ASSESSING SOCIAL ACCEPTANCE OF ENERGY PRODUCTION FROM FOOD WASTE IN MUNICIPAL SOLID WASTE MANAGEMENT

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ABSTRACT

ASSESSING SOCIAL ACCEPTANCE OF ENERGY PRODUCTION FROM FOOD WASTE IN MUNICIPAL SOLID WASTE MANAGEMENT

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A considerable amount of municipal solid waste (MSW) is still disposed of in landfills instead of harnessing its potential for energy production worldwide. The widespread reliance on landfills instead of pursuing more sustainable solutions underscores the concept that the success of managing MSW sustainability is closely linked to social acceptance. Changes in waste management lead to changes in people's lifestyles; thus, it should be investigated whether these changes are socially acceptable. This study applied a quantitative research technique using a sample size of 392 questionnaires to interrogate the dimensions of social acceptance for MSW, encompassing socio-political, community, and market aspects. The structural equation modeling-partial least squares methodology on data gathered via questionnaires was employed, and the multifaceted determinants of social acceptance for deriving sustainable energy from food waste were identified. Factors impacting social acceptance include experience, knowledge, distributive and procedural fairness, trust, perceived benefits and risks, positive affect, personal and social norms, perceived behavioral control, problem perception, and intention to accept. Notably, 'Intention to accept' emerged as the predominant predictor of social acceptance, trailed by social and personal norms and perceptions of risk and benefit. Trust was segmented into three distinct pillars in a novel approach, enhancing analytical depth and revealing nuanced relationships. The study also delves into relationships within the conceptual model across different demographic segments according to the measurement invariance determination and direct and indirect interconnections. The model's constructs, factors, and actors were aligned with dimensions of social acceptance.

Keywords: Social Acceptance, Municipal Solid Waste, Renewable Energy, Structural Equation Modeling-Partial Least Squares

ÖZ

BELEDİYE KATI ATIKLARININ YÖNETİMİNDE GIDA ATIKLARINDAN ENERJİ ÜRETİMİNİN SOSYAL KABULÜNÜN DEĞERLENDİRİLMESİ

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Dünya çapında önemli miktarda belediye katı atıkları, atığın enerji üretim için potansiyelinden faydalanmak yerine, hala düzenli depolama sahalarında bertaraf edilmektedir. Daha sürdürülebilir çözümler aramak yerine düzenli depolama alanlarına olan yaygın bağımlılık, belediye katı atıklarının sürdürülebilir bir şekilde yönetilmesinin başarısının sosyal kabulle yakından bağlantılı olduğu kavramının altını çizmektedir. Atık yönetimindeki değişiklikler insanların yaşam tarzlarında değişikliklere yol açmaktadır; dolayısıyla bu değişikliklerin sosyal kabulünün olup olmadığı araştırılmalıdır. Bu çalışmada, sosyo-politik, toplumsal ve piyasa boyutlarını kapsayan belediye katı atık yönetimi için sosyal kabul boyutlarını sorgulamak amacıyla 392 anketten oluşan bir örneklem büyüklüğü kullanılarak nicel bir araştırma tekniği uygulanmıştır. Anketler yoluyla toplanan veriler üzerinde yapısal eşitlik modellemesi-kısmi en küçük kareler metododu kullanılmış ve gıda atıklarından sürdürülebilir enerji elde edilmesine yönelik sosyal kabulün çok yönlü belirleyicileri tespit edilmiştir. Sosyal kabulü etkileyen faktörler arasında deneyim, bilgi, dağıtımsal ve prosedürel adalet, güven, algılanan fayda ve riskler, olumlu duygular, kişisel ve sosyal normlar, algılanan davranışsal kontrol, sorun algısı ve kabul etme niyeti yer almaktadır. Özellikle, 'kabul etme niyeti' sosyal kabulün en baskın belirleyicisi olarak ortaya çıkmış, bunu sosyal ve kişisel normlar ile risk ve fayda algıları izlemiştir. Güven, analitik derinliği artıran ve ayrıntılı ilişkileri ortaya çıkaran yeni bir yaklaşımla üç farklı başlık altında incelenmiştir. Çalışma ayrıca, ölçüm değişmezliği tespitine göre farklı demografik segmentler arasında kavramsal model içindeki ilişkilerin yanı sıra hem doğrudan hem de dolaylı bağlantıları da incelemektedir. Modelin yapıları, faktörleri ve aktörleri sosyal kabulün boyutlarıyla uyumlu olacak şekilde eşleştirilmiştir.

Anahtar Kelimeler: Sosyal Kabul, Belediye Katı Atıkları, Yenilenebilir Enerji, Yapısal Eşitlik Modellemesi-Kısmi En Küçük Kareler

To Mum, Dad, and All the Heroes and Super Girls in My Life

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I am proud to conduct the research as a strong woman on the 100th anniversary of the Republic of Türkiye.

TABLE OF CONTENTS

ABSTRACT v

ÖZ vii

ACKNOWLEDGMENTS x

TABLE OF CONTENTS xi

LIST OF TABLES xv

LIST OF FIGURES xvi

LIST OF ABBREVIATIONS xvii

CHAPTERS

1 INTRODUCTION 1

1.1 Objective of the Study 2

1.2 Scope of the Study 4

1.3 Research Question 6

1.4 Thesis Structure 7

2 LITERATURE REVIEW 9

3 CURRENT SITUATION OF MUNICIPAL SOLID WASTE MANAGEMENT IN TÜRKİYE 25

3.1 Properties and Generation Rate of Municipal Solid Waste 25

3.1.1 Properties of the Municipal Solid Waste 25

3.1.2 Municipal Solid Waste Generation Rate in Türkiye 27

3.2 Municipal Waste Management Policy in Türkiye 28

3.3 Legislative Framework 33

3.3.1 Published by the Ministry of Environment, Urbanization & Climate Change 33
3.3.2 Published by the Ministry of Energy and Natural Resources 36
3.4 Institutional Framework 41
3.4.1 Municipalities 41
3.4.2 Ministry of Environment, Urbanization & Climate Change 44
3.4.3 Market 46
3.5 Current Status of Waste-To-Energy Conversion Facilities in Türkiye 48
3.5.1 Technology Alternatives to Treat the Municipal Solid Waste 48
3.5.2 Food Waste as a Renewable Energy Source 49
3.5.3 Current Status of Food-Waste-To-Energy Conversion Facilities in Türkiye 51
3.5.4 MSW Management Treatment Costs and Social Cost of Carbon 52
4 THEORETICAL MODEL 57
4.1 Approaches to Conceptualize Social Acceptance of MSW 57
4.2 Conceptual Model 60
5 METHODOLOGY 75
5.1 Background Information about Ankara and the MSW Management System of the City 76
5.2 Survey Design 77
5.3 Pilot Study 78
5.4 Sampling Procedure 79
5.5 Data Collection 80
5.6 Data Analysis Methodology 85
6 RESULTS 87

6.1 Measurement Model Results ... 87
6.1.1 Identification of Constructs as Reflective or Formative ... 87
6.1.2 Validity and Reliability of Formative Construct ... 88
6.1.3 Validity and Reliability of Reflective Constructs ... 89
6.2 Structural Model Results ... 97
6.3 Importance-Performance Map Analysis ... 111
6.4 Mediation Analysis ... 113
6.5 Moderation Analysis ... 120
7 DISCUSSION ... 131
7.1 Experience-Knowledge-Trust Relationship ... 134
7.2 The Effect of Fairness ... 138
7.2.1 Procedural fairness ... 138
7.2.2 Distributive fairness ... 148
7.3 The Effect of Perceived Risks, Benefits, and Positive Affects ... 153
7.4 The Effect of Problem Perception ... 160
7.5 Intention to Accept and Acceptance ... 162
7.6 Evaluating Social Acceptance of Waste Treatment Facilities across Different Residential Proximities ... 164
7.7 Conceptualizing the Social Acceptance of MSWM ... 165
8 CONCLUSION ... 173
REFERENCES ... 177
APPENDICES
A. Short Chronology of MSW Legislation ... 191
B. Bootstrapping results ... 194

C. Approval of Applied Ethics Research Center 195
D. Questions used in questionnaire and references 197
E. Questionnaire (Turkish version) 203
F. Questionnaire (English version) 209
CURRICULUM VITAE 214

LIST OF TABLES

TABLES

Table 3.1 Feed-in-tariff for renewable energy production 39
Table 3.2 Information about the municipal waste generation and treatment in Türkiye 52
Table 4.1 Constructs used in the model and their short description 64
Table 4.2 Hypotheses that were subject to examination within the framework of this research 67
Table 5.1 Demographic properties 82
Table 5.2 Analysis list used in the study 86
Table 6.1 Results of internal consistency reliability and convergent validity analysis 90
Table 6.2 Discriminant Validity - Fornell ve Larckell Criterion 92
Table 6.3 Discriminant validity - Cross-loadings 93
Table 6.4 Discriminant validity – HTMT ratio matrix 95
Table 6.5 Results for Structural Model - R^2, f^2, Q^2 and VIF values 98
Table 6.6 Structural Model Direct Effect Coefficients 101
Table 6.7 Hypotheses Assessment Based on Analysis Results Analysis 106
Table 6.8 Mediation Analysis Results 115
Table 6.9 Categories used in moderation analysis 124
Table 6.10 Results of the Measurement Invariance 126
Table 6.11 Moderation analysis results according to the education 127
Table 7.1 Some projects that received initial authorization for small capacity and subsequently received EIA positive decision for large capacity 140
Table 7.2 Some of the examples of repeated tenders 147
Table 7.3 Criteria, actors, factors, and the way through the social acceptance of food waste to energy systems 170

LIST OF FIGURES

FIGURES

Figure 3.1. Municipal Waste Composition of Türkiye (%)....................................27
Figure 3.2. Municipal solid waste generated per capita in 2018 (kg/capita/day)....28
Figure 3.3. Waste Disposal Trends 2002-2020 32
Figure 3.4. Installed Capacity Trend in Renewable Energy in Türkiye (2005-2020) 36
Figure 4.1. Revised version of the model 66
Figure 6.1. IPMA results-construct level 112
Figure 6.2. IPMA results-indicator level 113
Figure 7.1. Training center in Mamak Landfill 137
Figure 7.2. Greenhouse at the Mamak Landfill[53] 137
Figure 7.3. Number of biomass (all kinds of biomass, not only MSW) to energy plants between 2020 and 2023 (source TEİAŞ reports; (TEIAS, 2019, 2021; TEİAŞ, 2021b, 2021a, 2023b, 2023a) 142
Figure 7.4. Distribution of the cost and benefits of waste-to-energy generation plants (adapted from Zeiss and Atwater, 1987) 152
Figure 7.5. Structural model results for the social acceptance of food waste-to-energy 169

LIST OF ABBREVIATIONS

ABBREVIATIONS

AVE	: Average Variance Extracted
CR	: Composite Reliability
CTA	: Confirmatory Tetrad Analysis
EIA	: Environmental Impact Assessment
EPDK	: Turkish Energy Market Regulatory Authority
IPMA	: Importance-Performance Map Analysis
MSW	: Municipal Solid Waste
MSWM	: Municipal Solid Waste Management
MSWMS	: Municipal Solid Waste Management System
MoEFCC	: Ministry of Environment, Urbanization and Climate Change
PLS	: Partial Least Squares
SEM	: Structural Equation Modeling
TEİAŞ	: Turkish Electricity Transmission Corporation
TurkStat	: Turkish Statistical Institute
W-t-P	: Willingness to Pay

CHAPTER 1

INTRODUCTION

In 2021, the amount of municipal waste produced per person in the EU was 530 kg, of which 49% was recycled and composted, and 22.8% was landfilled[1]. The landfilling and recycling rates differ depending on the country. Although these figures vary from country to country, there is no country without a landfill. But the Earth System does not need a landfill. From this point of view, it can be reevaluated whether humankind really needs garbage dumps or to what extent landfills are needed. The Earth's System sustains the handling of waste of nature and greenhouse gases without anthropogenic impacts. However, the increasing anthropogenic effects have damaged the Earth System’s sustainability. Some damaging factors are uncontrolled solid waste and increased greenhouse gases such as carbon dioxide.

Municipal Solid Waste (MSW) is the most widespread type of solid waste since it is produced daily by human practices and encompasses every individual on Earth. MSW generation capacity per capita increases, and the composition evolves due to various factors depending on consumption habits, urbanization, income, culture, etc. At the same time, it is clear that these factors affect many other characteristics of countries (economy, development, industrialization, etc.). Since the waste's composition and amount and the countries' characteristics vary according to many factors, handling the waste issue should also be country-specific according to the country's characteristics and the waste. Given these nuances and disparities, it becomes imperative that each nation tailors its Municipal Solid Waste Management

[1] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Municipal_waste_statistics (last visited on 11.08.2023)

(MSWM) strategies to its unique context and challenges. Based on this perspective, this study, aims to investigate the social acceptance of integrated sustainable MSWM by considering factors and actors such as driving forces.

Integrated Sustainable Waste Management should not be perceived only as a technical issue but as a concept in which policy and social acceptability factors play an important role[2] (Abrelpe & ISWA, 2013; The MOECC *Entegre Atık Yönetim Planı Hakkında Yazışma*, 2010; Tekin, 2020). The issue of MSWM is deeply rooted in individual habits, attitudes, and perceptions, while MSWM practices also shape stakeholders' views and contributions. Numerous other factors influence these stakeholders' behaviors. Recognizing this complexity, establishing sustainable and successful projects becomes pivotal for gaining social acceptance. Indeed, as societal structures and individual behaviors are deeply intertwined, the success of MSWM relies not just on efficient technologies but also on the participation of its stakeholders. As Murray Bookchin explains, ecological problems cannot be fully understood without considering societal issues (Vineeshiya & Mahees, 2019).

1.1 Objective of the Study

The scope of integrated solid waste management is extensive, and therefore this research concentrates on the social acceptance of generating energy from biodegradable portion in MSW. Although using MSW as an energy source has positive results, a large proportion of MSW remains buried instead of energy generation. In short, landfilling continues to cause environmental pollution and public health externalities.

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[2] https://webdosya.csb.gov.tr/db/cygm/editordosya/GNG2010-09EntAtikYonPlan.pdf

Certain policies have been formulated to divert the disposal of biodegradable waste in landfills both in the EU[3] and in Türkiye[4]. The driving force behind this study is the recognition that there is no deficiency in terms of legislation regarding the management of municipal waste. However, despite the availability of local technologies, a significant portion of the garbage is still disposed of through landfilling. This indicates a gap between the existing legislation and its practical implementation.

Most research on MSWM focuses on recycling. When considering energy production utilizing MSW, the emphasis is on advancing the relevant technologies and economies. Incineration plants have been used for years and are well-documented in academic literature. Likewise, numerous studies on landfills exist, highlighting topics like site selection, landfill characteristics, properties of materials used in impermeable layers, and hydrogeological considerations. As waste diversion from landfills becomes more critical, there's a noticeable push towards eliminating recyclable wastes first. Only recently has the importance of preventing biodegradable waste from ending up in landfills become a priority for stakeholders. Consequently, the study identifies a noticeable research gap in this area.

The conceptualization of social acceptance in renewable energy generation systems was revealed by Wüstenhagen et al. (2007), one of the important and most cited studies (Gordon et al., 2022) for social acceptance. In that study, social acceptance was conceptualized with three phenomena: community acceptance, socio-political acceptance, and market acceptance. The conceptualization of these three dimensions has paved the way for empirical studies, as in this study. For this aim, a quantitative questionnaire survey was employed to assess the social acceptance of using food waste as a renewable energy source. Ankara was chosen as a case to apply the survey.

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[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52005DC0105 (last visited on 12.08.2023)

[4] Atıkların Düzenli Depolanmasına Dair Yönetmelik, (last visited on 12.08.2023) https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=13887&MevzuatTur=7&MevzuatTertip=5

Given the critical importance of both "Municipal Solid Waste Management" and "climate change," this study aims to investigate the social acceptance of using food waste as a renewable energy source. Specifically, the factors, opportunities, and obstacles that influence acceptance toward achieving zero carbon emissions were explored.

1.2 Scope of the Study

MSWM is very complex as it is interconnected with many disciplines, each having different aspects. This process starts with the generation of the waste, then continues with the separation at the source, the collection and transportation of the waste, either sorted or not. Then, there are processes such as treating and disposing of the collected waste, which might be by landfilling. Many different institutions, organizations, experts, and citizens are involved in this process. The number of stakeholders engaged in solid waste management in one way or another is high since it involves society as a whole, including individual waste generators, policymakers, and policy implementers. As a consumer, each individual plays a part in the system as a waste generator due to their habits and as an implementer of policy. On the other hand, policymakers, municipalities, waste collectors, and operators are responsible for handling waste. Therefore, conducting an effective waste management system without considering all these actors' attitudes, abilities, and conditions is impossible. Consequently, all these stakeholders are subjects of interest within the scope of this study.

Governance of municipal solid wastes examined in this study by focusing on the biodegradable portion, which constitutes 55.5% of MSW (Figure 3.1) and can potentially be used for renewable energy production. Biowaste is defined by MoEUCC (T.C. Çevre ve Şehircilik Bakanlığı, 2016), which includes biodegradable park-garden waste, kitchen waste from homes, restaurants, and catering companies. That is, kitchen waste plus garden and park waste constitutes biowaste. There is no specific data on the rate of food waste in the National Waste Management and Action

Plan. However, municipalities assess their composition annually. According to the records of several municipalities, the amount of park and garden waste is not more than 3% (Demirarslan & Çelik, 2018; *Kocaeli Sera Gazı Envanteri ve İklim Değişikliği İnisiyatifi Projesi Sera Gazı Envanteri ve İklim Değişikliği Eylem Planı*, 2018; Soysert, 2018) Therefore, kitchen waste is the main part of biowaste. In this study, instead of kitchen waste, the primary expression was determined as food waste, which includes vegetables, fruits, food scraps, and leftovers, to avoid any confusion between biowaste, biomass, kitchen waste, wet waste, etc. The use of the concept of food waste is also because, during the survey, the respondents may not be familiar with the concepts of biowaste and/or biodegradable waste.

Within this study, the level of awareness among actors regarding the connection between climate change and waste management, along with the willingness of these actors to contribute to mitigation activities through the implementation of appropriate waste management systems, will also be assessed.

When the term waste-to-energy is used, the general belief is that it refers to thermal treatment technologies. However, the term includes all physical, chemical, and biological technologies (Rowe et al., 2016). This lack of understanding may be due to the fact that energy production by biodegradable wastes is new compared to thermal technologies, especially in terms of the bio-degradable portion of municipal waste. In this study, waste-to-energy refers to the renewable energy production from food waste.

A particular instance was selected for examination to explore the social acceptance of food waste as a viable renewable energy source. Specifically, the city of Ankara, which serves as the capital of Türkiye, was chosen to fulfill this investigative objective. To gather relevant data, a questionnaire was administered during the period spanning from August to October in the year 2022.

To achieve its purpose, this study was developed taking into account the framework and methodologies of the Nature4Cities Project (Nature Based Solutions for Re-naturing Cities: Knowledge Diffusion and Decision Support Platform Through New Collaborative Models, EU Project ID: 730468, Nature4Cities, 2018).

1.3 Research Question

Choosing this topic was motivated by a witnessed and perceived remarkable situation in municipal waste management in Türkiye. Despite the comprehensive legislative framework in place, a significant portion of municipal waste is still addressed via landfilling rather than utilizing locally accessible technologies. This apparent contradiction raises technical and operational queries concerning the effective implementation of existing waste management regulations and the seemingly underutilized waste treatment technologies. To prevent the aforementioned undesirable situation, actors and factors, the driving forces that play crucial roles in the solution were investigated in this study. This study aims to contribute to an improved understanding of the importance of social acceptance in the MSW management system while combating climate change. How different structures affect the management of food waste was investigated. To achieve the aim of the study, the following research question was addressed:

To what extent does the governance of energy utilization of food waste have social acceptance from the perspective of the social cost of carbon?

