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Turning Trash into Treasure: Unveiling Public Approval and Government Energy Policies in Thailand's Waste-to-Energy Evolution

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Abstract

Purpose: Waste-to-energy development in Thailand has gained significant attention to seeks sustainable solutions to its waste management challenges. Hence, this research aims to examine the significant impact of trust in government, perceived risk, perceived benefits, place attachment, government energy policies, public acceptance on waste-to-energy development. **Research design, data, and methodology:** The researcher assessed 500 residents in Bangkok Perimeters in Thailand. Target population are residents, living in Nonthaburi, Nakhon Pathom, Pathum Thani, Samutprakarn and Samutsakorn who are over 24 years old and over. There are purposive sampling, stratified random sampling, convenience and snowball sampling. Before the data collection, Content validity was assessed by item-objective congruence (IOC), and reliability test was conducted by the pilot test (n=35), using Cronbach's Alpha. After the data collection, the data analysis was applied through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). **Results:** The results show that trust in government, place attachment, and perceived benefits significantly impact perceived risk and public acceptance. Perceived risk strongly influences public acceptance, while government energy policies play a significant role in waste-to-energy development. **Conclusions:** The findings can contribute to the Thai government and public on the waste-to-energy development and related plans to accelerate the country's waste management and energy consumption.

Keywords: Trust, Place Attachment, Public Acceptance, Government Energy Policies, Waste-To-Energy Development

JEL Classification Code: E44, F31, F37, G15

1. Introduction

In Thailand, "Waste-to-energy development" has gained significant attention and momentum in recent years as the country seeks sustainable solutions to its waste management challenges. With a rapidly growing population and increasing urbanization, Thailand has faced mounting issues related to waste generation, disposal, and environmental pollution. "Waste-to-energy technologies" have emerged promising approach that address concerns by converting waste into valuable resources and generating clean energy (Ministry of Energy of Thailand, 2022).

Recognizing the potential of waste-to-energy, the Thai government has proactively accelerated its development. "The Ministry of Energy," in collaboration with pertinent agencies, has devised policies, regulations, and monetary benefits to facilitate the waste-to-energy plants' establishment. These measures aim to attract investment, promote technology transfer, and create a favorable business environment for waste-to-energy projects (Ministry of Energy of Thailand, 2022).

In terms of waste feedstock, Thailand's waste-to-energy plants utilize a mix of "municipal solid waste" (MSW), agricultural residues, and industrial waste. MSW comprises a significant portion of the feedstock and includes household waste, commercial waste, and non-recyclable

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materials. The nation has also adopted the idea of waste sorting and recycling to optimize the effectiveness of waste-to-energy systems and reduce the volume of waste directed for disposal (Ministry of Energy of Thailand, 2022).

"Waste-to-energy" facilities have been instituted in several provinces across Thailand, including Nonthaburi, Nakhon Pathom, Pathum Thani, Samutprakarn, and Samutsakorn. These plants are seen as driving economic forces in the country's efforts to address waste management challenges, reduce landfill dependence, and generate clean energy (Ministry of Energy of Thailand, 2022).

The progression of waste-to-energy initiatives in Thailand faces a myriad of hurdles demanding attention for successful implementation and sustainable growth (Jaisue et al., 2023). Challenges include inadequate waste management infrastructure, hindering efficient project execution, alongside limited public acceptance and awareness, potentially leading to resistance (Songwathana & Suanmali, 2016). Regulatory complexities pose barriers for investors and developers, while environmental concerns necessitate robust emissions management (Senpong & Wiwattanadate, 2022). Additionally, selecting suitable technologies to address diverse waste compositions and local contexts remains a significant challenge (Intharathirat & Abdul Salam, 2015). Addressing these challenges is imperative for fostering the advancement of waste-to-energy initiatives in Thailand.

