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TRIGGERS FOR REDUCING WASTE AND DISPOSABLE PACKAGING: INSIGHTS FROM FOOD TRUCK CONSUMERS IN THAILAND

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Abstract

This study was intricately crafted to explore the decision-making processes of customers at sustainable food truck venues. The study aimed to examine customers' pro-responsible intentions by utilizing the Norm Activation Model (NAM) as a foundational framework. This framework was extended by incorporating key factors such as anticipated feelings of pride and guilt, and intentions to reduce disposable packaging and waste within the unique context of sustainable food trucks. Using GSCA$_M$, the validity of the measurements was confirmed. The net-effect analysis and necessary condition analysis (NCA) generally supported the hypothesized relationships within the theoretical framework. Notably, the NAM variables, such as ascription of responsibility and moral norms, and anticipated emotions, emerged as significant and critical influencers of customer intentions, particularly in terms of intentions to reduce disposable packaging and waste. This comprehensive approach enhances both theoretical understanding and practical applications for promoting sustainability within these distinct environments.

Keywords: Food truck; waste reduction intention; norm activation model; behavioral intention; consumer responsible behavior.

1. INTRODUCTION

Food trucks have become increasingly popular as convenient, mobile eateries offering a diverse range of food options such as fried chicken, desserts, and both Asian and Western cuisine (Shin et al., 2019). This sector has shown remarkable growth and is now one of the standout performers in the global restaurant industry. Statistical data underscores this expansion. The global food truck market is projected to grow substantially, rising from $19.4 billion in 2022 to an estimated $26.3 billion by 2027. This growth reflects a compound annual growth rate of 6.2% over the period from 2022 to 2027 (Informa Markets, 2024). In a popular street food destination, such as Thailand (Fakfare et al., 2022), average business growth rate in the food truck sector is approximately 20% per year. Investment in a mobile restaurant typically ranges from 500,000 baht to 1 million baht, while the average annual income per food truck is estimated to be around 1.05 million baht (Arunmas, 2021). In light of these statistics, it is evident that food trucks present a lucrative and dynamic opportunity for entrepreneurs looking to capitalize on the evolving culinary landscape.

Scholars in hospitality and tourism have continuously explored the attitudes and behaviors of customers and practitioners toward pro-environmental decisions and behavior

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(Fakfare & Wattanacharoensil, 2023a; 2023b; Han, 2014; Kim et al., 2023; Koh et al., 2022; 2023; Talawanich, & Pongwat, 2024). The Norm Activation Model (NAM) has emerged as a prevalent framework used to explore the factors that prompt such behaviors within this domain (Fakfare et al., 2024b; Wattanacharoensil et al., 2024). Thus, this research used NAM to investigate consumers' responsible behaviors in the food truck context.

Despite the extensive validation of NAM in the environmental and social spheres, the intricate relationships among its primary constructs remain unclear. This lack of clarity largely arises from the varied interpretations of the model found in prior literature, resulting in inconsistencies in its application and analysis (Han, 2014). Additionally, anticipated emotions such as feelings of pride and guilt have been suggested to be linked with NAM in numerous studies (Han, 2014; 2015), although their specific explanations within a particular study context are often lacking (Meeprom & Fakfare, 2021). Given this background, there is a critical need for further research to elucidate the complex relationships among the primary constructs of the NAM within the food truck industry. This research gap underscores the importance of conducting rigorous studies that not only validate the applicability of NAM but also provide a deeper understanding of how its components interact to influence pro-environmental decisions and behaviors in this industry. Following the abovementioned discussion, this study aims to: (1) identify the triggering factors of waste reduction intentions, and intentions to reduce disposable packaging based on the norm activation model, (2) unearth the necessary conditions that must be present for waste reduction, and intentions to reduce disposable packaging among food truck consumers. In addition to conducting net-effect analysis through composite-based Structural Equation Modeling (SEM), this research adopts necessity logic to identify the desired outcomes within the food truck industry (Dul, 2022; Fakfare et al., 2024a; Meeprom et al., 2023). By employing necessity logic, the study aims to provide a deeper understanding of the factors that are essential for achieving specific outcomes in this context.

2. LITERATURE REVIEW

2.1 Sustainable Consumption in the Food Truck Context

In recent years, street food has experienced notable transformations, particularly within the form of food trucks (de Souza Bispo & Almeida, 2020). Food trucks have emerged as a prominent feature in the culinary landscape, boasting significant social and economic relevance across various countries. In this study, a food truck is defined as a compact, mobile kitchen mounted on wheels, catering to itinerant food sales (Shin et al., 2019). This classification covers various mobile food-selling entities, such as food trucks, and food carts (Choi et al., 2020; de Souza Bispo & Almeida, 2020).

Presently, the majority of food truck proprietors comprise chefs or individuals possessing a keen understanding of gastronomy. They have embarked on crafting concise, innovative menus featuring contemporary renditions of traditional dishes (Shafieizadeh et al., 2021). Gourmet cuisine stands as the focal point within this segment (Alfiero et al., 2017). In addition to redefining culinary preparation and presentation, food trucks offer an array of international cuisines (Wessel, 2012). Beyond merely vending food from a mobile platform, successful ventures require an awareness of promoting sustainable consumption. Furthermore, the "new wave" of food trucks should consider the significance of communication, particularly through the extensive utilization of green marketing to foster reduction of waste and disposable packaging (Li et al., 2022; Shafieizadeh et al., 2021). This transformation of street food dynamics through the advent of food trucks embodies an environmental movement, fundamentally altering societal dining practices.