This research problem was addressed through the following sub-questions:

a. Despite the availability of technology and legislation, why is a significant amount of waste still being disposed of in landfills?
b. What are the factors for the acceptance of energy utilization of food waste?
c. Who are the actors at the macro level and micro level?
d. Are the actors aware that waste is a renewable source of energy?
e. Are the actors familiar with the relationship between climate change and waste management?

f. Are citizens aware of the costs and results of the waste management system in their city?
g. How can social acceptance be conceptualized for the food waste-to-energy systems?

1.4 Thesis Structure

This thesis is organized systematically to provide a comprehensive understanding of the social acceptance of energy production utilizing Municipal Solid Waste (MSW). The thesis comprises eight chapters, with the current chapter being Chapter 1. It also includes the study's background, purpose, significance, objective, scope, motivation, and research questions. The structure of the thesis is as follows:

Chapter 2: Literature Review: A review of the relevant literature concerning social acceptance of MSWM, providing a context for the research.

Chapter 3: Current Situation of Municipal Solid Waste Management in Türkiye: A detailed examination of the present state of MSWM in Türkiye, including waste properties, policies, legislative and institutional frameworks, and the current status of waste-to-energy conversion facilities were explained.

Chapter 4: Theoretical Model: Development and discussion of the theoretical framework related to social acceptance of energy production utilizing MSW were included.

Chapter 5: Methodology: Details of the research design were included. For the collection of data, a questionnaire was prepared. This chapter details survey design, pilot study, sampling procedure, and data collection methods.

Chapter 6: Data Analysis and Results: Presentation and interpretation of the research data, including methodological details and various forms of data analysis. This chapter presents the discoveries of the research. The findings were established through the utilization of statistical software known as SmartPLS. The initial examination and screening of the data, including the implementation of reliability and validity tests and the testing of the hypotheses about the thesis, were outlined.

Chapter 7: Discussion: A comprehensive discussion of the research findings, shedding light on relationships, effects, perceptions, and social acceptance of MSWM.

Chapter 8: Conclusion: Final remarks, study contribution, implications, and suggestions for future research.

CHAPTER 2

LITERATURE REVIEW

The literature survey was conducted using different topics due to the interdisciplinary structure of the research. These topics include municipal waste management, climate change, renewable energy, social acceptance, structural equation modeling, and psychological factors that affect acceptance. This section aimed to draw attention to the studies that were analyzed as references for the research. These studies have provided valuable insights into the current state of the topics discussed. Upon careful consideration, a research gap was identified concerning energy production through food waste.

Da Silva et al. (2019) conducted a review of sustainability indicators for the waste management sector and identified 49 sustainability indicators. The study applied these indicators to cities in Brazil, demonstrating that they can be used to develop municipal solid waste management systems in any town (da Silva et al., 2019). Analysis of these indicators can help local managers and governments design strategic investment plans and develop capabilities throughout waste management. It also provides the opportunity to identify which indicators can be included where they are unavailable, highlighting the sustainability of natural resources and the social aspects of the MSWM.

The WTP of residents for different aspects of the waste management system in Aksum, Ethiopia, was measured (Gebreeyosus & Berhanu, 2019). For this aim, 150 questionnaires were distributed, which included choices for the waste management system. The study investigated whether the public prioritized improving the waste collection system before improving the waste disposal mechanism.

Mazzanti & Zoboli (2009) prepared environmental Kuznet Curves for waste in the EU. It was found that landfilling decreases significantly depending on income/consumption, while incineration increases with income/consumption. Similarly, Wu et al. (2015) used the Environmental Kuznet curve to assess the fee structure for managing municipal waste. Furthermore, China's waste disposal fee policy and its effectiveness in reducing collected waste were investigated. An innovative system was proposed to address any issues found in the study.

It was demonstrated that social capital plays a crucial role in policy-making for waste management (Jones et al., 2010). The importance of social acceptance before the implementation of any project was emphasized. The article presents the findings of a case study carried out in a community on a Greek island, which aimed to examine the influence of social factors on people's perceptions and willingness to invest in a market-oriented waste management solution. To comprehend, the study investigates four aspects of social capital: social trust, institutional trust, social networks, and compliance with social norms. Structural equation modeling software LISREL 8.80 was used to analyze data. It was stated that social factors can significantly influence individuals' perceptions and environmental behaviors.

In a rural part of China, a questionnaire was applied to define the waste separation intention of the public. To analyze the data, SmartPLS 2.0 and SPSS software were used (Liao et al., 2018).

An analysis to understand the effect of unit-based pricing on municipal waste generation and recycling was conducted by Usui & Takeuchi (2014). The study found that the reactions of different income levels are not the same. Specifically, low-income people care more about the unit-based price than the high-income group. Offering incentives does not affect the recycling habits of those with a high income. Over eight years, the study examined a unit-based pricing (UBP) system and analyzed data from 665 Japanese municipalities. The study showed that implementing the UBP model did not significantly encourage recycling among high-income individuals, although they were open to the idea of recycling. On the other hand, the UBP incentive strongly motivated low-income groups to participate in recycling activities.

Since financial sustainability is important for the success of waste management projects, Bartolacci et al. (2018) assessed the economic sustainability of waste management systems by analyzing waste collection and disposal companies in 880 Italian municipalities over three years (Bartolacci et al., 2018). The study focused on companies involved in municipal waste management (Bartolacci et al., 2017). Inefficiencies of small and medium enterprises in the waste management sector in Wales were assessed by Cordeiro et al. (2012) using parametric and non-parametric methods in stochastic frontier analysis (Cordeiro et al., 2012).

Ibáñez-Forés et al. (2019) identified some indicators to assess the social performance of MSWMS in Brazil. A case study was conducted in a city in Brazil, revealing that the city's waste management system needs improvement. The indicators and assessment method presented in the study provide a valuable tool for developing countries to enhance their WMS.

The factors that influence SWMS in Tanzania were identified using both qualitative and quantitative methods, including interviews and questionnaire surveys, in a municipality with a population of 93,000 (Shabani, 2015).

Anagnostopoulos et al. (2017) adapted a new approach to the waste management system using the web and internet of things approach, especially for waste collection.

Ali et al. (2019) examined the waste management system in Pakistan. One of the issues was the implementation of waste-aware indicators to assess the city’s waste management system. The study also aimed to identify the effect of seasonal differences on carbon footprint and the waste management system and establish the relationship between income level and carbon emissions. The findings indicated that, according to the waste-aware indicators, the city's waste management is quite inefficient. The study also revealed that emissions depend on seasonal variations, and high and middle-income residents are responsible for half of the carbon emissions. Based on these results, it was concluded that one of the differences between Europe and developing countries, in terms of waste management issues, is the behavioral aspect, not just the infrastructural problems. The study suggested that community-based waste management systems should be considered, and government policies for municipal solid waste management (MSWM) could be organized according to income level, as people belonging to different social groups behave according to other priorities.

The wasteaware benchmarking model was used by Chanhthamixay et al. (2017) to assess the performance of the waste management system in Bangkok. The data were collected via interviews and analyzed using the wasteaware. The study identified the strongest and weakest aspects of the waste management system implemented in Bangkok.

Choon et al. (2017) investigated the public perception of waste management in the Klang Valley metropolitan area of Malaysia. A questionnaire survey was conducted and distributed to 400 people. The data were analyzed using statistical concepts such as frequency analysis and factor analysis to determine the public's satisfaction, mainly regarding the waste collection system. The results showed that residents were content with the waste services but needed to increase source separation knowledge.

Demirbağ & Güngörmüş (2012) focused on the reasons for not separating recyclables at the source. The data was collected from a family health center in Trabzon and evaluated using the chi-square and percentage method in SPSS 11.5 software. The study observed that the biggest reason for those not separating recyclables is the difficulty of having different garbage bins.

The Bayesian Belief Networks model was used to analyze data provided by questionnaires to determine the factors that affect the separate collection. Four types of factors were identified: political, social, economic, cultural, and technological, based on the PEST (political, economic, social, and technical) analytical method (Chu et al., 2016).

Sukholthaman & Sharp (2016) determined the factors affecting the efficiency of the source separation process using different scenarios, which were represented using Vensim PLE 6.3E software for a system dynamics model.

Megersa (2018) defined the factors that affect the MSWMS. A survey was conducted and analyzed with descriptive statistical techniques and SPSS v16 for this aim. It was found that gender, education, years of residency, location, WTP, awareness, law enforcement, and access to private waste collectors have an impact on MSWMS.

Marshall & Farahbakhsh (2013) proposed new approaches for developing countries, as there is a need for system thinking. It was explained that changing a system is a gradual process. Developing countries cannot transform their MSWMS overnight; it involves taking multiple steps and learning from the experiences of other nations. To improve the state of MSWMS in developing countries, fresh approaches merge SWM, science, and complex adaptive systems research.

To analyze the social acceptance of the MSWM system in a city in Greece, Kokkinos et al. (2019) used the fuzzy logic method and self-organized maps. For this purpose, a survey was conducted using questionnaires. To predict waste management behavior, soft computing methods were suggested. Soft computing techniques, including neural networks, fuzzy logic, self-organizing maps, and Bayesian networks, are utilized to solve complicated issues that traditional methods cannot solve.

Pollans (2017) examined the barriers to sustainable waste management by interviewing scientists, representatives of the private sector in waste management, specialists, NGOs, and waste management professionals. This research emphasized the importance of providing more opportunities for individuals and organizations interested in implementing environmentally friendly waste management methods to have a say in decision-making and everyday activities.

Nastase et al. (2019) indicated that community participation is essential for improving WMS, as determined through qualitative research using NVivo software.

The study emphasized the importance of cooperation among actors in the waste management sector.

A study conducted in Singapore determined that awareness of waste disposal positively affected by behaviors related to reducing the amount of waste and recycling. MSWM behavior was evaluated using factor analysis with social-psychological, social-structural, and sociocultural theories, Principal Component Analysis, and Ordinary Least Squares regression analysis (Ong et al., 2019).

Content analysis was used to analyze the policies (websites and handbooks) applied in China between 1981 and 2015. It was found that the coordination between policy subjects was weak, and the governmental authorities' responsibilities were unclear (He et al., 2018).

To enable the effectiveness of the MSWM system in South Asia, the political and sociocultural processes were analyzed in Nepal, Sri Lanka, and Kerala by Véron et al. (2018). For this aim, qualitative interviews and quantitative surveys were conducted. The study promotes alternative practices and systems, specifically focusing on decentralizing institutional hierarchies. This approach emphasizes accountability and shortens waste chains, transforming them into closed loops. The ultimate goal is establishing a more circular waste economy that benefits the environment and local livelihoods.

Park (2018) investigated the factors that impact the cost burden for citizens under the volume-based waste fee system in South Korea. The recycling rate of South Korea was approximately 58%, while the OECD total average was 25% for 2015. One of the study's hypotheses was that there was a negative relationship between high recycling rates and the volume-based fee system, but this could not be supported. On the other hand, it was determined that there is a negative relationship between plastic bag prices and the volume-based fee citizen cost burden.

In the rural part of China, a survey was conducted to define the waste management awareness of the public. For the analysis of the data, SPSS and MS Excel were used.

It was found that public awareness is affected depending on income, education, and implementation of practical exhibitions (Han et al., 2018).

Veitch (2018) discussed whether the waste is excess or has potential, reflected in social policy. The study highlights waste management as a crucial matter that requires attention, asserting that waste and its disposal are significant topics in modern social policies. Furthermore, the study proposed that the waste concepts mentioned in the paper can serve as a beneficial reference for advancements in various social and economic policy domains. Then, the study argued the understanding of waste in the context of unemployment, healthcare, and higher education.

Margallo et al. (2019) compared the environmental impact of incineration, landfilling, and biological treatment methods and determined that landfilling has the most harmful effects. This article is referred to during explanations about landfilling in this thesis.

The effect of knowledge, attitude, and implementation on waste management among females in a city in Iran was analyzed (Almasi et al., 2019). Data on the knowledge, attitude, and practice of 1750 females were collected via questionnaires and analyzed using SPSS v20 software. The study found that educated females had a positive approach to waste management. Additionally, it revealed that the internet played an important role in improving their knowledge and attitude.

Fernando (2019) applied a combination of qualitative and quantitative methodologies to examine the factors affecting the successful implementation of SWM in local governments in the Western Province of Sri Lanka. The study results indicated that implementing a waste management system is significantly impacted by various factors, including staff salaries, commitment, motivation, support from political leaders, and contributions from society and the business world. These findings highlight the importance of considering multiple variables when successfully implementing a waste management system (Fernando, 2019).

Antonioli et al. (2018) examined the impact of technological developments and environmental policies on waste management performance in Italy between 1999 and 2010. It was found that implementing incentives for recycling and landfill taxes can impact waste management systems (Antonioli et al., 2018). The research revealed both complementary and substitutive effects between green technological advances and environmental policies on waste management performance in Italian regions. The diffusion of knowledge positively impacts recycling and influences both recycling and incineration as waste management options. Environmental policies such as the Tariffa di Igiene Ambientale shape waste management choices. An increase in these policies leads to an increase in the amount of waste recycled and incinerated per capita while the use of landfills decreases. Increasing population density may increase the tendency to incinerate rather than landfill. Northern and central Italian regions benefit more from information diffusion, while they experience more information leakage effects than peripheral and southern regions.

Expert interviews and a focus group discussion were organized for the choice experiment study in Hawassa City to understand the public's WTP for an improved collection and separate collection system (Tarfasa & Brouwer, 2018). The study showed the public was ready to pay for an enhanced waste management system.

By reviewing the literature, Satori et al. (2018) identified 59 indicators for successfully implementing an integrated waste management system. An analysis was conducted for a city in Indonesia to prepare an integrated waste management framework. Since each city had different conditions and issues with the waste management system, 17 factors were determined for the city of Bandung from the 59 indicators of integrated MSWMS (Municipal Solid Waste Management System). It was found that an integrated WMS can be successful with the coordination of environmental, social, and economic approaches together.

A questionnaire survey was conducted in Bangkok to investigate the source separation intention and WTP for improved MSW service and recycling facilities (Vassanadumrongdee & Kittipongvises, 2018). The Theory of Planned Behavior was used to understand residents' WTP. The first hypothesis was that perceived behavioral control impacts both WTP and separation at the source, which was supported. The other hypothesis was not supported, which stated that previous behavior, knowledge, and policies could increase people's intention to allocate at the source and increase their WTP. The data were analyzed using the multiple logistic regression method.

The aim of the study by Spoann et al. (2018) was to identify the status and pressures of solid waste management in Phnom Penh, Cambodia, and to propose some solutions and strategies to improve the waste management system by investigating the performance of local government authorities. The data were collected through literature review, interviews, and focus group meetings with local government officials. Performance criteria included technical, environmental, institutional/organizational, financial/economic, social/cultural, policy and legal factors.

Clarke et al. (2017) argued that behavioral change in society is needed to prevent the increase in waste generation. Therefore, a survey was conducted to determine the willingness of people to change, the factors influencing waste generation, and the level of knowledge. The collected data were analyzed using Microsoft Excel and SPSS v21.

Hsieh (2004) investigated the difficulty of convincing people to change the current recycling system. It was argued that the most radical way to bring about change is not to attack the policy itself but to challenge the capitalist economy and ideology that underpins it. The current recycling system is tied to the capitalist economy and ideology, making it difficult to change without challenging the underlying system. It was suggested that people may resist change because they believe that capitalism is the best system for society.

Mccrea et al. (2016) provide the results of the analysis of 1,212 questionnaires to identify the residents' attitudes, knowledge, and behavior about waste management and recycling of MSW in Melbourne, Australia, in 2016. T-tests, Analysis of

Variance (ANOVA) tests, and path analysis were used for the data analysis. The study identified the main factors for the success of the waste management system, concluding that the intentions and attitudes of the residents are the most critical factors.

Ren et al. (2016) assessed the willingness to accept a waste-to-energy plant in Shanghai using the contingent valuation method and used discriminant analysis to identify differences among respondents. The geographical distribution of the responses was shown, indicating waste treatment preferences. It was concluded that public involvement was important for the constitution of a waste management system.

Caniato et al. (2014) focused on stakeholders' characteristics and interactions. It was emphasized that there is no one-size-fits-all solution when it comes to managing solid waste management. Each city is unique, so factors must be considered, including physical, institutional, financial, socio-cultural, and socio-economic factors. Making practical, efficient, and sustainable waste management decisions requires careful consideration. Multiple parties can be affected by these decisions, and they are often influenced by them as well.

Chan et al. (2022) revealed that social norms have a considerable impact on motivating pro-environmental actions, such as backing the shift to renewable energy. The study found that the strength of this influence differs across countries, depending on their cultural and environmental circumstances. More precisely, social norms have a stronger effect on countries with higher levels of individualism and cultural flexibility or lower levels of air pollution and susceptibility to climate threats. These results imply that the impact of social norms on behavior is context-dependent.

Bourdin & Chassy (2023) investigated the social acceptance of biogas initiatives in France via a contingent valuation method. The research ascertained that the youth and those aware of the biogas projects display a greater propensity to explore biogas, and it was imperative not to overlook educational and geographical aspects to intensify environmental endeavors. In that research, a questionnaire was applied on a door-to-door basis to 396 people. Four scenarios were identified to evaluate the impact of socio-economic characteristics on the environmental effort people were willing to make to utilize biogas.

Li et al. (2020) focused on how compulsory policies affect residents' willingness to separate waste and their response to such measures. The approach involves setting a model to analyze the impact of these policies on residents' attitudes and subjective norms.

Zoellner et al. (2008) investigated the public acceptance of renewable energy technologies in Germany, specifically photovoltaics, biomass plants, and wind turbines. This study also investigated the level of support for biomass plants in a specific area in North-East Germany, and procedural fairness and reliability issues of these systems were investigated. Despite the presence of many biomass plants in the region, it was identified that there is still opposition from the local community.

Wüstenhagen et al. (2007) emphasized the significance of comprehending the three dimensions of social acceptance - socio-political, community, and market acceptance - to attain policymakers' goals of boosting the use of renewable energy. This research provided valuable insights for policymakers, investors, and project developers involved in renewable energy projects. It emphasizes the significance of comprehending social acceptance of renewable energy and the factors that impact it. By considering socio-political, community, and market acceptance dimensions, policymakers can create more effective policies to meet government goals of increasing renewable energy usage. Investors and project developers can utilize the knowledge from this paper to design projects that are more appealing to local communities and the larger financial community.

Wolsink (2007) shed light on the work of academics and offered recommendations with practical implications for policymakers and practitioners. The literature review on wind energy in that research was comprehensive, and the actors involved in social acceptance were identified in detail. It emphasizes the significance of collaborative approaches during the planning and implementation stages (Wolsink, 2007, 2010).

In a recent study, the importance of nature-based solutions (NBS) that are socially acceptable in addressing climate change was analyzed. Sarı et al. (2023) proposed a flexible framework for social acceptance that considers multiple factors such as fairness in procedures and distribution, perceived risks and benefits, knowledge, experience, and personal norms.

Kânoğlu-Özkan & Soytaş (2022) emphasized the significance of social acceptance when it comes to creating and enforcing energy policies, particularly concerning energy technologies. The social acceptance of shale gas development was presented with a well-developed theoretical perspective that was supported by empirical evidence. The research findings underscored the importance of measuring and managing social acceptance as an indicator.

Lin & Wu (2015) investigated the impact of trust, perceived benefits, and social interaction on online group buying behavior from a social commerce point of view. The Theory of Planned Behavior and the structural equation modeling analysis technique using SmartPLS 2.0 was employed. The research discovered that these factors played a crucial role in influencing the decision-making of group buyers (Lin & Wu, 2015).