This paper holds significant importance for addressing the research gap surrounding public acceptance and government energy policies for waste-to-energy development in Thailand for several reasons. Firstly, it informs policy development by providing valuable insights into public attitudes and preferences, enabling policymakers to formulate effective energy policies aligned with public expectations. Secondly, it aids in overcoming barriers and resistance by identifying factors contributing to public acceptance or opposition, thereby guiding strategies to garner community support for waste-to-energy initiatives. Thirdly, it promotes sustainable waste management by redirecting waste from landfills and leveraging its energy potential, thus advancing environmentally friendly practices. Fourthly, it enhances renewable energy generation by diversifying Thailand's energy mix and reducing reliance on fossil fuels, aligning with government energy policies. Lastly, it supports decision-making processes for stakeholders by offering insights into public perceptions and policy gaps, facilitating successful waste-to-energy implementation. Therefore, this study focuses on the significant impact of trust in government, perceived risk, perceived benefits, place attachment, government energy policies, public acceptance and waste-to-energy development in Thailand.

2. Literature Review

2.1 Trust in Government

According to He et al. (2019), trust in government" refers to "the level of confidence, belief, and reliance that individuals or communities have in the government or governing authorities regarding their ability to effectively manage, regulate, and make informed decisions regarding the planning, implementation, and operation of waste-to-energy projects. According to Mayer et al. (2007), trust in a business or government from an organizational perspective is influenced by the perception of the organization's benevolence. Governments should prioritize effective service delivery, efficient policy implementation, and evidence-based decision-making to increase citizens' trust (Bovens, 2010).

Research consistently affirms that reliance plays a central role in shaping individuals' perception of risks linked to specific hazards (Siegrist, 2021). Trust can be categorized into two types: social trust and generalized trust (Smith & Mayer, 2018). Social trust involves the reliance individuals place in those they do not personally know or in institutions responsible for regulating or managing hazards (Earle, 2010). Conversely, generalized trust refers to individuals' tendency to have faith in other members of society in general, influenced by their unique characteristics (Earle & Siegrist, 2008).

Trust in the government has been recognized as a pivotal factor affecting individual behavior (Shanka & Menebo, 2022). A wealth of empirical research underscores the significant influence of public trust in governments on health compliance behavior (Han et al., 2021). The role of trust in the public sector has attracted considerable research interest, particularly regarding individuals and society's reliance on public authorities when it comes to accepting or opposing scientific or technological advancements that encompass both benefits and risks (He et al., 2019). Accordingly, we derive the following hypotheses:

H1: Trust in government has a significant impact on perceived risk.

H3: Trust in government has a significant impact on perceived benefits.

2.2 Place Attachment

Hou et al. (2019) well-defined "place attachment" as the emotional bond or connection that individuals develop with a specific geographic location or place. Place attachment is the affective bond and sense of connection individuals develop with a particular place or spatial environment, resulting from the interplay of physical, social, cultural, and psychological factors (Scannell & Gifford, 2010). Studies have shown that aesthetic appeal, natural landscapes, landmarks, and proximity to amenities contribute positively to individuals' emotional connections and attachment to a place (Korpela et al., 2001).

Regarding natural disasters, a study by Hou et al. (2019) underscored the moderating and mediating impacts of place attachment in the interplay between risk perception and coping behavioral responses. Additionally, Venables et al. (2012) proposed that a sense of place served as a mediator in the connection between proximity and risk perception in the realm of renewable energy projects. Hence, it is imperative to delve deeper into how place attachment shapes the relationship between risk perception and opposing (or accepting) sentiments, particularly within the domain of waste-to-energy (WtE) settings (Hou et al., 2019). Thereby, we assume that:

H2: Place attachment has a significant impact on perceived risk.

2.3 Perceived Risk

Perceived risk refers to the subjective assessment or belief held by stakeholders regarding the potential negative consequences, uncertainties, or hazards associated with the implementation and operation of waste-to-energy technologies and systems (Hou et al., 2019). Prior studies have demonstrated that the degree of trust within a society, or the trust influenced by other individuals within that society, significantly shapes individual perceptions of both benefits and risks (Watanabe et al., 2021).

According to Guo and Ren (2017), the responsiveness of Public Acceptance of Nuclear Energy (PANE) was examined in relation to the proximity of individuals' residences to nuclear facilities. The results indicated that both the perception of advantages and the perception of hazards significantly influenced public acceptance, with emotional identification and social trust acting as mediators for these impacts. Similarly, Wang et al. (2019) explored the roles of benefit perception, risk perception, and trust in PANE, revealing a noteworthy positive association between benefit perception, risk perception, and public acceptance. Ho et al. (2019) found that participants in both countries prioritized economic benefits over environmental benefits and viewed nuclear accidents as the predominant risk. Building upon these studies, the following hypothesis is formulated:

H4: Perceived risk has a significant impact on public acceptance.