Unlike traditional street food vendors that contribute to environmental harm through

practices, such as excessive water and energy consumption, use of disposable products, and emissions, sustainable food trucks actively embrace eco-friendly principles. They adhere to environmental management strategies, demonstrate a commitment to sustainability, and continually evolve their business practices to reduce their environmental footprint (Okumus et al., 2019). Transforming a food truck to be sustainable is seen as meeting the rising demand for eco-conscious options among consumers, gaining a competitive edge in a market increasingly focused on sustainable development, and realizing significant cost savings through measures like water and energy conservation, waste reduction, and recycling. With these benefits in mind, many food truck operators are eager to adopt innovative sustainable management practices and strategies to support the sustainable development goals.

2.2 NAM and Its Extended Variables

The NAM, developed by Schwartz (1977) within the area of altruistic behavior, is utilized to analyze individuals' inclinations towards pro-environmental actions or intentions (Han, 2015). Schwartz (1977) posited three categories of antecedents within the NAM framework to forecast pro-social behavior: awareness of consequences, ascription of responsibility, and moral norms. According to this theory, the activation of a personal norm begins with an individual's recognition of potentially harmful consequences and their acknowledgment of responsibility for not engaging in environmentally friendly actions. This acknowledgment then triggers a moral obligation that guides whether the individual should undertake an action to avert detrimental outcomes (De Groot & Steg, 2009; Fakfare et al., 2024b; Wattanacharoensil et al., 2024).

Within this model, awareness of consequences pertains to an individual's understanding of the adverse outcomes for others or things they value when failing to act pro-socially or pro-environmentally (Han, 2015). Ascription of responsibility involves a sense of accountability for the negative consequences of not engaging in pro-social actions (Fakfare et al., 2024b), while personal norms signify a moral duty to either perform or abstain from specific actions (Schwartz & Howard, 1981). As Steg and De Groot (2010) claimed, the NAM is commonly interpreted in two main ways. Firstly, it is viewed as a sequential model where problem awareness influences the activation of a personal norm, which subsequently directly impacts pro-social intentions or behavior via the acknowledgment of responsibility, without a direct link between problem awareness and personal norms (i.e., problem awareness → ascription of responsibility → moral norms → pro-social intentions and behavior) (Onwezen et al., 2013). In the second interpretation, the model suggests that both problem awareness and ascription of responsibility directly influence the activation of a personal norm, which serves as an immediate predictor of pro-social intentions or behavior (Steg & De Groot, 2010). Unlike the sequential model, this alternative view does not involve a direct relationship between problem awareness and ascription of responsibility. Instead, both factors act in parallel, contributing to the formation of a personal norm, which then guides pro-social intentions and behavior (i.e., problem awareness & ascription of responsibility → moral norms → pro-social intentions and behavior). This perspective underscores the simultaneous impact of awareness of consequences and the acknowledgment of responsibility in shaping individuals' predispositions towards pro-social actions, bypassing a sequential progression.

In Han's (2015) study, two major revisions have been made to enhance the Norm Activation Model. The first revision involves the incorporation of attitudes and moral norms, under the assumption that an individual's environmentally responsible decision-making process or behavior is a result of a combination of pro-social motives and self-interests. The second revision pertains to the introduction of the emotional process, specifically the anticipated feelings of pride and guilt. This revision proposes that the activation of an

individual's moral norms and the formation of pro-social intentions are more comprehensively explained when both positive and negative aspects of the emotional process are considered. By recognizing the role of emotions such as pride in doing the right thing and guilt in failing to act responsibly, this revision acknowledges the complex interplay between cognitive processes and emotional experiences in shaping behavior. In the current study context, considering food truck customers, integrating feelings of pride and guilt into the NAM can offer insights into the decision-making process regarding environmentally responsible actions. For example, customers may experience pride when choosing the environmentally friendly options offered by food trucks, such as biodegradable packaging or locally sourced ingredients. Conversely, they may experience guilt if they opt for less environmentally friendly choices, such as single-use plastic utensils or products with high carbon footprints. By incorporating these emotional aspects into the NAM, the research can better elucidate the factors influencing food truck customers' pro-environmental behaviors. Additionally, it can inform strategies for promoting environmentally responsible practices within the food truck industry by leveraging positive emotions such as pride and mitigating negative emotions such as guilt. Overall, adopting the second revision of the NAM enhances the research's ability to understand and promote pro-social behaviors in the context of food truck customer decision-making.

2.3 Waste Reduction and Reduction in Disposable Packaging

In the food and restaurant industry, initiatives aimed at reducing waste and minimizing the use of disposable packaging are becoming increasingly important (Fakfare, 2021; Hamerman et al., 2018; Molloy et al., 2022). These efforts are driven by various factors including environmental concerns, cost reduction, and consumer preferences for sustainable practices. Waste reduction initiatives typically involve strategies such as better inventory management, portion control, donation of surplus food to charities, and composting organic waste (Hamerman et al., 2018). By implementing these measures, restaurants can minimize the amount of food that ends up in landfills, thereby reducing their environmental footprint and contributing to a more sustainable food system. Similarly, reducing the use of disposable packaging is essential for mitigating environmental impacts. Restaurants can adopt practices such as using reusable containers, offering incentives for customers who bring their own containers, and switching to biodegradable or compostable packaging materials (Molloy et al., 2022). These efforts not only help reduce waste but also align with consumer demand for eco-friendly dining options.