Kılıç et al. (2017) thoroughly evaluated the level of social acceptance of wind energy. Wütenhagen et al. (2007) approach was considered to assess social acceptance. The study focused on each dimension of social acceptance but emphasized the importance of socio-political acceptance, which was the most comprehensive and universal level of social acceptance.

Steg & Vlek (2009) reviewed the potential of environmental psychology for promoting pro-environmental behavior. The study focused on four primary areas: behaviors that cause change to improve environmental quality, factors that determine the behavior, interventions to encourage pro-environmental behavior, and the effects of interventions. It proposed a framework for identifying, examining, designing, and evaluating interventions to change behavior and reduce environmental impact (Steg & Vlek, 2009).

Ferretti (2010) examines the link between risk and distributive fairness, specifically regulating new technologies. It addresses the issue of how the risk burden is distributed fairly among different groups, such as present and future generations (Ferretti, 2010).

Aldas-Manzano et al. (2011) analyzed the factors influencing consumer loyalty to banking websites, including trust and perceived risks. It also evaluates the moderating effects of variables on the relationship between satisfaction and loyalty (Aldas-Manzano et al., 2011). It was found that there is a positive relationship between trust and perceived risks. When perceived risk is low, trust may not be as crucial for loyalty, but as the risk increases, trust becomes increasingly important. The interaction is positively correlated, meaning loyalty can only be built upon a solid foundation of trust when perceived risk is high.

Zeiss & Atwater (1987) explained in detail the resistance to waste disposal facilities in residential areas due to their physical and social impacts. To achieve acceptance, it was interpreted that the negativities should be minimized or benefits be increased. The distribution of benefits and costs associated with waste disposal services in a catchment area has been subjected to study. According to the study, all residents and firms in the catchment area derive benefits from the waste disposal service and bear equal unit disposal costs. Nonetheless, the local populace bears the brunt of the losses arising from the waste disposal service. This distribution of benefits and costs is deemed unjustifiable since the benefits are widespread, whereas the costs or impacts are concentrated solely on the host community.

Del Río & Burguillo (2008) stated that the socioeconomic impacts of renewable energy sources are less covered in the literature than their environmental benefits (Del Río & Burguillo, 2008). The study focused on the impact of renewable energy sources on local sustainability. It aimed to develop a theoretical framework to analyze the socioeconomic impact of renewable energy sources on local sustainability.

Watson & Bulkeley (2005) addressed environmental justice issues in transforming municipal waste management toward sustainability in the UK. It was analyzed that the case for implementing policies that aim to advance sustainability and environmental justice. It was determined that implementing procedures and allocating externalities were interrelated as they both play crucial roles in achieving environmental justice.

Discussing the financing of public services in local governments, Can (2014) also emphasized the importance of establishing a sound legal framework on the subject. In that study, the protection of the rights of the local authorities and the citizens who benefit from the service was considered an essential criterion for tender processes.

Bayram (2022) evaluated the effects of Environmental Impact Assessment (EIA) processes on environmental degradation in Türkiye. The study analyzed the strengths and weaknesses of the EIA process with a focus on waste management projects (Bayram, 2022). This particular study was reviewed for its significance in matters of procedural fairness.

Di Fiore et al. (2022) analyzed the social acceptance of the waste management policy implemented in Brazil in 2019. The aim was to assist decision-makers in the policy's social acceptance and successful implementation by evaluating the stakeholders' perceived risks, benefits, barriers, and incentives (Di Fiore et al., 2022).

Soland et al. (2013) investigated the local acceptance of existing biogas plants in Switzerland. The study showed local acceptance of existing biogas power plants was relatively high in Switzerland. Structural equation modeling was used to analyze the relationships. It was found that perceived benefits and costs and trust in the plant operator had a significant impact on local acceptance.

Gürbüz & Yılmaz (2018) examined the attitudes and behaviors regarding the use of plastic bags among university students. Structural Equation Modeling was used for analysis. Five hypotheses were formulated to investigate whether there is a significant relationship between the intention of people who were aware of the harm of plastic bags to reduce the use of plastic bags and their ability to sustain this behavior. All of the hypotheses were supported. The limitation of the study was the samples were from just a single university in Eskişehir.

Sovacool & Griffiths (2020) investigated the cultural barriers to applying low-carbon technologies. It was found that culture can be a significant barrier to supporting climate-friendly technologies and behavioral change. It was stressed that a concerted effort was needed to overcome social, technical, economic, and political obstacles to support the transition to low-carbon.

Halkos & Petrou (2019) defined waste culture as the relationship between cultural dimensions and waste behavior. The relationships were analyzed across 22 EU countries. The analysis results showed that cultural dimensions influenced attitudes to waste management. Furthermore, the study listed the specific dimensions affecting waste generation, taking into account the two different models. For further assessment, the need to apply field studies was highlighted.

Bulutay (2015) examined the economic and social conditions that affect economic development. The study emphasized the importance of considering the changing economic and social environments over time to understand the relationship between economic growth and social conditions.

Gordon et al. (2022) focused on the social acceptance of hydrogen technology in detail. It was highlighted that the opinions and beliefs of society and culture are influenced by their norms. However, if these views contradict the thoughts of technical experts and policymakers, trust in socio-political systems can decline. Gordon et al. (2022) identified the factors and actors. Furthermore, they identified social acceptance with five dimensions different from Wüstenhagen's framework. These dimensions are socio-political, market, community, attitudinal, and behavioral acceptance. These dimensions were also categorized, taking into account the scale as micro, meso, and macro.

We reviewed the literature and found that there are no comprehensive studies on the social acceptance of energy production from food waste. However, studies on social acceptance exist for issues like renewable energy production and recycling. Therefore, I believe that this study will contribute significantly to the literature.

CHAPTER 3

CURRENT SITUATION OF MUNICIPAL SOLID WASTE MANAGEMENT IN TÜRKİYE

In this section, the current situation in Türkiye has been revealed by considering the legislation and the roles and responsibilities of the actors from the perspective of renewable energy production and climate change in the governance of municipal waste. To handle the big picture of the issue, an investigation was conducted into topics that may not appear completely related to each other but are intertwined. It is crucial to comprehend how these issues intersect and interact with each other to ensure that current and future policies are effective and sustainable. This is essential for local governments, politicians, and practitioners to develop comprehensive strategies that can help reduce environmental pollution caused by municipal waste, increase renewable energy production, and tackle climate change.

3.1 Properties and Generation Rate of Municipal Solid Waste

3.1.1 Properties of the Municipal Solid Waste

Municipal solid waste includes materials with many properties, such as combustible, biodegradable, recyclable, etc. The composition of changes with several other conditions, such as cultural properties, income, consumption habits, legislative rules, pandemics, etc. For example, the COVID-19 pandemic affected people's behavior concerning food waste in Canada and İstanbul (Laila et al., 2022; Güneysu, 2020). Social and cultural properties emerge as issues that affect the perceptions and attitudes of people towards waste production. Waste management is called "waste culture" (Halkos & Petrou, 2019). According to Bauman (1998), when something is the subject of culture, it means that it can be manipulated. For a sustainable MSW management system, it can be valuable to identify the cultural dimensions that affect waste culture. In terms of legislative aspects, for example, if there is a levy on the amount of waste, the system causes a decrease in the amount (Thøgersen, 2003) (Thøgersen, 2003). Similarly, a policy aimed at reducing biodegradable organic waste and imposing a levy on such waste can decrease the amount of biodegradable organic waste.

The municipal waste composition of Türkiye in 2014 is shown in Figure 3.1. More than 55% of MSW in Türkiye is biowaste (T.C. Çevre ve Şehircilik Bakanlığı, 2016). Biowaste is defined by MoEUCC in the National Waste Management and Action Plan (T.C. Çevre ve Şehircilik Bakanlığı, 2016), which includes biodegradable park-garden waste, kitchen waste from homes, restaurants, and catering companies. That is, food waste/kitchen waste plus garden and park waste constitutes biowaste. There is no precise data regarding the rate of food waste in the National Waste Management and Action Plan. Nevertheless, municipalities conduct an annual evaluation of their composition. According to the records of several municipalities, the amount of park and garden waste is not more than 3% (Demirarslan & Çelik, 2018; *Kocaeli Sera Gazı Envanteri ve İklim Değişikliği İnisiyatifi Projesi Sera Gazı Envanteri ve İklim Değişikliği Eylem Planı*, 2018; Soysert, 2018) Therefore, kitchen waste is the main part of biowaste. In this study, instead of kitchen waste, the main expression was determined as food waste, which includes vegetables, fruits, and food scraps, to avoid any confusion between biowaste, kitchen waste, wet waste, etc. The use of the concept of food waste is also due to the fact that during the survey, the respondents may lack familiarity with the concepts of biowaste and biodegradable waste.

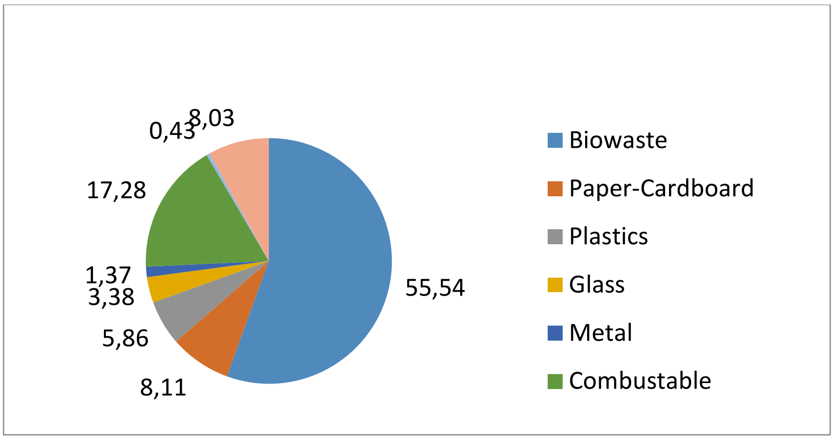

Figure 3.1. Municipal Waste Composition of Türkiye (%)

(T.C. Çevre ve Şehircilik Bakanlığı, 2016)

3.1.2 Municipal Solid Waste Generation Rate in Türkiye

In Türkiye, according to recent data from TurkStat, the annual generation of municipal solid waste, mainly from households but including similar wastes from sources such as commerce, offices, and public institutions, reached 32.3 million tons in 2020[5]. The MSW generated per person is about 1.14 kg per day[6] (Figure 3.2), below the EU-28 average of 1.45 kg per day for 2021[7]. It is projected that the population will be over 100 million[8]. The amount of MSW increases with population growth. The waste production capacity per capita also increases.

[5] These waste management stats are published every two years. https://data.tuik.gov.tr/Bulten/Index?p=Atik-Istatistikleri-2020-37198 (last visited on 22.07.2023)
[6] https://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics (last visited on 22.07.2023)
[7] Municipal waste statistics - Statistics Explained (europa.eu) (last visited on 27.09.2023)
[8] https://data.tuik.gov.tr/Bulten/Index?p=Nufus-Projeksiyonlari-2018-2080-30567 (last visited on 23.07.2023)

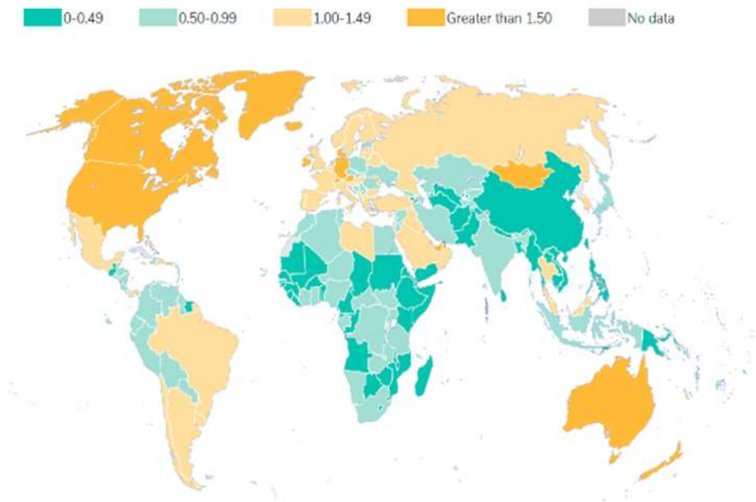

Figure 3.2. Municipal solid waste generated per capita in 2018 (kg/capita/day)[9]

3.2 Municipal Waste Management Policy in Türkiye

In 2016, the Ministry of Environment, Urbanization and Climate Change initiated a National Waste Management and Action Plan to enhance the waste management system (T.C. Çevre ve Şehircilik Bakanlığı, 2016). The plan analyzed the current state of waste management, outlined methods for separate collection, recycling, recovery, and disposal, identified areas for improvement or development, provided projections until 2023, and determined waste management investments. According to this plan, some of the targets set to improve the situation in 2014 until 2023 are as follows:

- To increase the rate of recovery of municipal wastes by biological methods from 0.2% to 4%.
- To increase the recovery rate of mechanical biological treatment of municipal waste from 5.4% to 11%.

[9] What a Waste (worldbank.org) (last visited on 04.09.2023)

- To increase the rate of recovery of municipal wastes by thermal methods from 0.3% to 8%.
- To decrease the rate of landfilling of municipal wastes from 88.7%[10] to 65%.

Based on the targets presented in the report, there is no specific goal for converting waste into energy. The report highlights that prioritizing material recovery over energy recovery aligns with the circular economy approach, which aims to increase recycling in EU member countries for waste management. In short, no targets were set for waste-to-energy production.

The absence of any waste-to-energy policy is not desirable regarding energy security issues. Although energy recovery of waste has found its place in the legislation with the Waste Management Regulation[11] and Zero Waste Regulation[12] published in 2015 and 2019, respectively, a target has not been determined.

On the other hand, the lack of supportive policies could be one of the reasons why other parties accept or participate—for example, adopting a zero waste policy and ensuring that it is made visible in every way and raises awareness for stakeholders from all walks of life[13]. It has been discovered that the tendency to bury waste in landfills exhibits a notable reduction in a direct correlation with the income level or consumption increase (Mazzanti & Zoboli, 2009).

Although there is a rule in legislation[14] that "*Biodegradable wastes are classified and collected separately, without mixing with other wastes at their source or where*

[10] According to the TurkSTAT data landfilling rate is higher than this number (that is 99%) source: https://data.tuik.gov.tr/Bulten/Index?p=Belediye-Atik-Istatistikleri-2014-18777 (last visited on 16.07.2023)

[11] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=20644&MevzuatTur=7&MevzuatTertip=5 (last visited on 11.08.2023)

[12] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=32659&MevzuatTur=7&MevzuatTertip=5 (last visited on 09.08.2023)

[13] https://csb.gov.tr/bakan-kurum-sifir-atik-hareketi-ile-geri-kazanim-orani-artti-96-milyar-tl-ekonomik-kazanc-saglandi-bakanlik-faaliyetleri-38651 (last visited on 09.08.2023)

[14] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=21174&MevzuatTur=9&MevzuatTertip=5 (last visited on 11.08.2023)

they are produced.", segregation of waste into different categories at the source is not common (in 2014, 8% recyclables were collected separately[8]) practice like other developing countries (Purkayasth & Sarkar, 2022) and the most common treatment method is landfilling according to the TurkStat[15]. Landfilling causes environmental pollution and safety hazards such as foul odor, leachate to the natural waters, emission of greenhouse gases (GHGs) into the atmosphere, and explosion risk. One of the GHGs emitted from landfills is methane. Due to methane's powerful radiative forcing properties, it is 34 times more dangerous than carbon dioxide over 100 years (Stocker, 2013). Therefore, the importance of diverting waste from landfills cannot be underestimated.

Regarding energy production from waste, the priority is waste disposal. The main aim is primarily to dispose of waste at the highest possible rate and then to produce energy if possible. The primary function of waste-to-energy plants should be to dispose of MSW.

In instances where numerous parties are involved in a complicated scenario, it can be a challenging task to ensure responsibilities. This dilemma is called the "problem of many hands," as it is unfeasible to attribute responsibility to a solitary individual (van de Poel et al., 2012; Van Est et al., 2012). The waste management issue is one of the instances where the problem of many hands comes into play. For example, when it comes to food-waste-to-energy systems, various ministries are involved, leading to complexities, such as;

- Ministry of Environment, Urbanization, and Climate Change; in terms of waste treatment, environmental impact assessment, and license and permit issues
- Ministry of Energy and Natural Resources; in terms of renewable energy production and transmission

[15] https://data.tuik.gov.tr/Bulten/Index?p=Atik-Istatistikleri-2020-37198 (last visited on 16.07.2023)

- Ministry of Agriculture and Forestry; in terms of utilization of digestate produced from MSW

Choosing the right and sustainable solution for MSW management is not easy due to the involvement of numerous actors within this system. The approach of each actor impacts the overall mechanism of the system. This study aims to comprehend the role of social acceptance within the MSW management system. To achieve this, it is crucial to define the actors and understand their attitudes, reactions, and needs, which will help determine the significance of social acceptance.

Despite the considerable strides made in legislation and technology over the past two decades, it is worth contemplating the fact that a significant proportion of waste continues to be disposed of in landfills. In 2002, landfilling accounted for 92% of waste disposal, whereas in 2020, this figure stood at 86% (Figure 3.3).

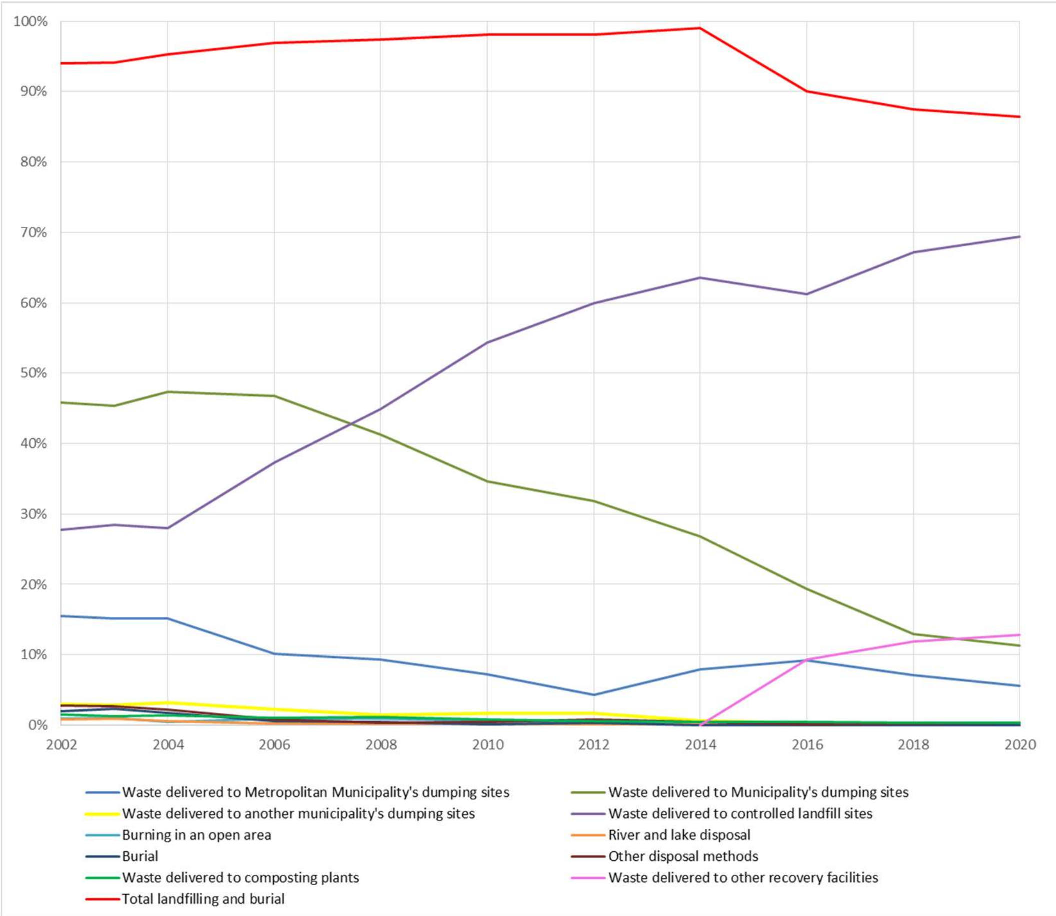

Figure 3.3. Waste Disposal Trends 2002-2020[16]

In terms of sustainable development, waste management systems should also encompass three pillars: environmental, economic, and social aspects. According to the Brutland Report, which is the first report to mention sustainable development (World Commission on Environment and Development, 1987);

"Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Anyone who wants to create a sustainable system must address these three aspects mentioned above in an integrated way. Moreover, adhering to the definition of

[16] TÜİK Kurumsal (tuik.gov.tr) (last visiten on 03.09.2023)

sustainable development, such a system should meet the needs of both present and future generations.

