, evidence-based employee knowledge is therefore not merely a training exercise but a strategic imperative and the most effective frontline defense against greenwashing—ensuring that every customer interaction promotes transparency, builds genuine green trust, and moves the industry toward a more responsible and sustainable future.

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