Overall, waste reduction and the reduction of disposable packaging are integral aspects of sustainability in the food and restaurant industry (Fakfare, 2021; Hamerman et al., 2018; Molloy et al., 2022). By implementing these initiatives, businesses can demonstrate their commitment to environmental responsibility while also potentially improving their bottom line and enhancing their reputation among environmentally conscious consumers. Furthermore, food trucks can leverage their mobility to participate in community events or markets where sustainable practices are encouraged. By showcasing their commitment to reducing waste and using environmentally friendly packaging, food trucks can attract environmentally conscious consumers and enhance their reputation as responsible businesses. Focusing on the customer perspective, like other research works in the field of hospitality and tourism, it is proposed that customers' intentions to reduce waste and disposable packaging can be fostered through the Norm Activation Model.

2.4 Application of Necessity Logic

There has recently been a surge in the adoption of the Necessary Condition Analysis

(NCA) within the field of tourism and hospitality research (Dul (2022a). NCA stands out as a pioneering methodology leveraging necessity logic to pinpoint indispensable conditions pivotal for achieving a desired outcome. Richter et al. (2020) further characterize these essential conditions as "must-have" factors. In contrast to conventional approaches employing symmetric-quantitative methods, like regressions or Structural Equation Modeling (SEM), which operate on a sufficient logic basis, NCA focuses the necessary conditions indispensable for the outcome. These "should-have" factors, as termed by Richter et al. (2020), denote antecedents significantly influencing the outcome variable but not inherently mandatory for its realization.

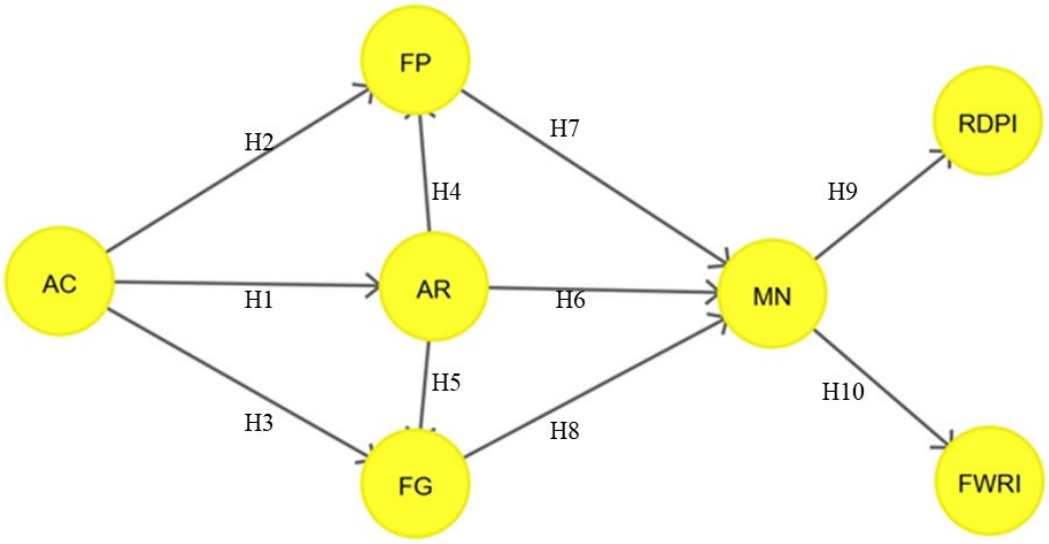
While prior research in tourism has predominantly leaned towards employing the fuzzy set Qualitative Comparative Analysis (fsQCA) technique to apply necessary logic and unravel the causal structure of investigated phenomena (Dul, 2022), it is observable that these studies have focused on establishing the "in kind" necessary condition, often overlooking the ability to express the necessary condition "in degree". Consequently, this limitation has occasionally led to misinterpretations and logical intricacies in the application of the NCA within these studies. Acknowledging the pivotal role of necessary conditions in attaining desired outcomes and the relatively underexplored terrain of this concept within tourism research, this study endeavors to investigate the indispensable conditions contributing to the formation of behavioral intentions regarding sustainable food truck consumption. The central argument posited by this study asserts that the presence of at least one NAM construct, along with its associated extended variables, is imperative for the desired outcomes—namely, the reduction of waste and disposable packaging—to materialize. Through the lens of the NCA, the study aims to elucidate the fundamental conditions that must be met for individuals to exhibit behavioral intentions conducive to sustainable food truck consumption.

2.5 Conceptual Model and Research Hypotheses

Figure 1 displays the conceptual model. This study proposes a total of seven constructs with ten hypotheses. The framework includes the original NAM constructs (i.e., awareness of consequences, ascription of responsibility, and moral norms), anticipated emotions (feelings of pride and guilt), and intentions to reduce disposable packaging and waste, thus deepening the NAM. Given this, the following hypotheses are proposed in the context of sustainable food trucks:

H1: awareness of consequences is related to ascription of responsibility
H2: awareness of consequences is related to anticipated feelings of pride
H3: awareness of consequences is related to anticipated feelings from guilt
H4: ascription of responsibility is related to anticipated feelings of pride
H5: ascription of responsibility is related to anticipated feelings of guilt
H6: ascription of responsibility is related to moral norms
H7: anticipated feelings of pride are related to moral norms
H8: anticipated feelings of guilt are related to moral norms
H9: moral norms are related to intentions to reduce disposable packaging
H10: moral norms are related to intentions to reduce waste
H11: At least one NAM factor and its extended variables is necessary for the occurrence of intentions to reduce disposable packaging
H12: At least one NAM factor and its extended variables is necessary for the occurrence of intentions to reduce waste

Figure 1 Conceptual Model



Note. AC = awareness of consequences, AR = ascription of responsibility, FP = anticipated feelings of pride, FG = anticipated feelings of guilt, MN = moral norms, RDPI = intentions to reduce disposable packaging, FWRI = intentions to reduce waste

3. METHODS

3.1 Measurements and Data Collection

In this research, the measurements for the study were borrowed from prior works (Han, 2014, 2015; Fakfare et al., 2024b; Wattanacharoensil et al., 2024). For the NAM constructs, awareness of consequences was measured using four items; ascription of responsibility was measured using three items; and moral norms were measured using three items modified from Han (2014; 2015). Anticipated feelings of pride and guilt were measured using four and three items respectively, adapted from Han (2014). The outcome constructs, including intentions to reduce disposable packaging and waste were measured using three and two items, modified from Li et al. (2022) and Manosuthi et al. (2022), respectively. All items were adapted to fit the study context of sustainable food truck consumption before being incorporated into a questionnaire.