3.3 Legislative Framework

In this section, legislative measures concerning waste are encompassed with respect to the management of waste at the municipal level, the production of renewable energy, and the biodegradable portion of municipal waste in Türkiye. The regulation of legislation about the waste management system's environmental and technical requirements has been established. Furthermore, regulations governing renewable energy production have also been enacted. The statutes encompassed within this domain include the Environmental Law, Metropolitan Municipality Law, and Municipal Law.

3.3.1 Published by the Ministry of Environment, Urbanization & Climate Change

In Türkiye, the development of waste management policies and legislation has been conducted with careful attention to the process of harmonization with the European Union. Environmental Law No. 2872 has formulated and executed waste management policies and legislation, aligning them with the national conditions on a global level (T.C. Çevre ve Şehircilik Bakanlığı, 2016).

There are municipal waste management legislations in the law, but these are frequently revised (Appendix A). Therefore, investors, market players, and the public suffer from unstable legislation (Arcadis and Trinomics, 2016), which leads to unreliable perceptions.

On the other hand, unrealistic targets stated in the legislation cannot be implemented. Instead of setting realistic targets, a governance style displays a pretense of compliance with the legislation. What is meant by this is that the technical experts working in the government approve reports when they are faced with a story that appears to comply with the legislation in the submitted reports without determining whether the work can be done technically or economically. Due to Türkiye's harmonization process with the European Union on environmental issues, especially the harmonization of legislation on waste management issues, it has been published without taking into account the adaptation of infrastructural and financial structures to the conditions of Türkiye (Sayıştay, 2007).

Although legislation is in place to manage MSW, 86.4% of MSW was sent to landfill in 2020. This rate shows that most of the MSW is still being buried. It also shows that there is not enough effort to treat MSW in Türkiye, even though there are no gaps in terms of legislation and rules that have been set to divert waste from landfilling.

Likewise, the procedures and principles for the Zero Waste Regulation[17] are presented as a new and very inclusive system. Still, in practice, there is no difference in terms of the "packaging waste management system" that has been applied unsystematically, inadequately, and unsuccessfully for 17 years. Although there has been a nationwide zero waste campaign, this discourse probably seeks community acceptance of the zero waste system. Still, in practice, it seems that there is nothing new compared to the former regulation. The first action in the zero waste campaign was the levy on plastic bags, which received a quick response from consumers at the markets, leading to a decrease in the use of plastic bags[18]. The reduction in the amount of plastic bags used in the markets means that those going to landfills are also decreasing. At this point, this also needs to be examined.

According to the "Polluter pays principle"[19] in environmental law, a levy can be applied to treat MSW. Houses, workplaces, and other buildings that benefit from

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[17] Sıfır Atık Yönetmeliği, Resmî Gazete Sayısı: 30829, 12/07/2019
[18] https://www.csb.gov.tr/plastik-poset-kullanimi-yuzde-75-oraninda-azaldi-bakanlik-faaliyetleri-31995
[19] No: 2872, 09/08/1983 Environmental Law

environmental cleaning services are subject to an "environmental cleaning tax". Generally, the "environment tax" known by the public is just for collection. However, there has been a regulation for municipal solid waste disposal since 2010[20] to formalize the tax for treatment, etc. Since there is no standardized implementation of waste levy, treatment fee, etc., municipalities are accountable for choosing both the treatment method and budget.

In addition to the governance of MSW, the same Ministry is also responsible for governing climate change issues. Recently, Türkiye accepted to apply to The Paris Agreement[21] as a developing country. As a result, the name of the Ministry of Environment & Urbanization has changed[22] to the Ministry of Environment, Urbanization & Climate Change. This change will likely lead to a new series of legislation. A climate change law is in progress, and the draft version has already been made open to the public.

The Environmental Impact Assessment Regulation (EIA) is applied according to the size of the projects. The process of EIA is a planning mechanism that facilitates the assessment of both positive and hazardous impacts of a proposed project regarding the technology and the implementation area. In this process, the public participation is required to approve the project. If appropriately applied, it is a valuable process to increase the stakeholders' knowledge. Hence, in matters concerning procedural fairness, the EIA procedure holds significance. In addition, regarding site selection issues, the EIA process plays a crucial role in addressing concerns related to distributive fairness.

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[20] Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelik, Resmî Gazete Sayısı: 27742, 27/10/2010
[21] Paris Anlaşmasının Onaylanmasının Uygun Bulunduğuna Dair Kanun, Resmî Gazete 31621, 07/10/2021
[22] Cumhurbaşkanı Kararı Resmî Gazete Sayı: 31643 29/10/2021

3.3.2 Published by the Ministry of Energy and Natural Resources

There has been legislation in Türkiye to purchase the electricity produced using renewable energy sources since 2005[23], known as the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy.

In 2011, a tariff[24] was published to subsidize renewable energy plants. The tariff was valid for ten years, and at the end of the ten years within the scope of the Law, new tariffs[25] have been determined for facilities that will come into operation after 30.06.2021. The first revision of the tariff was such a catalyst, accelerating investments in the renewable energy production sector (Figure 3.2).

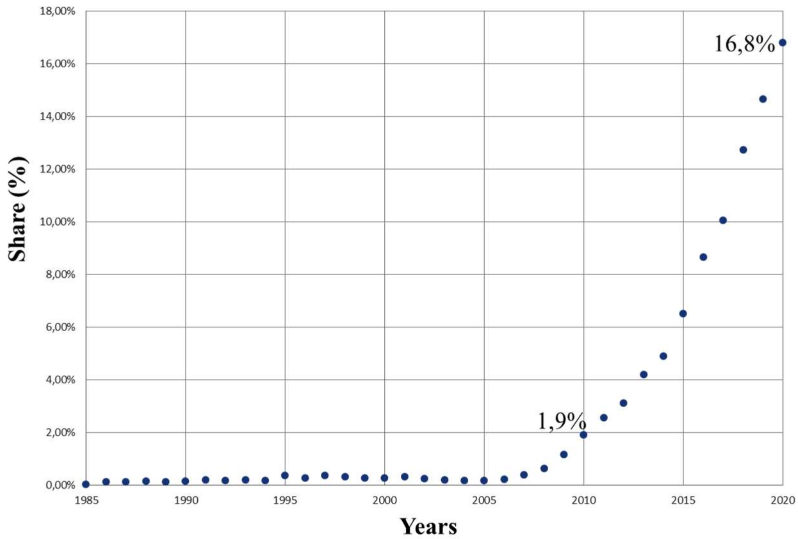

Figure 3.4. Installed Capacity Trend in Renewable Energy in Türkiye (2005-2020)[26]

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[23] Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına İlişkin Kanun Kanun No. 5346, Resmî Gazete Sayı: 25819, 18/05/2005

[24] Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına İlişkin Kanunda Değişiklik Yapılmasına Dair Kanun, Kanun No. 6094, Resmî Gazete Sayı: 27809, 08/01/2011

[25] Cumhurbaşkanı Kararı, Karar no. 3453, 30/01/2021

[26] TurkStat, Energy statistics – 2021 (https://biruni.tuik.gov.tr/medas/?kn=147&locale=tr) (last visited on 14.07.2023)

In 2011, the revised version of the Law added Landfill Gas (LFG) to the list of renewable energy sources. With the entry into force of the tariff (Yenilenebilir Enerji Kaynaklarını Destekleme Mekanizması-Utilization of Renewable Energy Sources – YEKDEM), old, wild landfills became valuable as LFG-to-energy projects became financially feasible. However, power generation from LFG is not technology-intensive and has started to be subsidized, like biomass conversion technology. With the same support for technology-intensive methods, landfilling has become a choice rather than applying waste treatment technologies. Therefore, in the point of investors to increase their profits instead of constructing MSW treatment facilities, the most preferred one was the utilization of LFG[27].

YEKDEM[28] has provided the sales of electricity to the National Grid, guaranteed at a feed-in tariff of 13.3 US$ cents/kWh for the period between 2011 and 2021. As of 1 July 2021, the feed-in tariff has been modified to lower prices (Table 3.1). This amendment adjusted the price to ensure that technology-intensive methods and LFG are kept separate. Then as of May 2023, the tariff was updated, and the previous decision[29] was canceled (Resmî Gazete Cumhurbaşkanı Karari, 2023).

When the first 10-year period was about to end, a 6-month extension was granted before the expiry with the published Presidential Decision on 18.09.2020. On the other hand, while investors and renewable energy producers expected that the new tariff would provide similar conditions, the feed-in tariff published in 2021 maintained different conditions than the previous one. While the differentiation of prices has been perceived and debated differently by each stakeholder in the sector, as of May 2023, the tariff has been increased for all types except thermal treatment plants, and the utilization period has been extended to 15 years for geothermal power plants (Resmî Gazete Cumhurbaşkanı Kararı, 2023).

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[27] https://data.tuik.gov.tr/Bulten/Index?p=Atik-Istatistikleri-2020-37198 (last visited on 20.08.2023)
[28] https://www.epdk.gov.tr/Detay/Icerik/3-0-0-122/yenilenebilir-enerji-kaynaklari-destekleme-mekanizmasi-yekdem
[29] Cumhurbaşkanı Kararı, Karar no. 3453, 30/01/2021

Discussions on this subject can be briefly listed as follows[30, 31]. Since this law does not only cover electrical energy produced from municipal waste, arguments are made for all renewable energy generation sources.

- Legislators and policymakers, technology has become cheaper regarding investment costs since the first tariff regulation.
- Industrialists who use electrical energy intensively, it is a positive development in terms of getting power at a lower cost.
- Investors who do not have any income, especially in MSWM other than renewable energy income, and who are used to this income are hesitant to make new investments.
- Some debates are handled over the concept of "renewable" and object to the fact that municipal wastes are not renewable. There is conceptual confusion at this point. MSW may not be a traditional renewable source, but it is an "alternative" (Cheng & Hu, 2010). In fact, it aims to create environmental benefits as an alternative to fossil fuels[32] to increase resource diversity in terms of energy security with the law (Article 1 of the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy).

In the same Law, there is another support for renewable energy producers who use local technology. Investors can receive additional financial support if they use locally produced instruments, machinery, or equipment (Table 3.1).

Although there is a support mechanism for electrical energy produced from waste, no legislation allows the use of biogas that can be produced from waste in pipelines like natural gas; because of that, biogas has to be used to produce electrical energy.

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[30] YEKDEM'de yeni fiyatlar ve yeni dönem yatırımları nasıl etkileyecek? - PetroTurk (last visited on 12.08.2023)
[31] https://www.emo.org.tr/genel/bizden_detay.php?kod=133832&tipi=3&sube=17 (last visited on 12.08.2023)
[32] https://www.iea.org/energy-system/renewables (last visited on 12.08.2023)

Table 3.1 Feed-in-tariff for renewable energy production

	Feed-in Tariff		Difference	Contribution of Locally-Produced Equipment	
Type of RE	*2010-June/2021 (TLkuruş /kWh)**	*August/2023 (TLkuruş/kWh)*[33]	*%*	*2010-2021 (TLkuruş/kWh)**	*2023 (TLkuruş/kWh)*[31]
Biomass LFG	361	132,56	63,3	13,5-77	36,02
Biomass Thermal	361	168,71	53,3	13,5-77	26,99
Biomass Biometh.	361	216,35	40,1	13,5-77	36,02
Solar	361	132,56	63,3	12-31,4	36,02
Geothermal	285	252,62	11,4	35-54	36,02
Wind - onshore	198	132,56	33,1	13-57	36,02
Wind - offshore	-	180,09	-	-	48,08
Hydro–river type	198	168,83	14,8	23-62,5	36,02
Hydro – reservoir	-	180,09	-	-	36,02
Hydro–pumped storage	-	252,62	-	-	48,08
Storage (wind/solar)	-	156,32	-	-	48,08
Wave	-	168,83	-	-	48,08

** Calculated taking into account the TCMB effective USD selling rate as of 21.08.2023

[33] https://www.epias.com.tr/tum-duyurular/piyasa-duyurulari/elektrik/kayit-ve-uzlastirma/01-07-2021-tarihinden-31-12-2030-tarihine-kadar-isletmeye-girecek-yek-belgeli-yenilenebilir-enerji-kaynaklarina-dayali-elektrik-uretim-tesisleri-icin-uygulanacak-fiyatlar-hk-2/ (last visited on 21.08.2023)

3.4 Institutional Framework

3.4.1 Municipalities

As this research focuses on the MSW, this section will cover the issue from the point of view of municipalities. In Türkiye, the responsibility for the disposal of MSW belongs to the municipalities, which includes the collection, transfer, and treatment of the MSW as stated in "Metropolitan Municipality Law No. 5218" and "Municipality Law No. 5393". The responsibilities of provincial, district municipalities and metropolitan municipalities are different, and each has its roles. In metropolitan municipalities, the duty of collecting and transferring MSW belongs to district municipalities, while the treatment responsibility falls under the jurisdiction of the metropolitan municipality. In provinces, the municipality is responsible for handling each process of MSW.

Due to the municipalities' responsibility for waste management, they also have to deal with the increasing amount of waste, primarily caused by population growth. The amount of waste is generally rising because of the population change. Consequently, municipalities must face the challenges posed by sudden or regular increases in the amount of waste.

Regarding waste disposal, the most and first preferred method by municipalities is dumping (in 2020, 86,4% as stated by TurkStat[34]), either wild landfilling or sanitary. The right to decide on the construction of treatment plants lies in the hands of the municipalities.

[34] cevreselgostergeler.csb.gov.tr/belediye-atiklari-miktari-ve-bertaraf-miktari-i-85749 (last visited on 12.08.2023)

The treatment technologies used in waste management are infrastructural constitutions. They are not straightforward due to the complexity of the waste composition, especially when it is not separated at the source (Purkayasth & Sarkar, 2022). Therefore, treatment plants for MSW require substantial capital costs. This means municipalities, as a responsible authority, have to bear the costs of the treatment facilities. There are several ways to finance these kinds of investments for municipalities. The establishment of the system's structure depends on the municipality's criteria.

In Environment Law No. 2872, the "polluter pays" principle, according to which municipalities can request a tax for collection, treatment, etc. costs in accordance with the "Regulation on the Procedures and Principles to Be Followed in Determining the Tariffs for Wastewater Infrastructure and Municipal Solid Waste Disposal Facilities[35]" and "Law on Municipal Revenues No. 2464[36]". Municipalities collect the tax through water bills, etc.

The other way to finance the MSWMS is to outsource the work to a contractor so that the contractor incurs all costs. The contractor builds the plant, operates the plant for a while, and then either transfers to the municipality or not at the end of the contract. In that case, the contractor has to create its income-generating activity, and the municipality does not need to pay the contractor. Furthermore, the municipality can require a share of the revenue. The revenue comes from selling the produced electricity, recyclables, etc. The system is called the "built-operate-transfer" or "built-operate" method. The contractor is responsible for building the plant and financing the capital and investment costs. After the completion of the plant, the contractor operates the energy utilization plant and sorting facility. Municipalities

[35] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=14390&MevzuatTur=7&MevzuatTertip=5 (last visited on 11.08.2023)
[36] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=2464&MevzuatTur=1&MevzuatTertip=5 (last visited on 11.08.2023)

receive revenues under the conditions of YEKDEM support and the sale of recyclables.

Generally, to choose a contractor, municipalities arrange tenders. Before placing the tender process, setting a viable business management plan is important. The other issues related to the tender processes:

- The pre-qualification requirement is important. The tender authority should meticulously identify the qualifications of potential bidders. This ensures that they can select a contractor with ample experience in the specific field.
- There is a challenge in that some municipalities consider the project as ordinary construction work, leading them to potentially proceed with the construction of disposal facilities alongside one of their so-called "reliable" contractors, who might lack experience in the MSW management sector. In such cases, the chosen contractor might struggle to execute the construction of the industrial plant effectively, possibly resulting in the inability of the "reliable" contractor to complete the plant successfully.
- The knowledge of responsible or technical personnel about the technologies is limited. As a result, municipalities are hesitant to adopt a new system. On the other hand, they can be easily persuaded by unreliable investors, known as "çantacılar" in Turkish, who are a type of fraudulent investor.

Due to the "one rule to rule them all" understanding in law, the same environmental rules and regulations are applied in every small and large municipality. However, small municipalities often struggle to comply with these regulations and, as a result, resort to illegal practices. For example, due to the rule to divert biodegradable wastes from landfills, municipalities are required to build composting and sorting plants regardless of their size. Small municipalities may find it challenging to handle such infrastructural constructions, leading to continued illegal dumping. If these municipalities ask for an environmental permit and license for a landfill, an investment for treatment plants will be required due to the rule in "The Communiqué on Mechanical Sorting, Biodrying, Biomethanisation, and Fermented Products Management". The Ministry of Environment, Urbanization, and Climate Change is familiar with the wrong applications, but the landfills continue to be used (National Waste Management and Action Plan, 2014).

As explained in Section 3.2, during the first 10-year period of the YEKDEM tariff system, there was no difference in the tariff between LFG (landfill gas) and biogas projects. Biogas projects are technology-intensive and require specific know-how when compared to LFG projects, making them inherently more expensive. At this juncture, the municipality's decision becomes crucial, considering its role as an actor and decision-maker in the MSW management system.

As the representatives of municipalities and political parties, Mayors play crucial roles in setting the municipal waste management system. On the one hand, they are the officials responsible for ensuring that the waste is treated appropriately. On the other hand, they are the politicians trying to build a positive reputation for possible re-election. Consequently, their decisions hold significance for current and future generations.

3.4.2 Ministry of Environment, Urbanization & Climate Change

The Ministry's Directorate General of Environmental Management comprises a Municipal and Biodegradable Waste Management Section, which falls under the Department of Circular Economy and Waste Management. The department's responsibilities are as follows:

- Developing targets, principles, policies, and strategies regarding the transportation, recovery, and disposal of waste; ensuring cooperation and coordination for their implementation; and monitoring national and international studies and developments in this field.

- Monitoring and conducting national and international studies on legislation, strategy, and policy development related to waste treatment.
- Formulating national, regional, and local waste treatment action plans and ensuring coordination with relevant institutions/organizations.
- Establishing criteria for waste treatment facilities, publishing and updating necessary technical manuals, and coordinating with the relevant unit responsible for issuing environmental licenses.
- Researching waste disposal technologies, preparing standards, determining the design principles, standards, and criteria for disposal facilities, approving projects, providing construction monitoring and inspection services, or delegating these to be done.
- Developing legislation, strategies, and policies regarding the treatment of mixed domestic waste and biodegradable waste.
- Planning and coordinating activities with public, private, and non-governmental organizations to increase waste recycling awareness.