2.4 Perceived Benefits

According to El Mustapha et al. (2017), perceived benefits in energy projects refer to individuals' subjective assessments of the advantages, positive outcomes, or favorable consequences associated with the development, adoption, or use of specific energy sources or technologies. perceived benefits can encompass various aspects such as environmental sustainability, waste management efficiency, energy generation, greenhouse gas reduction, economic opportunities, and potential social benefits" (He et al., 2019). Individuals' beliefs and expectations about the positive outcomes or advantages they anticipate from engaging in a behavior or adopting a technology shape their perceptions of benefits (Bamberg & Schmidt, 2003; Ha & Stoel, 2009).

Acknowledging the significance of public acceptance of a specific generation source or technology, substantial research has been dedicated to pinpointing the factors that impact this acceptance. One frequently used method to examine these determinants is the benefit-risk framework (Kim, 2018; Tanaka, 2006). Specifically, perceived benefits are positively correlated with acceptance, whereas perceived risks exhibit a negative association (Roh & Geong, 2021). Moreover, He et al. (2019) underscored in their literature that the perception of benefits is a key factor significantly affecting public acceptance. Thus, a hypothesis is demonstrated:

H5: Perceived benefits have a significant impact on public acceptance.

2.5 Public Acceptance

Public acceptance refers to the level of support, trust, and approval demonstrated by the general public or specific stakeholder groups towards a particular project, policy, technology, or decision-making process (Devine-Wright, 2009). Wüstenhagen et al. (2007) conceptualized that public acceptance is the state of public approval, support, and consent towards a specific initiative or intervention, taking into account their attitudes, beliefs, values, and perceptions. It involves the willingness of individuals to support, endorse, and engage in the proposed actions or changes, considering factors such as desirability, trustworthiness, legitimacy, and perceived benefits and risks (Devine-Wright, 2009; Siegrist et al., 2005).

The acceptance of the public plays a pivotal role in the advancement of waste-to-energy (WtE) projects, and numerous studies have delved into the connection between public acceptance and WtE development. As outlined by Liu et al. (2021), public acceptance stands as a critical determinant of the success or failure of WtE projects. Furthermore, Qazi et al. (2018) conducted a study examining the factors that impact the public acceptance of "waste-to-energy (WtE) technologies." They highlighted the importance of addressing these factors to enhance public acceptance and promote the sustainable development of WtE projects. Derived from these research studies, the subsequent hypothesis has been articulated:

H6: Public acceptance has a significant impact on waste-to-energy development.

2.6 Government Energy Policies

Government energy policies refer to the set of rules, regulations, strategies, and initiatives implemented by the government to guide and influence the energy sector's development and operation within a country (Leung & Yang, 2012). Government energy policies encompass diverse objectives, including energy security, environmental sustainability, renewable energy promotion, energy efficiency improvement, carbon emissions reduction, and the transition to low-carbon or clean energy systems. These policies aim to ensure a reliable and affordable energy supply, diminish reliance on fossil fuels and alleviate the effects of climate change, and foster sustainable development (Jacobson et al., 2015; Sovacool, 2016).

The legislative and strategic framework in Pakistan plays a vital role in propelling the progress of energy generation, as emphasized by Khattak et al. (2006). Similarly, Nicolli and Vona (2019) underscored the significance of energy liberalization in driving energy expansion, asserting that diminishing the state's monopoly in the power sector can yield positive outcomes for strategies related to renewable power. Additionally, engaging in partnerships with global donor institutions can provide valuable experiences and contribute to the formulation of more effective strategies (Ahmad et al., 2021). Drawing from these studies, the following hypothesis has been derived:

H6: Government energy policies have a significant impact on waste-to-energy development.

2.7 Waste-To-Energy Development

"Waste-To-Energy" (WtE) development refers to "the process of converting various forms of waste materials, such as municipal solid waste, biomass, or industrial waste, into usable forms of energy through various technological methods such as incineration, gasification, or anaerobic digestion (Jaisue et al., 2023). Astrup et al. (2015) described that "waste-to-energy development" refers to "the process of converting various forms of waste materials into usable energy, typically in the form of electricity, heat, or fuel." It involves the application of technologies and systems that thermally or biologically treat waste, recovering energy from the combustion, gasification, or anaerobic digestion of waste materials (Jutidamrongphan, 2018). Assessments of air emissions, ash management, and the fate of pollutants have been conducted to ensure that WtE technologies meet stringent environmental standards and regulations (Brunner & Rechberger, 2015). By addressing challenges related to technology optimization, environmental performance, economic feasibility, and supportive policy frameworks, stakeholders can maximize the benefits of WtE while ensuring sustainable waste management practices and energy generation (Achillas et al., 2011).