Data collection was conducted in February 2024, with the assistance of research students who distributed an online questionnaire link to the target sample comprising food truck consumers. The sampling methods employed included convenience and snowball sampling. Participation in the survey was limited to consumers who had purchased and consumed food from a food truck within the preceding 12 months. Consequently, 488 responses were amassed and retained for subsequent statistical analysis.

Descriptive data revealed that 59.8% of respondents identified as male, while 36.5% identified as female. The study predominantly attracted young consumers, with 69.1% falling within the 20-30 years age bracket, followed by 31-40 years old (15.6%), 41-50 years old (9.6%), and 51 years old and above (5.7%). In terms of education, respondents generally held a bachelor degree (67.4%), followed by high school diploma (17.2%), associate degree (11.9%), and postgraduate degree (3.5%). About 40% indicated that they earned less than THB15,000 monthly, followed by THB15,000-20,000 (27.3%), THB20,001-30,000 (16.6%), and THB30,001 or above (16.3%).

Table 1 Measurement Model Assessment

Construct	Indicator	AVE	Rho A	$\widehat{w}_i$	$CI_{\widehat{w}_i}$(L/U)		$\widehat{\lambda}_i$	$CI_{\widehat{\lambda}_i}$(L/U)	
AC	A food truck park/event can contribute to air pollution and global warming through emissions from vehicles and generator use.	0.62	0.86	0.329	0.313	0.354	0.813	0.775	0.862
	Attending a food truck park/event may generate greater environmental impacts on the host community and wider environment.			0.341	0.322	0.364	0.844	0.785	0.89
	The food truck industry can contribute to environmental deterioration through factors such as food waste, excessive use of plastic, and high consumption of energy, water, and natural resources.			0.339	0.32	0.361	0.838	0.795	0.889
	Engaging in environmentally responsible food truck consumption, which involves practices like water and energy conservation, waste reduction, and a variety of green initiatives, helps to minimize environmental degradation.			0.254	0.221	0.278	0.627	0.546	0.701
AR	I feel jointly responsible for the environmental deteriorations caused by the food truck industry.	0.71	0.88	0.415	0.384	0.425	0.876	0.813	0.898
	I feel partly responsible for the environmental problems arising from food truck consumption.			0.409	0.397	0.444	0.87	0.845	0.917
	I believe that every food truck consumer is partly responsible for the environmental problems caused by the food truck industry.			0.364	0.348	0.39	0.771	0.712	0.833
FP	*Imagine that you are attending an environmentally responsible food truck park/event that minimizes its negative impact on the host community and wider environment. How would you feel?*	0.81	0.95						
	Proud			0.269	0.261	0.281	0.877	0.827	0.92
	Accomplished			0.291	0.275	0.297	0.945	0.898	0.954
	Confident			0.275	0.267	0.288	0.896	0.87	0.924
	Worthwhile			0.273	0.264	0.288	0.889	0.858	0.925
FG	*Imagine that you are attending a food truck park/event that generates a negative impact on the environment and host community. How would you feel?*	0.79	0.92						

Table 1 (Continued)

Construct	Indicator	AVE	Rho A	$\widehat{w}_i$	$CI_{\widehat{w}_i}$(L/U)		$\widehat{\lambda}_i$	$CI_{\widehat{\lambda}_i}$(L/U)	
	Guilty			0.367	0.355	0.388	0.875	0.821	0.915
	Remorseful			0.384	0.375	0.411	0.917	0.891	0.949
	Sorry			0.372	0.353	0.383	0.88	0.813	0.913
MN	I feel an obligation to behave in a pro-environmental way while attending a food truck park/event.	0.80	0.92	0.354	0.346	0.369	0.846	0.804	0.891
	Regardless of what other people do, because of my own values/principles, I feel that I should act in environmentally friendly ways while visiting a food truck park/event.			0.39	0.369	0.408	0.933	0.903	0.945
	I believe it is essential to promote sustainable food truck consumption, aiming to minimize impacts on the host community and the broader environment.			0.375	0.367	0.388	0.896	0.871	0.928
RDPI	I intend to recycle any waste (e.g., plastic bottles) generated from food truck meals.	0.68	0.87	0.408	0.387	0.436	0.836	0.779	0.881
	I intend to sort garbage properly, especially when disposing of items from food trucks.			0.42	0.388	0.436	0.858	0.787	0.899
	I intend to use 'green' (non-plastic) containers or utensils when ordering food from food trucks.			0.382	0.363	0.419	0.782	0.742	0.849
FWRI	I am willing to practice waste reduction when I buy and consume food at a food truck park/event in the future.	0.81	0.89	0.556	0.542	0.571	0.901	0.879	0.93
SRMR = 0.08	When I buy and consume food at a food truck park/event in the future, I will try to reduce waste.			0.555	0.538	0.569	0.9	0.876	0.922