For policymakers, the effectiveness of policies should hold paramount importance, particularly for those with prospects of reelection. Policymakers' decisions must encompass long-term perspectives, especially when addressing waste management and climate change challenges. Politicians should assess social acceptance, avoiding hasty decisions in waste management and climate change matters.

There is a dilemma in policymakers' decision-making processes: should politicians prioritize the interests of investors and protect the environment, or should decisions be oriented toward the welfare of future generations? This issue also affects the MSW management policy, highlighting the role of policymakers as pivotal actors in MSW management.

Inconsistencies among regulations regarding recyclable management have eroded the gains of previous legislative periods, emphasizing the need for an integrated and long-term strategy.

Since 2004, recycling rates have consistently fallen short of targets. For example, the National Waste Management and Action Plan (2014) proposed a recycling rate of 35% in 2023, but it was 13.4% in 2020[37]. However, interestingly, as the Ministry announced, the recovery rate increased to 27.2% in 2021 and 30.13% in 2022[38].

3.4.3 Market

Individuals and market players such as waste collectors, junk shops, landfill or plant operators, recycling companies, technology providers, and others should be considered actors within the MSWMS.

The informal sector also plays an important role in MSWM. Widespread scavenging activities occur on streets and landfills, contributing to the growth of the unregistered economy. Despite numerous attempts and implementation of various regulations, a definitive solution has not yet been achieved. Whether perceived as problematic or not, scavenging is a multifaceted issue involving multiple stakeholders. It is often the result of existing deficiencies within waste management. A comprehensive approach to municipal waste management is the only viable solution to replace or transform scavenging. It is obvious that such a transformation cannot occur overnight, given that regulations have been in place. Scavenging also holds social, economic, and ethnic dimensions. It can become a pain point whenever significant changes are forced upon the waste management system.

The recycling sector highly depends on the USD/TL currency exchange rates, oil market prices, and countries' import/export politics. For example, China's ban on

[37] cevreselgostergeler.csb.gov.tr/belediye-atiklari-miktari-ve-bertaraf-miktari-i-85749 (last visited on 10.08.2023)
[38] https://cygm.csb.gov.tr/sifir-atik-ile-geri-kazanim-orani-30-13-e-ulasti.-haber-283024 (last visited on 11.08.2023)

waste imports[39] has significantly affected the plastic recycling sector worldwide, especially the Turkish recycling sector and small to medium enterprises.

Investors are one of the critical actors in the municipal waste management system. Due to the sector's intricate nature, experienced and willing investors are scarce. Investors must rely on technology, legislation, and market conditions. As explained in Section 3.3.1, municipalities arrange tenders to choose experienced and capable contractors, and the contractors expect that there are subsidies to produce electricity. Establishing a system that all actors can benefit from should be prioritized in a relationship of mutual trust.

In terms of legislation, there are two governmental agencies whose decisions directly impact investors' willingness to enter this market. These agencies are the Ministry of Environment, Urbanization, and Climate Change and the Ministry of Energy and Natural Resources. The former generally defines the rules for technology application, while the latter governs the electricity purchase and sale market as well as subsidies. Figure 3.2 illustrates the importance of policies providing subsidies for renewable energy production, as explained in Section 3.2.

In the market, there are individuals or companies who both use and purchase electricity. Notably, industrialists are a prominent group among them who try to manipulate energy prices[40]. Therefore, policymakers must consider targets for waste management and climate change, renewable energy producers, and energy consumers.

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[39] https://earth.org/chinas-import-ban/ (last visited on 10.08.2023)
[40] https://www.aa.com.tr/tr/ekonomi/sanayiciler-yekdemde-yeni-modele-katki-sunmaya-hazir/1897194 (last visited on 10.08.2023)

3.5 Current Status of Waste-To-Energy Conversion Facilities in Türkiye

This section aims to provide a concise overview of waste disposal technologies and waste-to-energy production technologies in a broader context, thereby setting the stage for a detailed discussion on waste-to-energy facilities specifically within Türkiye. Before delving into the specifics of the situation in Türkiye, it is aimed to establish a foundational understanding of the technologies. Following this, it will be presented with comprehensive information about the waste-to-energy conditions in Türkiye.

3.5.1 Technology Alternatives to Treat the Municipal Solid Waste

When it comes to the treatment of municipal solid waste, various technologies and approaches are available, contingent on factors such as the type of waste, its physical, chemical, and biological properties, waste composition, location, area, administrative preferences, budget constraints, stakeholder awareness, and more. With ongoing research and innovation, the properties and efficacy of these technologies have been thoroughly examined and demonstrated over many years, leading to their implementation worldwide. While technical solutions for waste management issues have been extensively explored for years, both in academic and practical domains, and continue to evolve, social acceptance is a relatively new aspect that demands attention. Therefore, this study will not primarily focus on the technologies employed to treat MSW; instead, it will focus on the impact and acceptance of the techniques and policies employed.

It is essential to note that selecting the appropriate technology for MSW treatment depends on various criteria, with one significant factor being the source-separation characteristic and waste composition prevalent in society, shaping the "waste culture" (Halkos & Petrou, 2019).

Given the emphasis of this research on food waste, the widely applied treatment technologies are anaerobic digestion, composting, and bio-drying. Anaerobic digestion, whether employing wet or dry technologies, is used to generate energy and soil amendment. The others can just produce soil amendments.

The collection system, separation at source activities, waste composition, employee salaries, electricity prices both to purchase and sell, etc., are important factors affecting the decision on applied technology.

Since commingled waste includes different types of materials together, such as metals and plastics (HDPE, LDPE[41], PVC, PET, etc.) (Purkayasth & Sarkar, 2022), if there is no separation at source system for bio-degradable organics, there is a need to apply a mechanical sorting system before the biological process. On the other hand, According to the "Regulation on Sanitary Landfilling of Waste[42]", wastes are not accepted in landfills without pre-treatment. Therefore, municipalities have to build a mechanical sorting plant.

3.5.2 Food Waste as a Renewable Energy Source

Municipal solid waste can serve as a renewable energy source, both directly without separation and after separating the biodegradable components, depending on the technology used. The recognition of MSW as a renewable energy source is termed "biomass" in legislation. Biomass can be utilized in various ways, as illustrated below. To choose sustainable waste treatment technology, lifecycle assessment studies can be helpful during the planning process (Ghosh et al., 2020).

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[41] HDPE: high density polyethylene such as liquid containers, LDPE; low density polyethylene such as plastic bags
[42] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=13887&MevzuatTur=7&MevzuatTertip=5 (last visited on 04.09.2023)

A. Landfill gas: Bio-degradable portion of buried commingled MSW decay within landfills, producing methane gas during this process. The methane gas is then collected from landfills via installed pipes. Then, the LFG is used to produce electricity.

B. Biochemical technologies – Biomethanization: The bio-degradable portion of MSW is introduced into anaerobic tanks and allowed to decompose via bacteria, generating biogas. Biogas can be utilized in gas engines to produce electricity.

C. Biochemical technologies – Hydrogen production: Although hydrogen production depends on the composition of the waste, novel technologies are still being researched at the laboratory scale (TMMOB, 2022), Genç, 2011).

D. Biochemical technologies – Ethanol production: Since most of the food waste consists of carbohydrates, fats, and proteins, these wastes can be used in the production of ethanol via fermentation, distillation, dehydration, etc. (TMMOB, 2022, Chen et al., 2022).

E. Thermal technologies: High temperatures (typically ranging from 850 to 1100℃) are applied to either burn or break down molecular structures through processes such as incineration, gasification, pyrolysis, refuse-derived fuel, or similar methods.

In terms of the technological intensity among those above the most practically applied methods of using biomass, the thermal process ranks as the most technology-intensive, followed by biomethanisation and LFG. The same order holds true for the investment costs associated with these technologies. As explained in Section 2.2, the legislation provides incentives for renewable energy producers who also utilize biomass. Consequently, these incentives can render the construction of MSW treatment plants financially feasible.

When MSW is buried in landfills, GHGs continue to be emitted into the atmosphere, contributing to climate change. Collecting LFG and treating MSW within controlled closed systems prevents atmospheric methane emission. The waste management sector holds a unique position in becoming a significant reducer of emissions (UNEP, 2010). Hence, this study aims to investigate the governance of MSW from the perspective of energy production potential while also considering the role of MSW management in addressing climate change.

3.5.3 Current Status of Food-Waste-To-Energy Conversion Facilities in Türkiye

There are numerous landfills spread across the country. Some of these are controlled and adhere to sanitary standards, while others are uncontrolled sites called wild landfills. All of these locations hold the potential for methane to power generation projects. Irrespective of whether a landfill is controlled or uncontrolled, the responsibility for its management lies with the respective municipality.

Some municipalities have established systems to manage municipal waste for electricity production, while others lack a municipal waste treatment infrastructure. An environmental permit system is in place for waste treatment plants. The licensed facilities are registered and cataloged within an online system[43]. This registry operates an open-source, which was used to identify municipalities equipped with MSW treatment plants. To perform this identification, licensed plants were filtered based on the waste code for commingled MSW (20 03 01 mixed municipal waste). Following this identification process, as of September 2023, it was determined that there are 28 municipalities with operational treatment systems encompassing mechanical sorting, biodrying, biomethanization, or composting. Among these 19 metropolitan municipalities, the remaining are provincial municipalities, as outlined in Table 3.2:

[43] https://eizin.cevre.gov.tr/Rapor/BelgeArama.aspx last visited on 09/08/2023

Table 3.2 Information about the municipal waste generation and treatment in Türkiye[19,44]

Type of Travel	*Number*	*Population*[45]	*Amount of MSW (ton/year)*	*Municipalities Having Treatment System*
Metropolitan municipality	30	65.156.232	26.709.812	19
Metropolitan sub-provincial mun.	519			
Provincial municipality	51	18.458.130	5.614.658	9
District municipality	403			

3.5.4 MSW Management Treatment Costs and Social Cost of Carbon

Waste management is a public service that requires financing for cost recovery rather than an economic activity for generating income. Therefore, municipalities need to develop their revenue as responsible authorities. The use of treatment technologies, such as mechanical and biological treatment and waste-to-energy, can increase the financial cost of waste management. Therefore, it should only be considered when a society is willing to pay a higher price for waste services and if it is technically feasible (volume, composition, etc.)[46]. Public awareness regarding the interrelation of climate change and waste management, as well as WTP, assumes importance due to the anticipation of climate change effects occurring earlier than initially projected (Nordhaus, 2019).

When comparing plants for energy generation from MSW with other plants that use renewable sources, the others do not have the role of an organization that disposes of waste and produces amendments for the soil. Therefore, it is essential to note that

[44] e-İÇİŞLERİ PROJESİ (e-icisleri.gov.tr) last visited on 16/01/2022
[45] https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2020-37210 last visited on 18.08.2023
[46] [46] What a Waste (worldbank.org) (last visited on 04.09.2023)

the priority of waste-to-energy plants is to dispose of waste. As per the polluter pays principle, the waste producers should bear the cost of disposing of waste. However, finding socially acceptable alternatives to polluter pay is an issue that needs further exploration. At this point, waste-to-energy production systems stand apart from other renewable energy production systems.

The modern world - referred to as the risk society - struggles to control changes, which consequently includes climate change (Girgin, 2018; Giddens, 2010). Climate change, viewed as a risk inherent in our age, arises from industrial capitalism.

Estimating the cost of climate change is an intricate task, not confined to a one-sided perspective. Economists and economic models can calculate these costs by considering numerous factors. However, the creators of these models acknowledge that certain parameters evade calculation within economic models. In such models, all factors are reduced to costs. Yet, social acceptance remains unaddressed, a parameter crucial in understanding climate change mitigation strategies. Therefore, in addition to these models, tools capable of detecting social acceptance are necessary. The Stern review (2007) assigns social acceptance the same importance as the price of carbon (Stern Review Part IV: Policy Responses for Mitigation (Nicholas Stern, 2007)). Therefore, this study delves into social acceptance.

In terms of municipalities having just LFG utilization systems, there was no immediate urgency to construct treatment plants, given the mutually beneficial situation that prevailed between municipal management and contractors in financial terms. Conversely, with the implementation of YEKDEM, old, untamed, unsanitary landfills have undergone rehabilitation. However, the amount of waste that must be diverted from landfills has not increased in tandem with the rise in renewable energy generation rates. The recent feed-in-tariff system has led to the categorizing of LFG and biogas projects, introducing a distinct pricing structure. Whether this new tariff system will change the trend in MSWMS remains to be monitored.

While it is necessary to consider the present disposal costs associated with the waste generated today, there is also the potential risk posed to future generations depending on the method of waste disposal chosen. The ongoing debate revolves around whether we should shoulder the responsibility for minimizing or eliminating these hazards. If the goal is to combat climate change, constructing new waste management facilities is one of the pillars of the solution, necessitating further research and investment. The decision to invest in facilities for MSW management intersects with the discourse on climate change, reflecting a complex overlap. In this context, the primary decision-makers are politicians and municipalities.

Comparing MSW with other renewable energy sources, it holds certain advantages due to its widespread availability in every city and its independence from environmental conditions. Solar, wind, and hydro energy sources rely heavily on atmospheric conditions, while MSW availability solely depends on consumer waste. But in terms of investment, cost, and labor needs are higher than other resources.

Regarding the issue of climate change, future and present generations are facing significant threats. The relentless challenge of climate change has already jeopardized future generations' well-being. Unfortunately, if human beings cannot prevent future generations from climate change damage, sustainable development can not be achieved.

While it may seem that the current generation will need to make significant changes in their daily habits to address climate change, it is unclear whether the actors will accept this. It is also explained by Giddens' paradox (Giddens, 2013), which suggests that people are unlikely to take action against climate change unless its effects directly impact their daily lives. Unfortunately, by the time the full extent of the damage is understood, it may be too late to prevent it. As of now, there are some indications of concern, but not enough concrete actions are being taken on an individual level to avoid climate change (Bulut, 2017).

Scientists and governments are discussing solutions to protect future and current generations from the perverse effects of climate change. To combat climate change, The Paris Agreement agreed upon in 2015 sets a target of keeping average global warming below 2°C. To achieve this goal, anthropogenic carbon dioxide emissions must be decreased, along with all greenhouse gases expressed as carbon dioxide equivalents. Greenhouse gas emissions from waste management systems are critically important, especially since landfills are one of the significant sources of methane (Stocker et al., 2013). Methane emissions from landfills contributed to 18% of global anthropogenic emissions between 2003 and 2012 (Saunois et al., 2016).

There is a common understanding that the current generation has to take action to solve the climate change problem. However, on the other hand, there exists a free-riding tendency among the present generation regarding climate change (Nordhaus, 2019). Integrated economic models have been improved to analyze the costs of climate change, presenting a new approach that offers different perspectives for humankind (Nordhaus & Boyer, 2000). Stern Review (Stern, 2007), which is one of the most popular and much-criticized documents in this issue, discusses the effects of climate change primarily from an economic point of view. Although the Stern Review (Stern, 2007) is not a peer-reviewed document (Nordhaus, 2006), the costs of climate change for future and present generations have been calculated in Stern Review (2007) and are being discussed by scholars. While calculating the cost of climate change for both future and current generations, the social discount rate is used and has become a subject of discussion. Some argue that the social cost of climate change should be calculated using high or low discount rates (Becker et al., 2010). Lower discount rates imply that the burdens of climate change are placed on the current generation, which is a highly problematic issue involving discussions from many stakeholders (Nordhaus, 2006). The realistic discount rate is being researched through economic models, but whether the calculation is right or wrong, the way to apply it to the real world can be problematic. At that point, the importance of social acceptance appears. Therefore, while research on discount rate calculations and waste treatment technologies is ongoing, other studies should also investigate their applicability, social acceptance, and further sustainability. In terms of waste management, waste causes GHG emissions when not appropriately treated. Treatment plants should be built to prevent the damage caused by waste. The capital and operation costs of these plants can become an issue in the social cost of carbon. That's why it is questioned in the study whether there is social acceptance of using food waste as a renewable energy source and the WTP the costs of building and operating these plants.

CHAPTER 4

THEORETICAL MODEL

4.1 Approaches to Conceptualize Social Acceptance of MSW

This chapter does not aim to provide a detailed description of existing concepts and theoretical trends in research on the social acceptance of renewable energy resources. However, it briefly intends to provide a starting point for exploring the social acceptance of using food waste for energy production. Although many studies on social acceptance have been conducted for different research areas (Upham et al., 2015; Wolsink, 2018), the most widely accepted method is the one developed for renewable energy systems by Wüstenhagen et al. (2007). The field of research on social acceptance was initially characterized by a significant emphasis on the degree of acceptance shown by members of the general public (Wüstenhagen et al., 2007, Wolsink, 2018). This changed with the study of Wüstenhagen et al. (2007). Social acceptance has become a highly relevant concept in the field of renewable energy technologies when it comes to policies (Upham et al., 2015). Wüstenhagen et al. (2007) became a cornerstone of the area and put forth a conceptual framework that identified three distinct phenomena as integral components of social acceptance, namely community acceptance, socio-political acceptance, and market acceptance.

This rigorous and comprehensive framework by Wüstenhagen et al. (2007) has served as a valuable guide to understanding the social acceptance of food-waste-to-energy systems. Furthermore, Gordon et al. (2022) introduced another perspective in the field, that is, the scaling of the actors as micro, meso, and macro in alignment with that of Wüstenhagen et al. (2007).

For the purpose of this study, the Nature4Cities framework has been referenced, which has served as the underlying model in this research endeavor. The model employed in this research was meticulously composed and successfully executed in the Nature4Cities project, which is known to provide nature-based solutions. This framework was used for the first time to assess the social acceptance of energy production using food waste in MSWM and revised, taking into account Huijts (2014), to measure the social acceptance of energy production from food waste. In addition, regarding trust, the variable was subjected to distinct analysis to provide a more comprehensive evaluation. In pursuit of this objective, trust was decomposed into three fundamental pillars.

Three dimensions formalized by Wüstenhagen et al. (2007) used in the study can be briefly described as follows:

Community acceptance refers to procedural justice, distributional justice, and trust. Procedural fairness covers not only siting decisions but also other procedures to choose the technology, technology provider, and/or investor in food-waste-to-energy utilization systems. Distributional fairness refers to the distribution of benefits and disadvantages due to the externalities of both waste-to-energy plants and climate change. Trust is a multifaceted concept encompassing a range of factors, such as the reliability of technology, the competency of those who implement it, the efficacy of policymakers, environmental and social concerns, and the transparency of procedures. Achieving community acceptance requires the involvement of local stakeholders, including residents and authorities. Community acceptance tends to follow a U-shaped pattern over time, reflecting changes in the level of acceptance throughout the various stages of a project.

Socio-political acceptance, which refers to the approval of technologies and policies by the public, key stakeholders, and policymakers, is a crucial factor in promoting the implementation of food-waste-to-energy systems. This acceptance is pivotal in providing for the legislative, financial, and planning strategies essential in advancing collaborative decision-making that influences market and community acceptance.

Market acceptance refers to the process of a system being adopted by the market. The focus for market acceptance of food waste-to-energy conversion systems is not on individual consumers but on energy producers, investors, technology manufacturers, financial institutions, grid operators, etc. Individual consumers cannot directly demand technology or electricity from the market for their homes. Instead, firms can act as consumers and purchase the renewable energy produced by the energy producer. Since the stakeholders in this acceptance are investors, financial institutions, technology suppliers, etc., there is a strong connection with socio-political acceptance.