3. Research Methods and Materials

3.1 Research Framework

The conceptual framework of this study is derived from previous studies and is illustrated in Figure 1. The researcher focuses to measure the significant impact of trust in government, perceived risk, perceived benefit, place attachment, government energy policies, public acceptance and waste-to-energy development. Therefore, the theoretical framework of the study is derived from three preceding investigations. First, Fatima et al. (2021) explored "Factors influencing renewable energy generation development: a way to environmental sustainability." Second, He et al. (2019) examined "Moderating effect of regulatory focus on public acceptance of nuclear energy." Third, Hou et al. (2019) investigated "Improving social acceptance of waste-to-energy incinerators in China: role of place attachment, trust, and fairness."

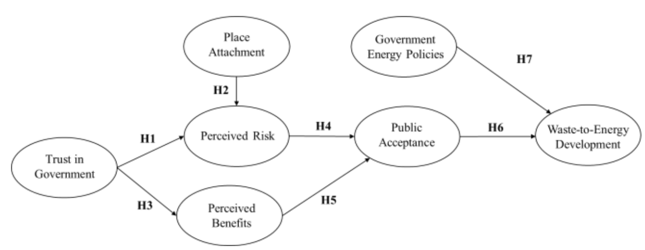

Figure 1: Conceptual Framework

H1: Trust in Government has a significant impact on perceived risk.
H2: Place attachment has a significant impact on perceived risk.
H3: Trust in Government has a significant impact on perceived benefits.
H4: Perceived risk has a significant impact on public acceptance.

H5: Perceived benefits have a significant impact on public acceptance.
H6: Public acceptance has a significant impact on waste-to-energy development.
H7: Government energy policies have a significant impact on waste-to-energy development.
H8: Social influence has a significant impact on intention to shop online.

3.2 Research Methodology

This study applied quantitative methos to investigate residents, living in Nonthaburi, Nakhon Pathom, Pathum Thani, Samutprakarn and Samutsakorn who are over 24 years old and over. In questionnaires, Likert scales are frequently employed to gauge participants' attitudes, opinions, or agreement/disagreement with statements. These scales typically encompass a series of items with a response continuum ranging from "strongly agree" to "strongly disagree."

Prior to data collection, content validity was evaluated through "item-objective congruence (IOC)," and a reliability test was conducted via a pilot test involving 35 participants, utilizing "Cronbach's Alpha." In this study, three experts or professionals holding Ph.D. titles and occupying high-level executive positions were invited to evaluate items using a scoring system. The scores ranged from 1, indicating "clearly measuring," to -1, denoting "clearly not measuring," and 0, representing "unclear measuring" (Turner & Carlson, 2003). The outcomes revealed that 24 items scored 0.6 or higher. In accordance with this approach, the pilot study for this research comprised 35 participants, and the evaluation of each construct was conducted using Cronbach's Alpha. The criteria used for coefficient value is equal or above 0.70 (Nunnally, 1978).

Following data collection, the data analysis involved "Confirmatory Factor Analysis" (CFA) and "Structural Equation Modeling" (SEM). CFA was employed to evaluate "Construct Validity, Convergent Validity, Factor Loading, Composite Reliability (CR), Average Variance Extracted (AVE), Discriminant Validity, and the Goodness of Fit." SEM is applied to test structural model's goodness of fits and hypotheses.

3.3 Population and Sample Size

Target population are residents, living in Nonthaburi, Nakhon Pathom, Pathum Thani, Samutprakarn and Samutsakorn who are over 24 years old and over. Accordingly, the research input the number on each required parameter, involving "latent variables (7)", "observed variables (24)," "anticipate effect size (0.2)," "desired statistical power level (0.8)," and "the probability level (0.05)." As a result, the minimum sample size required from Soper (2023) is 425 but researcher aims to 500 participants to ensure SEM analysis.