Note. $\widehat{w}_i$ = estimated weights, $CI_{\widehat{w}_i}$ = 95% Confidence interval of estimated weights, $\widehat{\lambda}_i$ = estimated loadings, $CI_{\widehat{\lambda}_i}$ = 95% Confidence interval of estimated loadings, rho_A = Dijkstra-Henselers_rho_A, AVE = Average Variance Extracted, AC = awareness of consequences, AR = ascription of responsibility, FP = anticipated feelings of pride, FG = anticipated feelings of guilt, MN = moral norms, RDPI = intentions to reduce disposable packaging, FWRI = intentions to reduce waste

3.2 Analytical Procedures

This study followed Richter et al.'s (2020) methodology to conduct a combined analysis of Structural Equation Modeling (SEM) and Necessary Condition Analysis (NCA). Similar to the approach of Wattanacharoensil et al. (2023; 2024), data were split into two sets: a training sample containing 80% of the data and a testing sample with the remaining 20%. While specific measures to assess the reliability and validity of the NCA construct were not implemented, the study model underwent evaluation using SEM criteria as outlined by Richter et al. (2020) beforehand. Component-based SEM was utilized in this study as it generates a linearly combined score suitable for subsequent analysis (Chumwichan et al., 2023; Leruksa et al., 2023; Rasmidatta, 2023).. Following the suggestion by Hwang et al. (2017), GSCA$_M$ was chosen as the primary estimator. GSCA$_M$ addresses both common and unique aspects of indicators, akin to how factor-based SEM handles measurement errors. Upon determining net-effects and single necessary conditions, the analysis uncovered distinct conditions not previously identified in SEM analysis; these were necessary and/or sufficient conditions for the occurrence of outcomes (i.e. intentions to reduce waste and disposable packaging).

4. RESEARCH FINDINGS

4.1 Assessment of the Measurement Model and Net Effects

In this investigation, GSCA$_M$ was utilized to evaluate the measurement model, yielding the results summarized in Table 1. The validation process ensured internal consistency by verifying that common reliability estimates, such as Dijkstra-Henselers rho_A, surpassed the threshold of 0.7. Convergent validity was established through all loadings and average variance extracted (AVE) values exceeding 0.5 (Fakfare & Lee, 2019; Fakfare, 2023; Fakfare et al., 2023; Meeprom & Fakfare, 2023). To further validate discriminant validity, an advanced heterotrait-monotrait ratio of correlations (HTMT2) was employed, revealing that all measures fell below the recommended cutoff of 0.85, thus confirming discriminant validity. Collinearity was assessed through examination of the variance inflation factor (VIF), with all VIF scores generally remaining below 5 (Fakfare et al., 2020; 2021; Hair et al., 2011), indicating no significant issues. Furthermore, fit measures indicated acceptable fit to the data (SRMR = 0.08, GFI = 0.972). Consequently, it is asserted that the measurement model demonstrates both validity and reliability.

Table 2 shows the results of the path analysis from the GSCA$_M$. Generally, the results supported the hypothesized relationships. Awareness of consequences (AC) was found to significantly influence ascription of responsibility (AR), therefore, H1 was supported. AR was discovered to affect anticipated feelings of pride (FP) and guilt (FG), and moral norms (MN), thus H4-H6 were supported. As expected, MN affects customers' intentions to reduce disposable packaging (RDPI) and waste (FWRI), thus supporting H9 and H10. Finally, AC negatively affects FP. These results are discussed in detail in the discussion section.

Table 2 Net Effect Analysis

	Estimate	**SE**	**95%CI**	
H1: AC→AR	**0.773**	0.037	0.69	0.825
H2: AC→FP	**0.169**	0.09	0.334	0.011
H3: AC→FG	0.097	0.098	-0.078	0.291
H4: AR→FP	**0.566**	0.087	0.396	0.748
H5: AR→FG	**0.522**	0.089	0.362	0.691

Table 2 (Continued)

	Estimate	SE	95%CI	Estimate
H6: AR→MN	**0.706**	0.055	0.592	0.794
H7: FP→MN	0.048	0.05	-0.054	0.161
H8: FG→MN	0.077	0.056	-0.017	0.203
H9: MN→RDPI	**0.57**	0.049	0.461	0.656
H10: MN→FWRI	**0.647**	0.045	0.532	0.718

Note. AC = awareness of consequences, AR = ascription of responsibility, FP = anticipated feelings of pride, FG = anticipated feelings of guilt, MN = moral norms, RDPI = intentions to reduce disposable packaging, FWRI = intentions to reduce waste R-square: AR = 0.60, MN = 0.61, FP= 0.20, FGI = 0.36, RDPI = 0.32, FWRI = 0.42, **Bold value** = significant

4.2 NCA Results

In the NCA model, the combined factor scores derived from the $GSCA_M$-SEM were employed, with an adherence to the guidelines suggested by Dul (2016). This methodology finds recurrent application in recreation and tourism studies such as those by Meeprom et al. (2023), Satitsamitpong et al. (2024), and Wattanacharoensil et al. (2024), showing its relevance and robustness. The NCA procedures aimed to provide a comprehensive understanding of visitors' pro-responsible intentions, particularly in terms of disposable packaging and waste reduction when consuming food or beverage products from food trucks. In this research, five key constructs from the extended NAM model formed the foundation of the NCA model, each playing a distinct role in shaping behavioral intentions, which constituted the desired outcome. These constructs encompassed awareness of consequences, ascription of responsibility, anticipated feelings of pride, guilt, and moral norms. Through rigorous analysis, the present study aimed to ascertain the significance of these constructs as fundamental conditions influencing customers' intentions to reduce disposable packaging and waste.