Two distinct behavioral theories incorporating emotions and hedonic effects (Huijts et al., 2012; J. Park & Ha, 2014) were integrated. Specifically, the Theory of Planned Behavior (TPB) (Ajzen, 1991; Ajzen & Gilbert Cote, 2008) and the Norm Activation Model (NAM) (Schwartz, 1977; Steg & de Groot, 2010) were harmoniously merged, following established research practices. This integration, however, uniquely accounts for the social acceptance theory (Nature4Cities, 2018; Sari et al., 2018; Sari et al., 2023). These theories are mainly used theories in solid waste management research, as noted by scholars (Raghu & Rodrigues, 2020; Concari et al., 2020). Scholars have chosen to combine the TPB and NAM because they recognize various factors rooted in these theories as significant predictors of intention. Combining self-interested and pro-social motivations is deemed the most suitable approach for comprehending pro-environmental behavior (Concari et al., 2020; Huijts et al., 2012; Huijts et al., 2014). Therefore, with this comprehension, the model was developed to elucidate the role of social acceptance within the framework. It establishes connections between the variables employed in both TPB and NAM theories (Figure 4.1). Identifying both the social structure and antecedents within individuals is crucial. Addressing these two factors together is essential for a more comprehensive understanding (Raghu & Rodrigues, 2020).

This research delves into a topic that is not centered solely around a technology that the involved actors would independently choose to use or not. In fact, the complexities surrounding waste management issues are closely intertwined with the social phenomena under scrutiny in this academic research (Raghu & Rodrigues, 2020). Thus, addressing the matter necessitates exploration from various angles, including the lens of social acceptance theory and more.

4.2 Conceptual Model

The model developed by Nature4Cities Project (2018) underwent subsequent revision, considering Huijts et al. (2014), incorporating additional pathways for integration in this study. Subsequently, the relationships deemed suitable for this study were applied within the conceptual model. After revision of the referenced model (Nature4Cities Project 2018, Sari et al., 2023), the model was used as shown in Figure 4.1. The constructs within the model and the interrelationships established between these constructs are explained below:

Experience and knowledge are factors mutually influencing trust. Experience is gained through past experiences and shapes the establishment or lack thereof of trust in practitioners or institutions vested with decision-making authority over our future experiences. Additionally, experience contributes to the knowledge pool. Therefore, this study postulates a causal relationship between experience, knowledge, and trust, in alignment with Nature4Cities (2018), Sari et al. (2023), and Kânoğlu-Özkan & Soytaş (2022).

In this study, experience is taken into account as an action by visiting a waste treatment plant or landfill site. Due to specific characteristics, visiting waste management systems differentiate from other renewable facilities and nature-based solutions. Unlike sanitary facilities or places easily visited daily, landfills or waste treatment facilities are accessible to the public without permission due to health and safety concerns. These sites are considered hazardous areas, requiring authorization for entry. Therefore, in this research, the experience variable stands apart from other personally encountered renewable energy technologies.

Trust has been linked to social acceptance through perceived benefits, risks, costs, and positive and negative effects. Since trust is a strong variable capable of encapsulating various factors on its own, and the conceptual model involves evaluating complex relationships, the trust variable is approached from three distinct angles to yield well-defined results, although this slightly complicates the model. To provide a more detailed assessment of trust, it is categorized into subtopics rather than a single factor (Huijts et al., 2014; Mccrea et al., 2016; Kânoğlu-Özkan & Soytaş, 2022). Within this context, issues related to transparency of environmental and social impacts, held by relevant companies and regulatory bodies regarding management, environmental protection, and human rights within food (biodegradable) waste-to-energy projects, the reliability and safety of food waste-to-energy production, and trust in the companies implementing these projects are systematically categorized.

Trust in environmental and social considerations denotes the belief that implementing food-waste-to-energy systems will yield positive environmental and social outcomes. This belief encompasses the notion that these systems will contribute to reducing greenhouse gas emissions, sustainable waste management, and advancing a circular economy. Trust in environmental and social considerations also implies that the systems are designed and operated carefully for the well-being of communities, aiming to minimize any negative impacts on human health, local ecosystems, overall quality of life, and human rights.

Trust in reliability and safety pertains to the belief that food-waste-to-energy systems are dependable and entail minimal risks for the surrounding communities and the companies utilizing the technology. This aspect of trust encompasses the perception that the technology has been proven, reliable and effective in converting food waste into energy. It also encompasses the belief that these systems are designed, built, and operated in compliance with stringent safety standards and guidelines, ensuring that potential hazards are minimized or mitigated.

Trust in transparency and responsibility involves the belief that the actors and organizations involved in developing, implementing, and managing food-waste-to-energy systems operate transparently and responsibly in their endeavors. Stakeholders, including policymakers and private companies (especially those responsible for waste treatment), openly share information about the systems, their potential benefits, and associated risks. This dimension also suggests that these actors are accountable for their actions, adhere to ethical principles, address public concerns sensitively and responsibly, and conduct necessary inspections.

Taking the social acceptance theory into account, social norms, perceived behavioral control, attitude from the TPB, and the personal norm from the NAM have been connected to the intention to accept. This connection is founded on the understanding that the intention to accept directly predicts acceptance within the context of social acceptance.

Given the extensive, diverse, and complex nature of issues related to environmental justice, for the purpose of simplification, the concept of fairness-employed to explore the social acceptance of waste utilization, especially in energy conversion-can be delineated into two main topics (Watson & Bulkeley, 2005). These topics are the environmental consequences of actions and the systems generating these results. These consequences include health effects, pollution, etc. The impact of actors in such matters is considered distributive fairness. Environmental inequality arising from specific policies and practices, the equity of decision-making processes, and the systems generating these outcomes are associated with procedural fairness. The concept of "procedural fairness" pertains to the impartiality and transparency of decision-making procedures and involves community participation (Watson & Bulkeley, 2005). It has been linked to the three pillars of trust. Distributive fairness has been linked to positive/negative affects, perceived costs/risks/benefits, personal norms, and attitude.

The Paris Agreement concerning climate change bears significance to human rights, primarily due to the Agreement's emphasis on the urgency of addressing the grave threat of global climate change, which could lead to temperatures exceeding 1.5 or 2°C (Boyle, 2018). Furthermore, an interdependent correlation exists between safeguarding the environment and upholding human rights (Lewis, 2018).

Examining the subject matter through a methodologically sound lens, it can be posited that every social acceptance dimension plays a crucial role in determining the actors that shall be selected to form the research sample (Sari et al., 2023). For the conceptual model, the variables were explained in Table 4.1, and hypotheses developed between variables are provided in Table 4.2.

Table 4.1 Constructs used in the model and their short description

Construct	*Description*
Experience	Personal experience in a waste management area
Knowledge	Knowledge about waste management systems and utilization of food waste as a renewable energy source
Trust – Environmental & Social Responsibility	The perceptions that food-waste-to-energy systems have positive environmental and social outcomes
Trust – Reliability & Safety	The perception that the technology is proven, reliable, and efficient and ensures that potential hazards are minimized
Trust – Transparency & Responsibility	Actors involved in the food-waste-to-energy systems are transparent and responsible in their actions.
Procedural Fairness	Participation in the decision-making process
Distributive Fairness	Distribution of benefits and risks
Outcome Efficacy	Addressing the public sensitivities during the planning process of food-waste-to-energy production
Positive Affect	Positive feelings about the waste management system
Negative Affect	Negativities of the waste management system

Table 4.1 Constructs used in the model and their short description (Cont'd)

Construct	*Description*
Perceived Costs	Perceived costs of the implementation of the system and the impact on the costs of the implementation
Perceived Risks	Perceived environmental risks, high-security operations, and contribution/prevention to air pollution during the process.
Perceived Benefits	Perceived benefits of food waste to energy utilization plants for society and individual
Problem Perception	Perceived problems with waste management, renewable energy production, and climate change
Personal Norms	Personal support
Subjective Norms	Others to know individual support.
Perceived Behavioral Control	The difficulty of changing behavior to prevent climate change
Attitude	Attitudes about renewable energy production
Intention to Accept	Having intention if there will be improvement for economy, environment, climate change
Social Acceptance	Willingness to pay more, acceptance to what extent of environmental pollution, acceptance of energy utilization of food waste

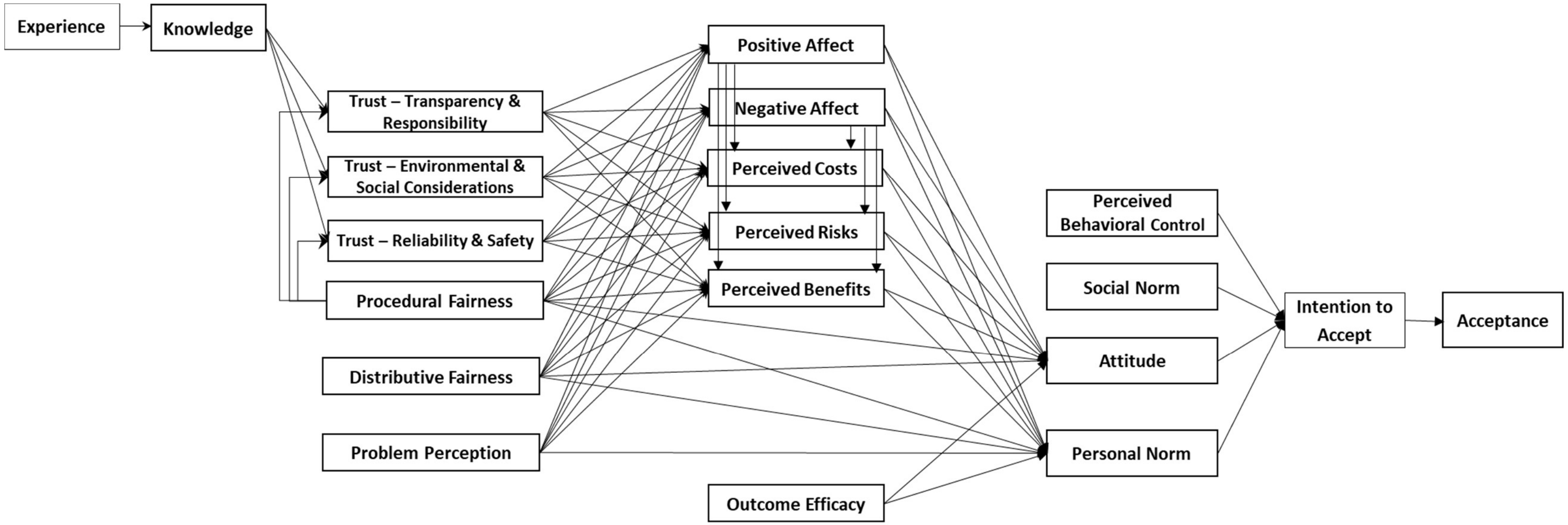

Figure 4.1. Revised version of the model

Table 4.2 Hypotheses that were subject to examination within the framework of this research

Hypothesis 1	With more experience related to food-waste-to-energy systems, society will become more knowledgeable about the technology. Therefore, there is a positive causal relationship between experience and knowledge.
Hypothesis 2	Knowledge increases trust in actors, procedures, etc. Therefore, there is a positive causal relationship between knowledge and trust.
Hypothesis 2a	Knowledge increases trust in actors, procedures, etc. Therefore, a positive causal relationship exists between knowledge and Trust- Environmental & social considerations.
Hypothesis 2b	Knowledge increases trust in actors, procedures, etc. Therefore, knowledge and Trust- Reliability & safety have a positive causal relationship.
Hypothesis 2c	Knowledge increases trust in actors, procedures, etc. Therefore, knowledge and trust-transparency & responsibility have a positive causal relationship.
Hypothesis 3a	There is a positive relationship between trust-environmental & social considerations and perceived benefits.
Hypothesis 3b	A positive relationship exists between trust- reliability & safety, and perceived benefits.
Hypothesis 3c	There is a positive relationship between trust-transparency & responsibility and perceived benefits.
Hypothesis 4a	There is a negative relationship between trust-environmental & social considerations and perceived risks.
Hypothesis 4b	A negative relationship exists between trust- reliability & safety, and perceived risks.
Hypothesis 4c	There is a negative relationship between trust-transparency & responsibility, and perceived risks.
Hypothesis 5a	There is a negative relationship between trust-environmental & social considerations and perceived costs.
Hypothesis 5b	There is a negative relationship between trust-reliability & safety and perceived costs.
Hypothesis 5c	There is a negative relationship between trust-transparency & responsibility and perceived costs.
Hypothesis 6a	Trust- Environmental & social considerations have a direct impact on positive affect.
Hypothesis 6b	Trust- reliability & safety has a direct impact on positive affect.
Hypothesis 6c	Trust-transparency & responsibility has a direct impact on positive affect.

Table 4.2 Hypotheses that were subject to examination within the framework of this research (Cont'd)

Hypothesis 7a	Trust- Environmental & social considerations have an adverse impact on negative affect.
Hypothesis 7b	Trust-reliability & safety has an adverse impact on negative affect.
Hypothesis 7c	Trust-transparency & responsibility has an adverse impact on negative affect.
Hypothesis 8a	Perceived fairness in the decision process positively affects trust-environmental & social considerations.
Hypothesis 8b	Perceived fairness in the decision process positively affects trust-reliability & safety.
Hypothesis 8c	Perceived fairness of the decision process positively affects trust-transparency & responsibility.
Hypothesis 9	Distributive fairness of the process has a positive effect on attitudes.
Hypothesis 10	Perceived fairness in the decision process has a positive effect on personal norms.
Hypothesis 11	If the belief that one's views are influential in shaping policies related to waste-to-energy production is dominant, the attitude toward the acceptance of the food-waste-to-energy systems will increase.
Hypothesis 12a	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, the tendency to support energy from food waste will increase.
Hypothesis 12b	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, perceived benefits will increase.
Hypothesis 12c	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, perceived risk will decrease.
Hypothesis 12d	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, perceived costs will decrease.
Hypothesis 12e	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, positive affect will increase.
Hypothesis 12f	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, negative affect will decrease.
Hypothesis 13	The lower the perceived costs associated with food-waste-to-energy systems, the more likely individuals are to develop a personal norm that supports the social acceptance of these systems.
Hypothesis 14a	Positive affects influence attitudes.
Hypothesis 14b	Negative affects influence attitudes.
Hypothesis 15a	The greater the perceived benefits associated with food-waste-to-energy systems, the more likely individuals are to develop a personal norm that supports the social acceptance of these systems.

Table 4.2 Hypotheses that were subject to examination within the framework of this research (Cont'd)

Hypothesis 15b	Positive affects influence personal norms.
Hypothesis 15c	Negative affects influence personal norms.
Hypothesis 15d	The lesser the perceived risks associated with food-waste-to-energy systems, the more likely individuals are to develop a personal norm that supports the social acceptance of these systems.
Hypothesis 16a	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences positive affect.
Hypothesis 16b	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences negative affect.
Hypothesis 16c	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences perceived costs.
Hypothesis 16d	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences perceived risks.
Hypothesis 16e	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences perceived benefits.
Hypothesis 17	The perceived distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences individuals' norms related to the systems.
Hypothesis 18	A higher cost perception leads to a decrease in attitudes towards waste-to-energy systems.
Hypothesis 19	A higher risk perception leads to a decrease in attitudes towards waste-to-energy systems.
Hypothesis 20	A higher perception of benefits leads to increased attitudes towards food waste-to-energy systems.
Hypothesis 21	If an individual perceives that their social network approves of accepting food waste-to-energy, they have a greater intention to accept it.
Hypothesis 22	The perceived difficulty of preventing climate change will affect the intention to accept food waste-to-energy systems.

Table 4.2 Hypotheses that were subject to examination within the framework of this research (Cont'd)

Hypothesis 23	Having an attitude about energy production positively influences the intention to accept.
Hypothesis 24	If an individual perceives that accepting food waste-to-energy systems aligns with their personal norms and values, they have a positive attitude toward that behavior and a greater intention to engage.
Hypothesis 25	Intention to accept has a positive effect on acceptance.
Hypothesis 26a	Negative affects influence on perceived costs.
Hypothesis 26b	Negative affects influence on perceived risks.
Hypothesis 26c	Negative affects influence on perceived benefits.
Hypothesis 26d	Positive affects influence on perceived costs.
Hypothesis 26e	Positive affects influence on perceived risks.
Hypothesis 26f	Positive affects influence on perceived benefits.
Hypothesis 27a	If the belief that one's views are influential in shaping policies related to waste-to-energy production is dominant, the personal norms toward the acceptance of the technology will increase.
Hypothesis 27b	If the belief that one's views are influential in shaping policies related to waste-to-energy production is dominant, the attitude toward the acceptance of the technology will increase.
Hypothesis 28a	Perceived fairness of the decision process decreases the negative affect.
Hypothesis 28b	Perceived fairness in the decision process increases the positive affect.
Hypothesis 28c	Perceived fairness in the decision process has a positive effect on perceived benefits.
Hypothesis 28d	Perceived fairness in the decision process has a negative effect on perceived risks.
Hypothesis 28e	Perceived fairness of the decision process has a negative effect on perceived cost.
Hypothesis 29a	Trust-environmental & social considerations mediate the relationship between procedural fairness and positive affect.
Hypothesis 29b	Trust-reliability & safety mediates the relationship between procedural fairness and positive affect.
Hypothesis 29c	Trust-transparency & responsibility mediates the relationship between procedural fairness and positive affect.
Hypothesis 29d	Trust-environmental & social considerations mediate the relationship between procedural fairness and negative affect.

Table 4.2 Hypotheses that were subject to examination within the framework of this research (Cont'd)

Hypothesis 29e	Trust-reliability & safety mediates the relationship between procedural fairness and negative affect.
Hypothesis 29f	Trust-transparency & responsibility mediates the relationship between procedural fairness and negative affect.
Hypothesis 29g	Trust-environmental & social considerations mediate the relationship between procedural fairness and perceived costs.
Hypothesis 29h	Trust-reliability & safety mediates the relationship between procedural fairness and perceived costs.
Hypothesis 29i	Trust-transparency & responsibility mediates the relationship between procedural fairness and perceived costs.
Hypothesis 29j	Trust-environmental & social considerations mediate the relationship between procedural fairness and perceived risks.
Hypothesis 29k	Trust-reliability & safety mediates the relationship between procedural fairness and perceived risks.
Hypothesis 29l	Trust-transparency & responsibility mediates the relationship between procedural fairness and perceived risks.
Hypothesis 29m	Trust-environmental & social considerations mediate the relationship between procedural fairness and perceived benefits.
Hypothesis 29n	Trust-reliability & safety mediates the relationship between procedural fairness and perceived benefits.
Hypothesis 29o	Trust-transparency & responsibility mediates the relationship between procedural fairness and perceived benefits.
Hypothesis 30a	Positive affect mediates the relationship between trust-environmental & social considerations and perceived costs.
Hypothesis 30b	Positive affect mediates the relationship between trust-reliability & safety and perceived costs.
Hypothesis 30c	Positive affect mediates the relationship between trust-transparency & responsibility and perceived costs.
Hypothesis 30d	Positive affect mediates the relationship between trust-environmental & social considerations and perceived risks.
Hypothesis 30e	Positive affect mediates the relationship between trust-reliability & safety and perceived risks.
Hypothesis 30f	Positive affect mediates the relationship between trust-transparency & responsibility and perceived risks.
Hypothesis 30g	Positive affect mediates the relationship between trust-environmental & social considerations and perceived benefits.
Hypothesis 30h	Positive affect mediates the relationship between trust-reliability & safety and perceived benefits.
Hypothesis 30i	Positive affect mediates the relationship between trust-transparency & responsibility, and perceived benefits.
Hypothesis 30j	Negative affect mediates the relationship between trust-environmental & social considerations and perceived costs.
Hypothesis 30k	Negative affect mediates the relationship between trust-reliability & safety and perceived costs.