3.4 Sampling Technique

The data collection process involves three stages: purposive sampling, stratified random sampling, and convenience sampling, along with snowball sampling. Purposive sampling applied is to identify "residents living in Nonthaburi, Nakhon Pathom, Pathum Thani, Samutprakarn and Samutsakorn who are over 24 years old as legal age in Thailand." Proportion divided per population of each province as of stratified random sampling, as shown in Table 1. For convenience sampling, Online survey distribution via Email, Facebook, LinkedIn and Line Application. Snowball sampling is employed to encourage individuals to share the online questionnaire within their networks.

Table 1: Sample Units and Sample Size

Provinces	Total number of residents in 2023	Proportionate of sample size
Nonthaburi	1,229,735	119
Nakhon Pathom	911,492	89
Pathum Thani	1,129,115	110
Samut Prakan	1,310,766	127
Samut Sakhon	568,465	55
Total	**5,149,573**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

The demographic data of 500 participants are summarized in Table 2. Gender distribution shows that 52.0% are male, 42.4% are female, and 5.6% are unspecified. The age distribution indicates that 23.5% are 24-30 years old or younger, 27.3% are 31-40 years old, 31.8% are 41-50 years old, and 17.4% are 51 years old or older. Professionally, 26.6% are corporate employees, 23.3% are government employees, 14.6% are students, 19.3% are self-employed or business owners, 10.1% are retired or unemployed, and 6.1% fall into the 'others' category. Regarding education, 10.4% have below a bachelor's degree, 63.0% hold a bachelor's degree, 20.0% have a master's degree, and 6.6% possess a doctorate degree.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	221	52.0%
	Female	180	42.4%
	Unspecified	24	5.6%
Age	24-30 Years-old or below	100	23.5%
	31-40 Years-old	116	27.3%
	41-50 Years-old	135	31.8%
	51 Years-old or over	74	17.4%
Professions	Corporate Employees	113	26.6%
	Government Employees	99	23.3%
	Students	62	14.6%
	Self-Employed/Business Owner	82	19.3%
	Retired/Unemployed	43	10.1%
	Others	26	6.1%
Education	Below Bachelor's Degree	44	10.4%
	Bachelor's Degree	268	63.0%
	Master's Degree	85	20.0%
	Doctorate Degree	28	6.6%

4.2 Confirmatory Factor Analysis (CFA)

In Table 3, the results of the confirmatory factor analysis (CFA) along with composite reliability (CR) and average variance extracted (AVE) for various variables are presented. The factors loading represent the strength of the relationship between each observed variable and its corresponding latent factor. All factors' loadings are statistically significant ($p < 0.05$) and notably high, ranging from 0.780 to 0.947, indicating a robust relationship between the observed variables and their underlying constructs. Composite reliability (CR) values range from 0.596 to 0.818, with all constructs exceeding the commonly accepted threshold of 0.70, suggesting satisfactory internal consistency reliability. Average variance extracted (AVE) values range from 0.639 to 0.792, with all constructs meeting or surpassing the recommended threshold of 0.50, indicating adequate convergent validity (Fornell & Larcker, 1981). These findings collectively suggest that the measurement model demonstrates good reliability and validity, providing confidence in the accuracy of the constructs measured.

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
1. Trust in Government (TG)	He et al. (2019)	**3**	**0.815**	0.725-0.799	0.815	0.596
2. Perceived Risk (PR)	He et al. (2019)	4	0.912	0.810-0.888	0.913	0.724
3. Perceived Benefit (PB)	He et al. (2019)	4	0.947	0.890-0.918	0.947	0.818
4. Place Attachment (PA)	Hou et al. (2019)	4	0.909	0.825-0.889	0.910	0.717
5. Public Acceptance (PU)	He et al. (2019)	3	0.919	0.853-0.917	0.920	0.792
6. Government Energy Policies (GEP)	Fatima et al. (2021)	2	0.779	0.787-0.812	0.780	0.639
7.Waste-to-Energy Development (WTE)	Fatima et al. (2021)	4	0.920	0.836-0.878	0.920	0.742