Table 3 presents a concise summary of the ceiling lines, depicting the upper bounds of necessity for all identified relationships. Notably, the analysis revealed that each determinant exhibited substantial necessity effect size estimates ($d > 0.1$, $p < 0.01$), as outlined in prior literature (Dul, 2016; Wattanacharoensil et al., 2024). Consequently, all identified determinants were deemed essential for the manifestation of intentions for the use of disposable packaging and waste reduction, thus affirming Hypotheses 11 and 12. Figure 2 further provides a visual representation of the NCA plots, offering a clear depiction of the interplay between the key constructs within the model.

Table 3 Single Necessary Condition Analysis

Outcome RDPI	**CE-FDH (d)**	**p-value**	**Triggered level 80% Outcome**	**Necessary?**
AC	0.076	0.969	17.4%	In degree
AR	0.190	0.229	65.8%	In degree
MN	0.238	0.000	84.8%	**In kind****
FP	0.270	0.000	59.6%	**In kind****
FG	0.150	0.246	28.6%	In degree
Outcome FWRI	**CE-FDH (d)**	**p-value**	**Triggered level 80% Outcome** Antecedent/Outcome	**Necessary?**
AC	0.128	0.127	33.9%	In degree
AR	0.118	0.068	24.6%	**In kind***

Table 3 (Continued)

Outcome FWRI	CE-FDH (d)	p-value	Triggered level 80% Outcome Antecedent/Outcome	Necessary?
MN	0.114	0.021	23.6%	**In kind****
FP	0.157	0.007	50.6%	**In kind****
FG	0.112	0.009	1.5%	**In kind****

Note. CE-FDH = Ceiling Envelopment with Free Disposal Hull, CR-FDH = Ceiling Regression with Free Disposal Hull, AC = awareness of consequences, AR = ascription of responsibility, FP = anticipated feelings of pride, FG = anticipated feelings of guilt, MN = moral norms, RDPI = intentions to reduce disposable packaging, FWRI = intentions to reduce waste; * = significant at the 90% confidence level, ** = significant at the 95% confidence level

Figure 2 NCA Plots (RDPI as Outcome)