Table 4.2 Hypotheses that were subject to examination within the framework of this research (Cont'd)

Hypothesis 30l	Negative affect mediates the relationship between trust-transparency & responsibility, and perceived costs.
Hypothesis 30m	Negative affect mediates the relationship between trust-environmental & social considerations and perceived risks.
Hypothesis 30n	Negative affect mediates the relationship between trust-reliability & safety and perceived risks.
Hypothesis 30o	Negative affect mediates the relationship between trust-transparency & responsibility and perceived risks.
Hypothesis 30p	Negative affect mediates the relationship between trust-environmental & social considerations and perceived benefits.
Hypothesis 30q	Negative affect mediates the relationship between trust-reliability & safety and perceived benefits.
Hypothesis 30r	Negative affect mediates the relationship between trust-transparency & responsibility, and perceived benefits.
Hypothesis 31a	Positive affect mediates the relationship between problem perception and perceived costs.
Hypothesis 31b	Positive affect mediates the relationship between problem perception and perceived risks.
Hypothesis 31c	Positive affect mediates the relationship between problem perception and perceived benefits.
Hypothesis 31d	Positive affect mediates the relationship between problem perception and personal norms.
Hypothesis 32a	Negative affect mediates the relationship between problem perception and perceived costs.
Hypothesis 32b	Negative affect mediates the relationship between problem perception and perceived risks.
Hypothesis 32c	Negative affect mediates the relationship between problem perception and perceived benefits.
Hypothesis 32d	Negative affect mediates the relationship between problem perception and personal norms.
Hypothesis 33a	Perceived costs mediate the relationship between positive affect and attitude.
Hypothesis 33b	Perceived risks mediate the relationship between positive affect and attitude.
Hypothesis 33c	Perceived benefits mediate the relationship between positive affect and attitude.
Hypothesis 34a	Perceived costs mediate the relationship between negative affect and attitude.
Hypothesis 34b	Perceived risks mediate the relationship between negative affect and attitude.
Hypothesis 34c	Perceived benefits mediate the relationship between negative affect and attitude.
Hypothesis 35a	Perceived costs mediate the relationship between positive affect and personal norms.
Hypothesis 35b	Perceived risks mediate the relationship between positive affect and personal norms.

Table 4.2 Hypotheses that were subject to examination within the framework of this research (Cont'd)

Hypothesis 35c	Perceived benefits mediate the relationship between positive affect and personal norms.
Hypothesis 36a	Perceived costs mediate the relationship between negative affect and personal norms.
Hypothesis 36b	Perceived risks mediate the relationship between negative affect and personal norms.
Hypothesis 36c	Perceived benefits mediate the relationship between negative affect and personal norms.
Hypothesis 37a	Positive affect mediates the relationship between distributive fairness and perceived costs.
Hypothesis 37b	Positive affect mediates the relationship between distributive fairness and perceived risks.
Hypothesis 37c	Positive affect mediates the relationship between distributive fairness and perceived benefits.
Hypothesis 38a	Negative affect mediates the relationship between distributive fairness and perceived cost.
Hypothesis 38b	Negative affect mediates the relationship between distributive fairness and perceived risks.
Hypothesis 38c	Negative affect mediates the relationship between distributive fairness and perceived benefits.
Hypothesis 39a	Perceived benefits mediate the relationship between problem perception and personal norms.
Hypothesis 39b	Perceived cost mediates the relationship between problem perception and personal norms.
Hypothesis 39c	Perceived risks mediate the relationship between problem perception and personal norms.
Hypothesis 40	People living near waste treatment facilities such as Mamak and Çankaya show more social acceptance than others.

CHAPTER 5

METHODOLOGY

In this study, basic quantitative research was applied. As explained by Wüstenhagen et al. (2007), social acceptance has three pillars: community, socio-political, and market. Sovacool & Ratan (2012) further conceptualized social acceptance based on the definition by Wüstenhagen et al. (2007). The pioneering work by Wüstenhagen et al. (2007) provided a comprehensive framework for understanding specific dimensions for conceptualizing the social acceptance of renewable energy sources for this study. This structure was subsequently adapted for a more niche area of sustainability utilizing food waste to energy systems. The study aiming to delve deeper into the complexities of social acceptance related to food waste-to-energy systems took inspiration from The Nature4Cities Project model. Survey questions (found in Appendix D-E) were meticulously adapted to ensure the research was thorough and meaningful. These questions considered fundamental dimensions of socio-political acceptance, market acceptance, and community acceptance. Each dimension encapsulates a set of criteria and challenges that can influence the perception and acceptance of the actors. Having previously applied these questions in the Nature4Cities Project offers a unique advantage. It provides an opportunity not just to understand the current perceptions but also to compare the findings against past data. Such comparisons pave the way for understanding the overall conceptualization of social acceptance.

Data collection involved questionnaire surveys. For the surveys, a questionnaire was prepared and administered in Ankara.

Structural Equation Modelling (SEM) - Partial Least Square (PLS) method was performed using SmartPLS 4.0 (version 4.0.9.5) software to analyze the data. SEM is a comprehensive statistical method widely used in various fields such as medical science, biology, marketing, social research, education, and behavioral science to assess causal and mutual relationships between observed and latent variables (Çelik & Yımaz, 2016). SmartPLS can be used without the requirement of normal distribution in the data (Yıldız, 2021; Doğan, 2019), thus eliminating the need for normally distributed data during this study.

5.1 Background Information about Ankara and the MSW Management System of the City

Ankara serves as both the capital city and a metropolitan municipality. The city encompasses two distinct landfill sites strategically located at separate points. One site is an old rehabilitated wild landfill situated in the Mamak district, while the other is a sanitary landfill in close proximity to the Sincan district. These two landfills share similar MSW treatment systems, comprising mechanical sorting plants, biomethanization systems, and energy production facilities. Their primary distinction lies in their capacity: Mamak boasts an installed energy production capacity of 17.0 MW, handling 1,500 tons of MSW per day, while Sincan possesses a higher installed energy production capacity of 54.7 MW, capable of processing 4,000 tons of MSW[47] daily.

The mechanical sorting plant segregates municipal solid waste into three distinct categories. Recyclable materials are channeled towards recycling plants to bolster the economy. Bio-degradable waste, on the other hand, finds its way to the fermentation system. The remaining waste is classified as residual. Bio-degradable organic waste in the fermentation system, including materials such as vegetables, fruits, and garden refuse, is treated in an oxygen-deprived environment. This controlled process expedites natural decomposition and produces methane gas, along with soil fertilizer additives. The power generation plant utilizes the biogas generated

[47] https://www.itcturkiye.com/tr/tesislerimiz/ankara-mamak (last visited on 15.07.2023)

from both fermentation systems and landfills to produce alternative energy. As for the residual portion can serve as RDF (refuse-derived fuel), functioning as an alternative fuel source, or be consigned to landfills.

The thermal energy generated by the engines is used to heat nearby buildings, greenhouses, and fermentation tanks integral to biomethanization, as well as specific residential and commercial along certain neighboring residential and commercial areas in the vicinity.

Additionally, the Mamak Landfill features a training center. Annually, the The center hosts approximately 25,000 visitors from various agencies, institutions, and schools for training sessions and technical site visits[48].

In 2002, Ankara Metropolitan Municipality organized[49] a tender for rehabilitating the Mamak Landfill and establishing a transfer station at the same site, as well as constructing and operating a waste treatment plant in Sincan. A contractor was selected and was obligated to finance the project without receiving[50] any fees, as explained in Section 3.3.1.

5.2 Survey Design

The survey, conducted through questionnaires provided in Appendix A, was designed to assess the extent of social acceptance regarding the utilization of food waste for energy production. The questionnaire employed a Likert scale, including a range from "1: strongly disagree" to 5 (“strongly agree”), as well as including 0 (“don't know"). In addition, there was a single question with a different scale aimed at gauging experience, offering "yes" or "no" options for responses.

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[48] https://www.itcturkiye.com/tr/tesislerimiz/ankara-mamak (last visited on 15.07.2023)
[49] https://www.resmigazete.gov.tr/eskiler/2002/06/20020621.pdf (last visited on 12.08.2023)
[50] https://www.emo.org.tr/genel/bizden_detay.php?kod=57427 (last visited on 12.08.2023)

To identify the questions encompassing in the second section of the questionnaire, the guidance of the Nature4Cities Project was sought, and their questions were modified and adjusted to align with the scope of this thesis. Particularly, these questions were selected to represent the factors in the conceptual model. Additionally, as a part of the research's focus, only three questions were crafted to assess specific themes. One question assesses participants' understanding of the polluter pays principle in relation to the management of municipal solid waste. Another inquires about perceived behavioral control in addressing the challenges of climate change mitigation, while the final question measures the acceptance of government-owned electricity generation based on personal norms. The questions, along with the corresponding references, can be found in the attached table (Appendix D).

The questionnaire begins with a section that provides information about the thesis topic and researcher, followed by a segment dedicated to gathering demographic information. In the first section of the questionnaire, participants were clearly informed that their participation was completely voluntary. They retained the option to refrain from participating in any segment of the questionnaire or to withdraw from the study at any point without facing any consequences. The concluding section encompasses questions that correspond to the structures outlined in the model.

The questionnaire was submitted to the METU Applied Ethics Research Center and was approved in August 2022 (Appendix C). The data collection process took place between August 2022 and October 2022.

5.3 Pilot Study

A pilot study was conducted to prevent any confusion with the questions and assess their suitability. During this pilot study, the survey questions were pretested with 15 individuals.

It was observed that participants, including those with primary school education, responded with "I don't know" or "I'm not sure" to most of the questions. This phenomenon was attributed to the complex nature of the subject matter, making individuals with primary school education uncomfortable with answering the questions. Therefore, a decision was made to choose samples with at least a high school education. Accordingly, five surveys were excluded based on the educational criteria, and the remaining data from the pilot study was incorporated into the complete research. The outcome of the pilot study indicated that the questions did not require modification.

5.4 Sampling Procedure

Every resident in Ankara who is over 18 years old, has graduated from high school, and who generates municipal solid waste and experiences the effects of MSW management has the potential to be a sampling unit. (Punch, 2005 & Guthrie, 2010). Ankara is the capital city with a population of over 5 million people. To ensure the feasibility of the study within a limited time and budget, clustered random sampling was employed (Singh, 2007 & Gorard, 2003). For this purpose, the districts of Ankara were chosen as clusters (İlhan & Deniz, 2021). Attention was paid to ensuring the statistical representation of Ankara's districts, taking into account demographic characteristics such as population, gender, and education.

In Ankara, there are 25 districts with a total population of 5,782,285[51] as of September 2023, out of which 91.9% belong to 10 districts with a population of over 100,000. Therefore, samples were selected from the districts with populations exceeding 100,000. These districts include Altındağ, Gölbaşı, Çankaya, Etimesgut, Keçiören, Mamak, Polatlı, Pursaklar, Sincan, and Yenimahalle. Since the remaining

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[51] http://www.ankara.gov.tr/ilcelerimiz (last visited on 27.09.2023)

15 districts are located at longer distances and represent only 8.1% of the people, this approach ensures that the survey is more feasible in terms of economy and time.

The districts' population and proportions in the total population were calculated using TurkStat data. These proportions were then used to ensure representativeness in the study and calculate the required sample size for the mentioned districts.

On the other hand, considering that the closest and oldest waste disposal site to the city center is located in Mamak, which is situated on the eastern border of the city, care was taken to select samples from the areas around this landfill (Nature4Cities, 2018; Sari et al., 2023). The nearest districts to this landfill are Mamak and Çankaya (Tadesse et al., 2008). This choice was made due to the assumption that residents of these neighborhoods would be more familiar with the Mamak Landfill and the city's waste management practices than residents of other areas. This decision was also influenced by the author's personal experience as a professional involved in Mamak landfill rehabilitation, installing the Sincan landfill, and managing the Ankara Waste Management Project for over 12 years. Furthermore, the survey could access all targeted districts of the city, ensuring representativeness.

A chi-square test was conducted to assess the representativeness in terms of population. The test results indicated that the samples were consistent with the population data.

5.5 Data Collection

The required number of samples was calculated statistically (KILIC, 2012; Naing et al., 2006). Based on the calculation, it was determined that a sample size of 384 is required for Ankara, which has a population of 5,782,285[52], at a 95% confidence level.

[52] http://www.ankara.gov.tr/ilcelerimiz (last visited on 23.08.2023)

Samples were collected from various sources, including municipalities, households, governmental institutions, private sector entities, NGOs, financial institutions, universities, and hospitals. The demographic information of the respondents is presented in Table 5.1.

Throughout the survey period, the quantity of missing data was monitored regularly, leading to the cancellation of certain questionnaires. The research team was kept informed about the number of canceled samples, allowing them to continue collecting the necessary number of questionnaires. In total, 460 questionnaires were initially collected. After accounting for exclusions, 392 questionnaires were retained for data analysis. The reasons for excluding specific responses were as follows:

- If a single respondent had more than 15% missing data, their observation was typically excluded, as per the criteria set by (Hair et al., 2017).
- The questionnaire spanned four pages. Some respondents did not complete the final page or even the last two pages. In certain instances, respondents consistently made the same choice throughout.

Table 5.1 Demographic properties

Item	Status	Total	Percentage (%)	Female	Male	H. school	University	P.Graduate	High school	University	P.Graduate
						Female			Male		
Age	<20	9	2.3	2	7	2	-	-	7	-	-
	20-29	87	22.2	49	38	12	30	7	17	20	1
	30-39	90	23.0	60	28	15	36	9	11	13	4
	40-49	110	28.1	49	59	17	28	4	25	27	7
	50-59	63	16.1	27	33	12	10	5	12	16	5
	60-69	25	6.4	3	21	2	1	-	12	8	-
	>70	3	0.8	1	2	-	1	-	1	1	-
	No Answer	5	1.3	3	1	-	-	-	-	-	-
Gender	Female	195	49.7	195	-	60	109	25	-	-	-
	Male	189	48.2	-	189	-	-	-	85	86	18
	Unspecified	8	2.0	-	-	-	-	-	-	-	-
Education	Highschool	150	38.3	60	85	60	-	-	85	-	-
	Master's/PhD	43	11.0	25	18	-	-	25	-	-	18
	University	198	50.5	109	86	-	109	-	-	86	-
	No Answer	1	0.3	-	-	-	-	-	-	-	-

Table 5.1 Demographic properties (Cont'd)

Item	Status	Total	Percentage (%)	Female	Male	H. school	University	P.Graduate	High school	University	P.Graduate
						Female			Male		
Occupation	Academician	8	2.0	4	4	-	-	4	-	2	2
	Governmental Institution	127	32.4	64	61	10	48	6	23	30	8
	Housewife	26	6.6	26	-	18	7	1	-	-	-
	Municipality	29	7.4	11	17	5	4	2	6	9	2
	NGO	2	0.5	1	1	-	1	-	-	1	-
	Other	10	2.6	4	5	-	4	-	1	3	1
	Private Sector	111	28.3	51	57	12	31	7	27	26	4
	Retired	40	10.2	15	23	6	6	3	12	10	1
	Student	38	9.7	18	20	11	5	2	16	4	-
	Unemployed	1	0.3	1	-	-	1	-	-	-	-
	No Answer		0.0	-	1	-	-	-	1	-	-
Residency	Dormitory	2	0.5	-	2	-	-	-	1	1	-
	Lodging	6	1.5	3	3	-	3	-	1	2	-
	Owner	240	61.2								
	Tenant	115	29.3								
	Relative's house	27	6.9	13	14	3	6	4	3	10	1
	No Answer	2	0.5	2		1	1	-	-	-	-

Table 5.1 Demographic properties (Cont'd)

Item	Status	Total	Percentage (%)	Female	Male	H. school	University	P.Graduate	High school	University	P.Graduate
						Female			Male		
District	Altındağ	16	4.1	7	9	3	3	1	4	3	2
	Çankaya	121	30.9	58	62	8	35	15	27	27	8
	Etimesgut	31	7.9	22	9	4	18	-	2	7	-
	Gölbaşı	7	1.8	3	4	1	2	-	1	3	-
	Keçiören	43	11.0	27	14	9	17	1	9	5	-
	Mamak	76	19.4	28	47	15	11	2	18	24	5
	Polatlı	8	2.0	6	2	2	3	1	1	1	-
	Pursaklar	10	2.6	7	3	-	6	1	1	2	-
	Sincan	30	7.7	11	19	8	2	1	16	3	-
	Yenimahalle	50	12.8	26	20	10	12	3	6	11	3

5.6 Data Analysis Methodology

This chapter endeavors to present the initial scrutiny and analysis of the data, in addition to the subsequent examination encompassing the assessment of normality, reliability, and validity. Moreover, it encompasses the implementation of Partial Least Squares (PLS) and Path Modeling alngside the importance-performance map analysis (IPMA), mediation analysis, and moderator analysis.

An evaluation was carried out to ascertain the normality of the data, utilizing the Skewness and Kurtosis measures and & Shapiro-Wilk normality tests. It was established that the data did not adhere to a normal distribution, which is one of the reasons for using the SmartPLS software. Structural Equation Modeling (SEM) is an analytical technique employed in multivariate statistical analysis to investigate and analyze structural associations. In the context of utilizing Partial Least Squares (PLS) SEM, the significance of both β (Beta) values and p values play pivotal roles in understanding and interpreting the results. β values are standardized regression coefficients, representing the strength and direction of the relationship between two constructs. p values are used to test the hypothesis (Doğan, 2019; Yıldız, 2021).

Before the execution of the validity of reliability tests, the constructs were identified, whether formative or reflective.

Cronbach's Alpha and Composite Reliability (CR) were computed to execute the reliability test. The Average Variance Extracted (AVE) was employed to assess the constructs' validity. Table 5.2 shows a brief list of analyses used in this study.

Table 5.2 Analysis list used in the study

Measurement Model Analysis

- Basic descriptive statistics (Mean, median, standard deviation)
- Skewness, Kurtosis, & Shapiro-Wilk normality tests
- Confirmatory Tetrad Analysis (CTA)
- Validity & Reliability Tests for reflective constructs
    - Internal Consistency Reliability
        - Composite Reliability (rho_a)
        - Cronbach’s alpha
    - Convergent Validity
        - AVE
        - Outer Loadings
    - Discriminant Validity
        - Fornell-Larcker
        - Cross-Loadings
        - HTMT (Heterotrait-Monotrait Ratio)

Structural Model/Path Analysis

- Predictive power
  (PLSPredict; Cross-validated predictive ability test CVPAT)
- R^2
- Effect size (f^2)
- Outer Loading
- VIF
- Path analysis, Bootstrapping
- Importance-Performance Map Analysis (IPMA)
- Mediation effect
- Moderation effect

CHAPTER 6

RESULTS

6.1 Measurement Model Results

Before analyzing the structural model, validity and reliability analyses of the measurement model in the research were conducted. Since there are both reflective and formative constructs, the validity and reliability analysis of the formative construct was performed first, followed by the validity and reliability analysis of the reflective constructs.

6.1.1 Identification of Constructs as Reflective or Formative

In Structural Equation Modeling (SEM)-Partial Least Squares (PLS) constructs are categorized as reflective or formative. Both reflective and formative constructs are considered latent variables. For reflective constructs, multiple indicators point to the construct, implying that they reflect the same underlying construct. In other words, these indicators are assumed to measure the identical underlying construct. Changes in the indicators are reflected in changes in the construct. Reflective indicators stem from a shared cause and exhibit strong correlations with each other, making them interchangeable (Kono et al., 2021). Therefore, removing a single from reflective constructs does not substantially change the targeted measurement of the construct, in contrast to formative constructs.

Formative constructs, also called composite measures, are defined by several indicators that are assumed to cause or shape the underlying construct instead of merely reflecting it (Diamantopoulos et al., 2008). In this approach, the construct is regarded as a linear combination of the indicators, with the weights representing the causal influence of each indicator on the construct. Formative constructs are better suited when the indicators are conceptually distinct and are presumed to cause or form the underlying construct.

The model applied in the study includes both reflective and formative constructs. The choice between reflective and formative constructs depends on the theoretical and empirical considerations of the study (Diamantopoulos & Winklhofer, 2001). Each construct was individually evaluated to determine whether it should be included in the model.