The measurement model's fit indices, including CMIN/DF (1.869), GFI (0.933), AGFI (0.913), NFI (0.954), CFI (0.978), TLI (0.974), and RMSEA (0.042), all surpass widely accepted thresholds, indicating a robust fit between the proposed model and the observed data. Consequently, researchers can have confidence in the reliability and validity of the measurement model, thus supporting its utility for accurately assessing the targeted constructs in empirical research.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	≤ 5.00 (Marsh et al., 2004)	431.723/231 = 1.869
GFI	≥ 0.80 (Nayir, 2013)	0.933
AGFI	≥ 0.80 (Nayir, 2013)	0.913
NFI	≥ 0.80 (Wu & Wang, 2006)	0.954
CFI	≥ 0.80 (Nayir, 2013)	0.978
TLI	≥ 0.80 (Sharma et al., 2005)	0.974
RMSEA	≤ 0.08 (Pedroso et al., 2016)	0.042
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index, and RMSEA = root mean square error of approximation

Fornell and Larcker (1981) proposed assessing discriminant validity by comparing the square root of each construct's Average Variance Extracted (AVE) with the inter-construct correlations. In this study, all AVE square roots exceeded the correlations between constructs, indicating robust discriminant validity. Thus, the convergent and discriminant validity were both confirmed, providing substantial evidence for establishing construct validity.

Table 5: Discriminant Validity

	GEP	PR	PA	PU	WTE	PB	TG
GEP	**0.800**						
PR	0.361	**0.851**					
PA	0.388	0.507	**0.847**				

	GEP	PR	PA	PU	WTE	PB	TG
PU	0.389	0.589	0.546	**0.890**			
WTE	0.445	0.462	0.434	0.552	**0.861**		
PB	0.312	0.387	0.444	0.293	0.237	**0.904**	
TG	0.401	0.604	0.593	0.523	0.427	0.326	**0.772**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

In Table 6, the goodness-of-fit indices for the structural model are presented alongside their corresponding acceptable values as per established criteria. The calculated values for the indices are as follows: CMIN/DF ratio (3.333), GFI (0.881), AGFI (0.854), NFI (0.913), CFI (0.937), TLI (0.929), and RMSEA (0.068). These values generally meet or exceed the acceptable thresholds suggested by prior research, indicating a satisfactory fit of the structural model to the empirical data.

Table 6: Goodness of Fit for Structural Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	≤ 5.00 (Marsh et al., 2004)	816.477/245 = 3.333
GFI	≥ 0.80 (Nayir, 2013)	0.881
AGFI	≥ 0.80 (Nayir, 2013)	0.854
NFI	≥ 0.80 (Wu & Wang, 2006)	0.913
CFI	≥ 0.80 (Nayir, 2013)	0.937
TLI	≥ 0.80 (Sharma et al., 2005)	0.929
RMSEA	≤ 0.08 (Pedroso et al., 2016)	0.068
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index, and RMSEA = root mean square error of approximation

4.4 Research Hypothesis Testing Result

In the hypotheses, the magnitude of the relationship between the independent and dependent variables is measured through regression coefficients or standardized path coefficients, as shown in Table 7.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-value	Result
H1: TG→PR	0.499	9.718	Supported
H2: PA→PR	0.312	7.020	Supported
H3: TG→PB	0.343	6.799	Supported
H4: PR→PU	0.563	11.826	Supported
H5: PB→PU	0.082	1.993	Supported
H6: PU→WTE	0.485	10.629	Supported
H7: GEP→WTE	0.282	5.435	Supported

Source: Created by the author

H1: Trust in Government has a significant impact on perceived risk.

This hypothesis suggests that individuals who trust the government are likely to perceive less risk associated with waste-to-energy development initiatives. The standardized path coefficient (β = 0.499, t = 9.718) indicates a strong positive relationship between trust in government and perceived risk, which is statistically significant ($p < 0.05$). This implies that higher levels of trust in the government correlate with lower perceptions of risk regarding waste-to-energy projects. This finding underscores the importance of government credibility and transparency in shaping public perceptions of environmental initiatives like waste-to-energy.

H2: Place attachment has a significant impact on perceived risk.

This hypothesis posits that individuals who have a stronger attachment to their place of residence are likely to perceive less risk associated with waste-to-energy development. The standardized path coefficient (β = 0.312, t = 7.020) indicates a positive relationship between place attachment and perceived risk, which is statistically significant ($p < 0.05$). This suggests that individuals with stronger place attachment may perceive lower risks associated with waste-to-energy projects, possibly due to a sense of familiarity and connection to their local environment.