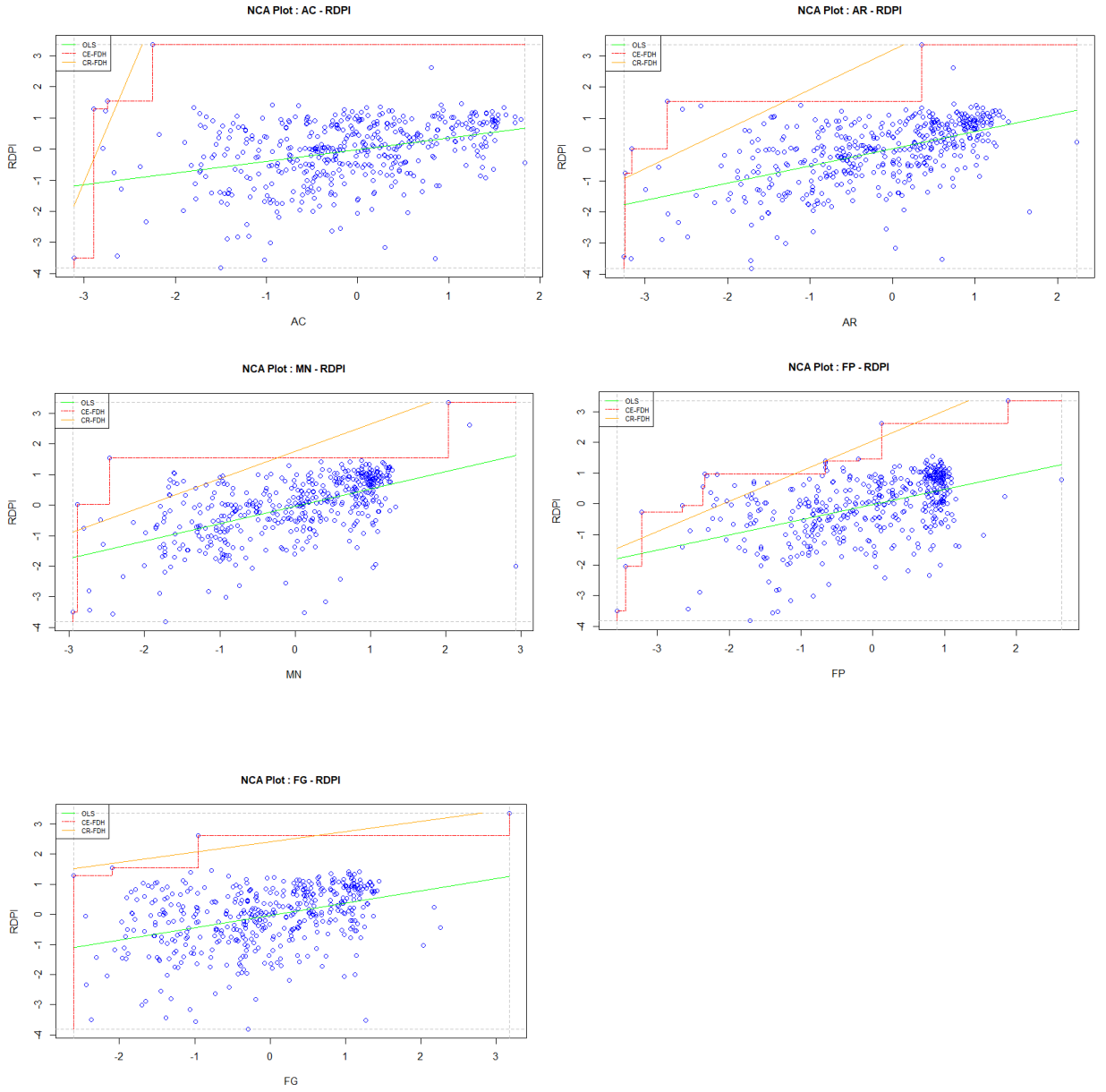
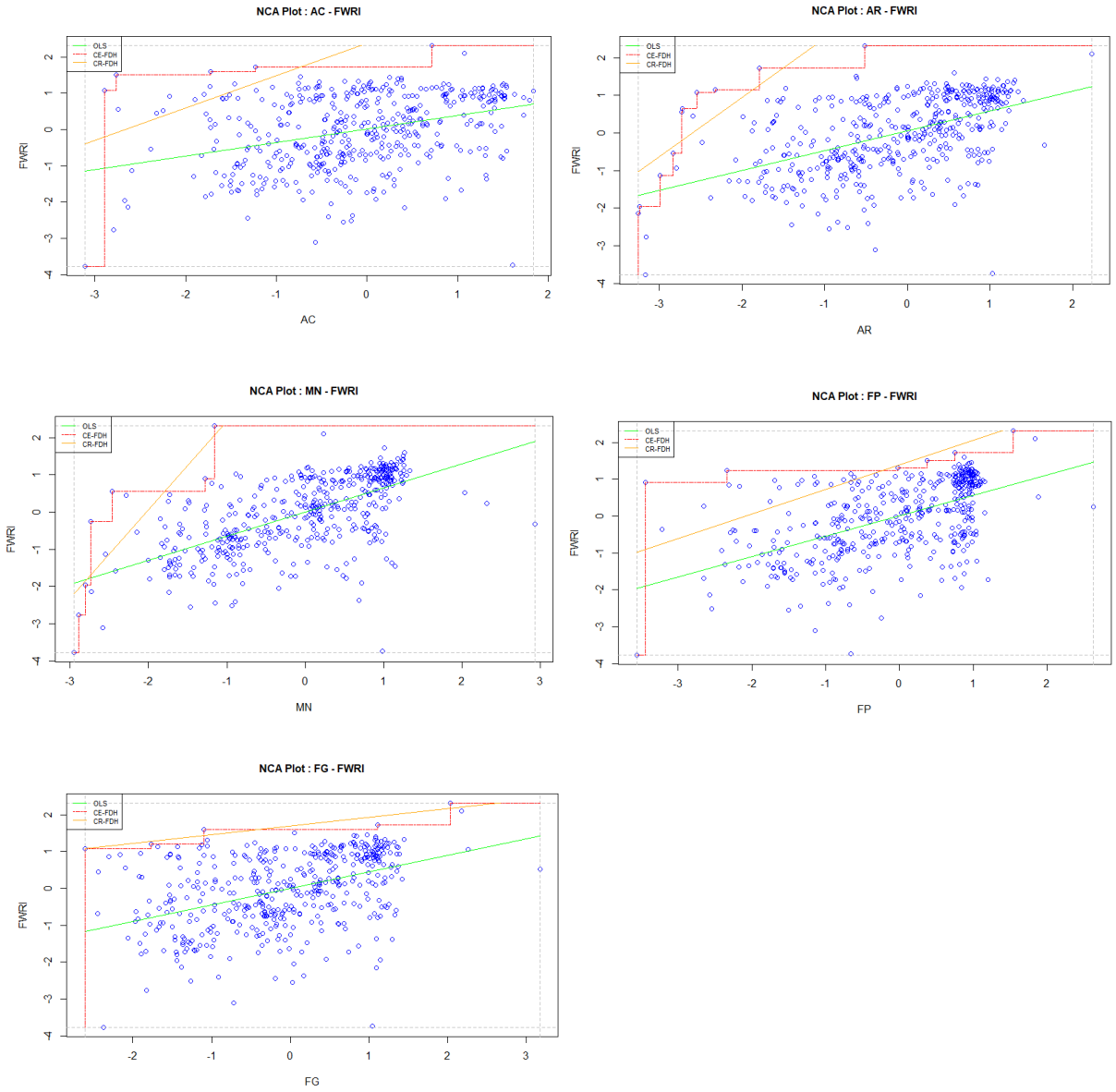


Figure 3 NCA Plots (FWRI as Outcome)



5. DISCUSSION AND IMPLICATIONS

This research primarily aimed to understand the triggers affecting customers' intentions to reduce disposable packaging and waste when consuming food and beverages from food trucks. Grounded on the NAM theory, this study incorporated the key NAM constructs (i.e., awareness of consequences, ascription of responsibility, and moral norms), its extended variables (i.e., anticipated feelings from pride and guilt) and behavioral intentions, particularly in terms of intentions to reduce disposable packaging and waste, into the research model.