H3: Trust in Government has a significant impact on perceived benefits.

This hypothesis suggests that individuals who trust the government are likely to perceive greater benefits from waste-to-energy development projects. The standardized path coefficient (β = 0.343, t = 6.799) indicates a positive relationship between trust in government and perceived benefits, which is statistically significant ($p < 0.05$). This implies that higher levels of trust in the government correlate with greater perceptions of benefits associated with waste-to-energy initiatives, such as improved waste management and environmental sustainability.

H4: Perceived risk has a significant impact on public acceptance.

This hypothesis proposes that higher levels of perceived risk associated with waste-to-energy development will lead to lower levels of public acceptance of such projects. The standardized path coefficient (β = 0.563, t = 11.826) indicates a strong positive relationship between perceived risk and public acceptance, which is statistically significant ($p < 0.05$). This suggests that increased perceptions of risk are associated with decreased public acceptance of waste-to-energy projects, highlighting the importance of addressing public concerns and mitigating perceived risks in promoting project acceptance.

H5: Perceived benefits have a significant impact on public acceptance.

This hypothesis suggests that individuals who perceive greater benefits from waste-to-energy development projects are more likely to accept such initiatives. The standardized path coefficient (β = 0.082, t = 1.993) indicates a positive relationship between perceived benefits and public acceptance, which is marginally statistically significant ($p < 0.05$). Although the relationship is weaker compared to perceived risk, it still suggests that perceptions of benefits play a role in shaping public acceptance of waste-to-energy projects.

H6: Public acceptance has a significant impact on waste-to-energy development.

This hypothesis proposes that higher levels of public acceptance of waste-to-energy projects will contribute to their successful implementation and development. The standardized path coefficient (β = 0.485, t = 10.629) indicates a strong positive relationship between public acceptance and waste-to-energy development, which is statistically significant ($p < 0.05$). This highlights the critical role of public support and acceptance in facilitating the implementation and progress of waste-to-energy initiatives.

H7: Government energy policies have a significant impact on waste-to-energy development.

This hypothesis suggests that government energy policies influence the development and implementation of waste-to-energy projects. The standardized path coefficient (β = 0.282, t = 5.435) indicates a positive relationship between government energy policies and waste-to-energy development, which is statistically significant ($p < 0.05$). This underscores the importance of supportive regulatory frameworks and policies in promoting the growth and sustainability of waste-to-energy initiatives.

These findings collectively highlight the multifaceted nature of factors influencing waste-to-energy development in Thailand, emphasizing the importance of trust in government, perceptions of risk and benefits, place attachment, public acceptance, and government policies in shaping the trajectory of such projects.

5. Conclusion and Recommendation

5.1 Conclusion

The findings of this study shed light on the intricate dynamics surrounding waste-to-energy development in Thailand, particularly within the context of public perception and government policy. The discussion will focus on the implications of the hypotheses results and their broader implications for sustainable waste management strategies and policy-making.

Firstly, the significant impact of trust in government on perceived risk and perceived benefits underscores the pivotal role of government credibility and transparency in shaping public perceptions of waste-to-energy initiatives. As indicated by the results, higher levels of trust in the government are associated with reduced perceptions of risk and heightened perceptions of benefits, highlighting the importance of fostering trust through effective communication, stakeholder engagement, and transparency in project planning and implementation.

Secondly, the positive association between place attachment and perceived risk suggests that individuals with stronger ties to their local environment may view waste-to-energy projects through a lens of familiarity and attachment, leading to lower perceptions of risk. This finding underscores the importance of considering local context and community engagement in waste management initiatives, as community perceptions and attitudes can significantly influence project outcomes and acceptance.

Thirdly, the strong impact of perceived risk on public acceptance underscores the critical importance of addressing public concerns and mitigating perceived risks in promoting the acceptance and success of waste-to-energy projects. Effective risk communication, environmental impact assessments, and community engagement strategies are essential in building public trust and acceptance, thereby facilitating the implementation and progress of such initiatives.

Furthermore, while the impact of perceived benefits on public acceptance was found to be marginally significant, it still highlights the relevance of emphasizing the potential benefits of waste-to-energy projects, such as improved waste management and environmental sustainability, in garnering public support and acceptance.