Using sufficiency logic, the net effect analysis through GSCA$_M$ shows several interesting findings. In line with Han (2014), awareness of consequences (AC) was found to positively affect ascription of responsibility (AR), and subsequently influenced moral norms (MN). These results strengthen and verify the NAM framework (Fakfare et al., 2024a), particularly in the food truck context. Furthermore, it was found that anticipated emotions, particularly in terms of feelings of pride were influenced by AC and AR. As stated by Han

(2014; 2015), individuals do not only undergo positive or negative emotions but also anticipate the emotions they will feel from participating in specific behaviors. These anticipated emotions, such as pride and guilt, commonly categorized as self-conscious emotions, play a crucial role in understanding the decision-making processes related to environmental responsibility within the NAM. In the context of sustainable food trucks, consumers exhibit anticipated feelings of pride when they are aware of the consequences of their choices and ascription of responsibility regarding sustainable practices. Anticipated feelings of guilt were found to be affected by AR, implying that food truck consumers may experience a sense of guilt when they acknowledge their role in contributing to unsustainable practices or neglecting environmentally responsible behaviors (Han (2014). This emotional anticipation underscores the intricate interplay between cognitive processes, emotional responses, and behavioral intentions in driving environmentally responsible decision-making among food truck consumers. As expected, when moral norms are activated, food truck consumers tend to show their intentions to reduce disposable packaging and waste when attending food truck events (H9 and H10). The results strengthen the NAM framework, thus contributing to the literature relating to sustainable food trucks.

This study further uses necessity logic via the NCA (Dul, 2016) to identify "must-have" factors for the occurrence of customers' intentions to reduce disposable packaging (RDPI) and waste (FWRI). Interestingly, two underlying antecedents were found to be necessary in kind for RDPI to occur. For the occurrence of FWRI, four causes were shown as necessary conditions in kind. MN and FP were found to be critical factors that stimulate RDPI. Individuals must exhibit anticipated feelings of pride and moral norms to achieve the RDPI outcomes. In the context of sustainable food trucks, these findings imply that fostering a sense of moral obligation and promoting anticipated feelings of pride among consumers are essential strategies for encouraging behaviors aimed at reducing disposable packaging. By emphasizing these factors, food truck operators can potentially enhance customer intentions to engage in sustainable practices. Additionally, for FWRI to materialize, this study identified four necessary conditions: AR, MN, FP, and FG. These findings underscore the multifaceted nature of waste reduction intentions, highlighting the importance of addressing various psychological factors such as ascribed responsibility, moral norms, and emotional responses such as pride and guilt. To achieve the desired outcome in terms of waste reduction intentions, it is crucial for interventions and strategies to address all these necessary conditions comprehensively.

In terms of theoretical contributions, this study carries several implications for academia. Firstly, it contextualizes the constructs of the NAM along with its extended variables, as outlined by Han (2014; 2015), and applies them within the sustainable food truck context. By incorporating the notion of moral norms, it is proposed that behavioral intentions, particularly concerning intentions to reduce disposable packaging and waste, are formulated and shaped within this specific setting. Secondly, this research expands the understanding of the applicability of the NAM framework beyond traditional contexts and into the field of sustainable food consumption. By demonstrating the relevance of NAM constructs in influencing consumer behaviors within the food truck industry, this study contributes to the enrichment of theoretical knowledge in the field of environmental psychology and consumer behavior. Thirdly, the identification of critical factors such as moral norms, anticipated feelings of pride, and ascription of responsibility sheds light on the underlying mechanisms driving sustainable behaviors among food truck consumers. This provides valuable insights for scholars interested in understanding the psychological processes involved in pro-environmental decision-making. Additionally, by employing necessity logic through the NCA, this study offers a novel approach to identifying the essential conditions required for the emergence of intentions to reduce disposable packaging and waste. This methodological

contribution enhances the analytical toolkit available to researchers studying complex phenomena within the field of sustainability and consumer behavior.

In terms of practical implications, the contextualization of NAM constructs and their application within the sustainable food truck context offers valuable insights for practitioners and policymakers. Firstly, by understanding how moral norms, anticipated feelings of pride, and responsibility attribution influence consumer behaviors, food truck operators can tailor their strategies to promote sustainable practices effectively (Fakfare et al., 2024a). This may involve initiatives such as offering eco-friendly packaging options, implementing waste reduction measures, and communicating the environmental benefits of such actions to customers. Secondly, the identification of the critical factors driving sustainable behaviors among food truck consumers provides actionable guidance for businesses seeking to enhance their sustainability efforts (Han, 2014). By prioritizing interventions that target moral norms, pride, and ascription of responsibility, food truck operators can foster a culture of environmental responsibility among their clientele. This may lead to increased customer loyalty, positive brand perception, and a competitive advantage in the market. Furthermore, the application of necessity logic through the NCA enables practitioners to pinpoint the essential conditions necessary for promoting intentions to reduce disposable packaging and waste. By focusing on these key factors (e.g., AR, AC, FP, FG), food truck operators can develop more targeted and effective sustainability initiatives that yield tangible results. This may include the implementation of incentives, rewards programs, or educational campaigns aimed at encouraging sustainable behaviors among customers.

6. LIMITATIONS AND FUTURE RESEARCH

This research has certain limitations to be addressed. First, this study may be susceptible to the limitations inherent in cross-sectional research designs. While such studies effectively capture the prevalence of a specific outcome within a target population, they provide only a snapshot of that population at a single point in time. Consequently, this limitation implies that the findings of the study could potentially vary if a different time period were selected for data collection (Fakfare & Sangpikul, 2022). Secondly, this study mainly relies on the NAM and its extended variables to explore customers' pro-responsible intentions and behaviors. It is recommended that future research adopt other potential concepts and theories, such as value-belief-norms, or the value-attitude-behavior model to investigate issues in this area of investigation (Intayos et al., 2021). Finally, GSCA$_M$ is the only estimator employed to derive the net-effect and factor scores for this research. Future studies may consider comparing the results using different types of estimators, maximum likelihood, or partial least squares, to verify the robustness and validity of the outcomes.

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