Finally, the significant influence of government energy policies on waste-to-energy development underscores the importance of supportive regulatory frameworks and policy interventions in fostering the growth and sustainability of such initiatives. Clear and coherent policy directives, incentives, and regulations can provide the necessary framework for investment, innovation, and collaboration in the waste-to-energy sector.

In conclusion, the findings of this study underscore the complex interplay of factors influencing waste-to-energy development in Thailand, emphasizing the critical importance of trust in government, community engagement, effective risk communication, and supportive policy environments in promoting sustainable waste management practices and advancing towards a greener and more sustainable future.

5.2 Recommendation

Based on the findings and implications of this study, the following recommendations are proposed for stakeholders involved in waste-to-energy development and environmental sustainability efforts:

Enhance Stakeholder Engagement: Stakeholders should prioritize meaningful and inclusive engagement with local communities, government agencies, industry partners, and environmental organizations throughout all stages of waste-to-energy projects. This includes soliciting input, addressing concerns, and fostering collaboration to ensure that projects are responsive to the needs and priorities of all stakeholders.

Invest in Public Awareness and Education: Develop targeted public awareness campaigns and educational initiatives to raise awareness about the benefits of waste-to-energy technologies, dispel misconceptions, and promote informed decision-making among community members. These initiatives should emphasize the potential environmental, economic, and social benefits of waste-to-energy projects, while also addressing concerns related to health, safety, and environmental impact.

Strengthen Regulatory Frameworks: Governments and regulatory agencies should establish clear and comprehensive regulatory frameworks to govern the planning, implementation, and operation of waste-to-energy projects. This includes setting standards for environmental impact assessments, emissions monitoring, and waste management practices, as well as streamlining permitting processes to facilitate project development.

Promote Technological Innovation: Encourage research and development in waste-to-energy technologies to improve efficiency, reduce environmental impact, and enhance the economic viability of projects. Governments, academic institutions, and industry partners should collaborate to support innovation in areas such as advanced combustion technologies, waste sorting and preprocessing, and resource recovery from waste streams.

Foster Public-Private Partnerships: Facilitate partnerships between government agencies, private sector companies, and non-profit organizations to leverage resources, expertise, and funding for waste-to-energy projects. Public-private partnerships can help overcome barriers to project development, accelerate technology adoption, and maximize the social, economic, and environmental benefits of waste-to-energy initiatives.

Prioritize Environmental and Social Impact Assessment: Conduct comprehensive environmental and social impact assessments for waste-to-energy projects to evaluate potential risks and benefits, identify mitigation measures, and ensure compliance with regulatory requirements. These assessments should be conducted in a transparent and participatory manner, with input from affected communities and stakeholders.

Monitor and Evaluate Project Performance: Establish robust monitoring and evaluation mechanisms to track the performance of waste-to-energy projects over time, including their environmental, economic, and social outcomes. Regular monitoring and evaluation can help identify areas for improvement, assess the effectiveness of mitigation measures, and inform future decision-making and project planning.

Promote Circular Economy Principles: Integrate waste-to-energy initiatives into broader efforts to promote a circular economy, where resources are recycled, reused, and recovered to minimize waste and maximize value. This includes implementing strategies such as waste segregation, material recovery, and energy generation from renewable sources to create a more sustainable and resilient waste management system.

By implementing these recommendations, stakeholders can enhance the effectiveness, sustainability, and acceptance of waste-to-energy projects, contributing to the transition towards a more sustainable and circular economy.

5.3 Limitation and Further Study

Despite the valuable insights provided by this study, it is important to acknowledge several limitations that may impact the interpretation and generalizability of the findings . First, the study sample consisted of 500 residents living in specific areas within Bangkok Perimeters in Thailand. This sampling approach may not fully capture the diversity of perspectives and experiences across different demographic groups and geographic regions, potentially limiting the generalizability of the findings to the broader population. Second, the study employed a cross-sectional design, which allows for the examination of relationships at a single point in time. However, this design precludes the assessment of causality or changes over time, limiting the ability to draw definitive conclusions about the causal relationships between variables. Lastly, Data for this study were collected using a single method (e.g., surveys), which may introduce methodological limitations such as response bias or common method variance. Using multiple methods of data collection (e.g., interviews, observations) could provide a more comprehensive understanding of the phenomena under study.

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