Furthermore, to determine whether it is formative or reflective both theoretically and empirically, Confirmatory Tetrad Analysis (CTA) is a statistical technique used in Structural Equation Modeling (SEM) to test and confirm the constructs' nature as reflective or formative (Hair et al., 2019). In CTA, a tetrad is a set of four items. CTA was used to test and confirm both formative and reflective constructs in the study. Interpreting the CTA results in this study, it was determined that only social acceptance was defined as a formative construct, while the others were reflective.

6.1.2 Validity and Reliability of Formative Construct

Collinearity Statistics Outer VIF (Variance Inflation Factor) values were calculated via SmartPLS of the social acceptance construct. It was observed that the values are below the threshold value of 5 (Hair et al., 2017), indicating that the first rule for validity was satisfied. The second rule for validity involves checking the outer weights of the indicators to determine whether there is an indicator with p-values greater than 0.05 (Yıldız, 2021); then, it was identified that the second rule for validity was satisfied.

6.1.3 Validity and Reliability of Reflective Constructs

An assessment was conducted for internal consistency, reliability, convergent validity, and discriminant validity to validate and ensure the reliability of reflective constructs. Internal consistency reliability was evaluated through Cronbach's alpha and composite reliability coefficients. Factor loadings and average variance extracted (AVE) values were used to determine convergent validity. Factor loadings are expected to be ≥0.40; Cronbach's Alphas are expected to be ≥0.60 and composite reliability (CR) coefficients are expected to be ≥0.70; and average variance extracted (AVE) is expected to be ≥0.50 (Hair et al., 2006; Hair et al., 2017; Fornell & Larcker, 1981). The outcomes of the analysis, presented in Table 6.1, demonstratethe internal consistency reliability and convergent validity results for the constructs in the study.

The Cronbach's Alpha coefficients of the constructs ranged from 0.656 to 0.888, and the CR coefficients ranged from 0,823 to 0,911, indicating the achievement of internal consistency reliability.

Upon analyzing the values in Table 6.1, it is evident that the factor loadings were between 0.589 and 1.0. Hair et al. (2017) suggest that factor loadings should be ≥0.708. The authors recommend excluding statements with factor loadings between 0.40 and 0.70 from the model if their AVE or CR values fall below the threshold value. After comparing the AVE and CR values with the threshold values, factor loadings below 0.708 were not excluded from the measurement model. Given that the factor loadings of the constructs were between 0.589 and 1.0 and AVE values ranged from 0.526 to 0.749, it can be concluded that convergent validity was successfully established.

In determining discriminant validity, the criteria proposed by Fornell and Larcker (1981) and the HTMT criteria (Table 6.4) proposed by Henseler et al. (2015) were used. Cross-loadings were also checked (refer to Table 6.3). According to Fornell and Larcker (1981) criterion, the square root of the AVE values of the constructs in the study should be higher than the correlations between the constructs in the study. The analysis results based on the Fornell and Larcker (1981) criterion are presented in Table 6.2.

When the values in Table 6.2 are analyzed, it is seen that the square root of the AVE for each construct is higher than the correlations with other constructs.

As per to the criterion by Henseler et al. (2015), HTMT (Heterotrait-Monotrait Ratio) represents the ratio of the mean of the correlations of the statements belonging to all variables in the research (the heterotrait-heteromethod correlations) to the geometric mean correlations of the statements belonging to the same variable (the monotrait-heteromethod correlations) (Henseler et al., 2015)). The authors suggest that the HTMT value should be below 0.90 and even lower (below 0.85) for concepts that significantly differ in content (Doğan, 2019).

When the values in the table are analyzed, it is seen that the HTMT values are below the threshold value (Table 6.4). Based on the findings in Tables 6.2, 6.3, and 6.4, it can be stated that discriminant validity has been achieved.

Table 6.1 Results of internal consistency reliability and convergent validity analysis

Construct	**Indicator**	**Factor Loading**	**Cronbach's Alfa**	**CR**	**AVE**
Experience (EXP)	E1	1			
	K1	0.734			
Knowledge (KNW)	K2	0.805	0.681	0.824	0.610
	K4	0.801			
Procedural Fairness (PF)	PF1	1			
	T5	0.754			
Trust- environmental&social cons.(T)	T6	0.782	0.693	0.830	0.620
	T7	0.826			
	T2	0.772	0.666	0.819	0.602
Trust- reliability & safety (T)	T3	0.847			
	T4	0.701			
	T1	0.597			
	T8	0.726			
Trust-Transparency&responsibility (T)	T9	0.665	0.771	0.846	0.526
	T10	0.791			
	T11	0.824			
Distributional Fairness (DF)	DF2	1			
Outcome Efficacy (OE)	OE2	1			

Table 6.1 Results of internal consistency reliability and convergent validity analysis (Cont'd)

Construct	Indicator	Factor Loading	Cronbach's Alfa	CR	AVE
Positive Affect (PA)	AFF1	1			
Negative Affect (NA)	AFF2	1			
Perceived Costs (PC)	C1	1			
Perceived Risks (PR)	R1	0.747	0.656	0.811	0.589
	R2	0.798			
	R3	0.756			
Perceived Benefits (PB)	PB1	0.589	0.773	0.847	0.529
	PB2	0.687			
	PB3	0.802			
	PB4	0.790			
	PB5	0.748			
Attitude (ATTD)	ATTD2	1			
Perceived Behavioral Control (PBC)	PBC1	1			
Personal Norm (PN)	PN1	0.813	0.670	0.815	0.598
	PN2	0.844			
	PN3	0.648			
Problem Perception (ProbPerc)	PP1	0.667	0.709	0.821	0.535
	PP2	0.812			
	PP4	0.721			
	PP6	0.719			
Social Norm (SN)	SN1	0.820	0.740	0.852	0.658
	SN2	0.851			
	SN3	0.760			
Intention to Accept (I-t-A)	I-t-A1	0.817	0.888	0.923	0.749
	I-t-A2	0.861			
	I-t-A3	0.891			
	I-t-A4	0.891			

Table 6.2 Discriminant Validity - Fornell ve Larckell Criterion

	ATTD	DF	EXP	I-t-A	KNW	NA	OE	PA	PB	PBC	PC	PF	PN	PR	PR PER	SN	Trst - Reliab. &Safety	Trst - Trans & Resp.	Trust - Env. & Soc.
Attitude (ATTD)	1.000																		
Distributive Fairness (DF)	0.122	1.000																	
Experience (EXP)	0.037	-0.080	1.000																
Intention to Accept (I-t-A)	0.518	0.045	0.035	0.866															
Knowledge (KNW)	0.004	0.016	0.316	0.065	0.781														
Negative Affect (NA)	0.099	0.167	0.019	-0.038	0.096	1.000													
Outcome Efficacy (OE)	0.045	0.130	0.112	0.146	0.232	0.004	1.000												
Positive Affect (PA)	0.241	0.229	0.064	0.174	0.179	0.181	0.191	1.000											
Perceived Benefits (PB)	0.350	0.209	0.079	0.506	0.176	0.069	0.328	0.291	0.727										
Perceived Behavioral Control (PBC)	0.353	0.081	-0.041	0.385	0.058	0.070	0.008	0.045	0.300	1.000									
Perceived Costs (PC)	0.007	0.147	0.087	-0.070	0.310	0.263	0.152	0.207	0.179	0.023	1.000								
Procedural Fairness (PF)	0.039	0.073	0.197	-0.017	0.340	0.062	0.222	0.035	0.110	-0.062	0.133	1.000							
Personal Norm (PN)	0.487	0.061	0.072	0.608	0.023	-0.002	0.125	0.181	0.518	0.414	-0.009	0.029	0.773						
Perceived Risks (PR)	0.020	0.306	0.117	0.026	0.233	0.093	0.292	0.217	0.345	0.033	0.293	0.174	0.071	0.767					
Problem Perception (ProbPerc)	0.340	0.103	0.057	0.424	0.003	-0.051	0.110	0.121	0.282	0.244	-0.091	-0.067	0.447	0.044	0.732				
Social Norm (SN)	0.446	0.032	0.058	0.616	0.059	-0.078	0.203	0.258	0.598	0.376	0.033	-0.007	0.643	0.152	0.403	0.811			
Trst - Reliab. &Safety	0.084	0.202	0.128	0.122	0.339	0.090	0.340	0.225	0.417	0.054	0.305	0.261	0.112	0.421	0.074	0.187	0.776		
Trst - Trans & Resp.	0.099	0.287	0.114	0.015	0.283	0.187	0.256	0.335	0.282	-0.019	0.334	0.253	0.014	0.474	-0.042	0.084	0.463	0.725	
Trust - Env. & Soc.	-0.016	0.197	0.073	-0.032	0.294	0.269	0.140	0.196	0.224	-0.032	0.365	0.249	-0.007	0.372	-0.107	0.067	0.391	0.571	0.788

Table 6.3 Discriminant validity - Cross-loadings

	ATTD	DF	EXP	I-t-A	KNW	NA	OE	PA	PB	PBC	PC	PF	PN	PR	PR PER	SN	Social Acceptance	Trst - Reliab. &Safety	Trst - Trans & Resp.	Trust - Env. & Soc.
A1	0.213	0.018	0.053	0.234	0.094	0.140	0.101	0.066	0.163	0.173	0.045	0.073	0.197	0.085	0.104	0.078	0.390	0.069	0.067	0.105
A2	0.309	0.075	0.064	0.571	0.057	-0.060	0.107	0.047	0.377	0.227	-0.050	0.011	0.461	0.057	0.363	0.450	0.954	0.063	0.024	-0.007
A3	0.165	0.122	0.129	0.152	0.124	0.083	0.101	0.125	0.168	-0.043	0.119	0.115	0.147	0.140	0.037	0.134	0.254	0.233	0.251	0.268
A4	0.153	0.027	0.064	0.197	0.111	0.082	0.133	0.135	0.233	0.002	0.161	0.070	0.142	0.139	0.058	0.150	0.329	0.134	0.184	0.158
A5	0.127	0.135	0.091	0.179	0.214	0.101	0.096	0.134	0.238	-0.026	0.193	0.161	0.150	0.284	0.020	0.115	0.299	0.235	0.383	0.331
AFF1	0.241	0.229	0.064	0.174	0.179	0.181	0.191	1.000	0.291	0.045	0.207	0.035	0.181	0.217	0.121	0.258	0.086	0.225	0.335	0.196
AFF2	0.099	0.167	0.019	-0.038	0.096	1.000	0.004	0.181	0.069	0.070	0.263	0.062	-0.002	0.093	-0.051	-0.078	-0.006	0.090	0.187	0.269
ATTD 2	1.000	0.122	0.037	0.518	0.004	0.099	0.045	0.241	0.350	0.353	0.007	0.039	0.487	0.020	0.340	0.446	0.349	0.084	0.099	-0.016
B1	0.160	0.152	0.016	0.187	0.129	0.067	0.197	0.203	0.589	0.148	0.149	0.149	0.212	0.335	0.130	0.281	0.212	0.333	0.269	0.173
B2	0.351	0.099	0.040	0.394	0.084	0.012	0.263	0.184	0.687	0.294	0.078	-0.009	0.430	0.175	0.239	0.508	0.361	0.188	0.119	0.087
B3	0.233	0.204	0.043	0.408	0.167	0.032	0.240	0.195	0.802	0.208	0.132	0.066	0.427	0.267	0.210	0.465	0.364	0.354	0.198	0.171
B4	0.223	0.202	0.132	0.403	0.185	0.101	0.279	0.246	0.790	0.202	0.164	0.135	0.392	0.312	0.184	0.412	0.248	0.344	0.248	0.225
B5	0.305	0.098	0.045	0.423	0.068	0.036	0.211	0.228	0.748	0.239	0.129	0.059	0.406	0.175	0.258	0.498	0.352	0.294	0.195	0.153
C1	0.007	0.147	0.087	-0.070	0.310	0.263	0.152	0.207	0.179	0.023	1.000	0.133	-0.009	0.293	-0.091	0.033	0.007	0.305	0.334	0.365
DF2	0.122	1.000	-0.080	0.045	0.016	0.167	0.130	0.229	0.209	0.081	0.147	0.073	0.061	0.306	0.103	0.032	0.100	0.202	0.287	0.197
E1	0.037	-0.080	1.000	0.035	0.316	0.019	0.112	0.064	0.079	-0.041	0.087	0.197	0.072	0.117	0.057	0.058	0.089	0.128	0.114	0.073
I-t-A1	0.431	0.072	0.007	0.817	0.102	-0.042	0.146	0.140	0.484	0.303	-0.020	-0.033	0.515	0.061	0.394	0.492	0.522	0.163	0.026	-0.006
I-t-A2	0.420	0.000	0.029	0.861	0.034	-0.024	0.119	0.146	0.418	0.339	-0.062	-0.022	0.493	0.050	0.343	0.541	0.507	0.106	-0.001	-0.068
I-t-A3	0.504	0.061	0.051	0.891	0.032	-0.053	0.097	0.167	0.429	0.382	-0.078	0.020	0.585	-0.023	0.371	0.542	0.497	0.059	-0.004	-0.044
I-t-A4	0.435	0.023	0.031	0.891	0.062	-0.013	0.147	0.148	0.424	0.304	-0.081	-0.027	0.511	0.007	0.362	0.557	0.549	0.100	0.033	0.010
K1	0.030	-0.025	0.200	0.099	0.734	0.009	0.160	0.134	0.141	0.041	0.233	0.251	0.107	0.162	0.051	0.095	0.123	0.226	0.211	0.238
K2	-0.009	0.060	0.294	0.040	0.805	0.099	0.196	0.124	0.117	0.046	0.270	0.202	-0.027	0.212	-0.017	0.016	0.082	0.305	0.233	0.252
K4	-0.009	-0.008	0.235	0.018	0.801	0.112	0.185	0.166	0.158	0.048	0.218	0.357	-0.014	0.167	-0.021	0.036	0.067	0.255	0.218	0.195

Table 6.3.Discriminant validity - Cross-loadings (Cont’d)

	ATTD	DF	EXP	I-t-A	KNW	NA	OE	PA	PB	PBC	PC	PF	PN	PR	PR PER	SN	Social Acceptance	Trst - Reliab. &Safety	Trst - Trans & Resp.	Trust - Env. & Soc.
OE2	0.045	0.130	0.112	0.146	0.232	0.004	1.000	0.191	0.328	0.008	0.152	0.222	0.125	0.292	0.110	0.203	0.138	0.340	0.256	0.140
PBC1	0.353	0.081	-0.041	0.385	0.058	0.070	0.008	0.045	0.300	1.000	0.023	-0.062	0.414	0.033	0.244	0.376	0.230	0.054	-0.019	-0.032
PF1	0.039	0.073	0.197	-0.017	0.340	0.062	0.222	0.035	0.110	-0.062	0.133	1.000	0.029	0.174	-0.067	-0.007	0.058	0.261	0.253	0.249
PN1	0.402	0.121	0.059	0.504	0.000	-0.047	0.159	0.223	0.476	0.317	0.019	0.028	0.813	0.156	0.293	0.519	0.359	0.190	0.086	0.075
PN2	0.398	0.052	0.069	0.533	0.037	0.007	0.053	0.147	0.434	0.370	-0.016	-0.005	0.844	0.029	0.476	0.581	0.453	0.039	-0.023	-0.052
PN3	0.328	-0.084	0.032	0.343	0.014	0.062	0.076	-0.003	0.248	0.267	-0.035	0.067	0.648	-0.067	0.232	0.355	0.299	0.003	-0.058	-0.060
PP1	0.220	0.118	0.003	0.324	0.003	-0.032	0.074	0.118	0.169	0.152	0.007	-0.105	0.268	0.053	0.667	0.259	0.171	0.001	-0.031	-0.109
PP2	0.247	0.086	0.060	0.321	0.025	-0.061	0.074	0.078	0.205	0.186	-0.100	-0.040	0.359	-0.001	0.812	0.273	0.293	0.036	-0.077	-0.132
PP4	0.236	0.089	0.033	0.315	-0.034	-0.107	0.130	0.102	0.225	0.191	-0.080	0.003	0.306	0.047	0.721	0.306	0.281	0.130	0.067	-0.042
PP6	0.286	0.017	0.062	0.289	0.013	0.047	0.046	0.064	0.221	0.182	-0.078	-0.065	0.365	0.036	0.719	0.338	0.267	0.042	-0.076	-0.034
R1	0.058	0.231	0.103	0.084	0.166	0.082	0.235	0.227	0.343	0.084	0.231	0.124	0.125	0.747	0.035	0.167	0.057	0.311	0.274	0.191
R2	0.015	0.269	0.063	-0.019	0.247	0.103	0.228	0.141	0.201	-0.007	0.226	0.144	-0.015	0.798	0.053	0.073	0.103	0.361	0.460	0.370
R3	-0.027	0.197	0.113	0.008	0.104	0.020	0.211	0.141	0.276	0.011	0.218	0.132	0.078	0.756	0.007	0.126	0.132	0.287	0.330	0.271
SN1	0.313	0.062	0.017	0.440	0.047	-0.094	0.166	0.209	0.521	0.261	0.057	-0.014	0.477	0.141	0.243	0.820	0.332	0.163	0.114	0.098
SN2	0.340	-0.002	0.082	0.503	0.067	-0.032	0.163	0.221	0.473	0.339	0.032	-0.014	0.500	0.128	0.328	0.851	0.401	0.175	0.021	0.063
SN3	0.419	0.023	0.038	0.541	0.032	-0.067	0.163	0.196	0.463	0.307	-0.003	0.009	0.573	0.103	0.391	0.760	0.350	0.119	0.074	0.010
T1	0.013	0.116	0.073	-0.084	0.235	0.083	0.252	0.168	0.132	-0.074	0.194	0.223	-0.038	0.233	-0.035	0.014	0.033	0.427	0.597	0.380
T10	0.089	0.197	0.088	0.067	0.152	0.141	0.157	0.255	0.211	0.026	0.215	0.190	0.065	0.372	-0.046	0.100	0.135	0.287	0.791	0.347
T11	0.155	0.267	0.148	0.144	0.229	0.140	0.199	0.341	0.333	0.081	0.278	0.191	0.114	0.420	0.017	0.174	0.147	0.379	0.824	0.406
T2	0.143	0.148	0.073	0.161	0.168	-0.002	0.287	0.145	0.407	0.096	0.127	0.204	0.169	0.252	0.122	0.228	0.109	0.772	0.273	0.175
T3	0.095	0.165	0.044	0.145	0.238	0.108	0.293	0.212	0.378	0.055	0.328	0.187	0.143	0.314	0.060	0.181	0.095	0.847	0.290	0.232
T4	-0.031	0.156	0.179	-0.014	0.368	0.089	0.212	0.160	0.196	-0.018	0.233	0.218	-0.041	0.401	0.001	0.037	0.084	0.701	0.503	0.485
T5	0.020	0.258	0.005	-0.012	0.185	0.265	0.097	0.137	0.197	-0.034	0.287	0.148	0.037	0.275	-0.009	0.096	0.047	0.331	0.438	0.754
T6	-0.047	0.078	0.030	-0.050	0.251	0.205	0.120	0.140	0.162	-0.025	0.291	0.187	-0.045	0.264	-0.163	0.015	0.060	0.256	0.423	0.782
T7	-0.011	0.134	0.129	-0.014	0.257	0.171	0.113	0.183	0.171	-0.016	0.286	0.249	-0.008	0.337	-0.079	0.048	0.095	0.335	0.486	0.826
T8	0.030	0.224	0.063	-0.067	0.194	0.144	0.191	0.234	0.173	-0.047	0.233	0.145	-0.058	0.386	-0.032	-0.001	0.055	0.379	0.726	0.478
T9	0.040	0.211	0.021	-0.064	0.229	0.166	0.145	0.184	0.129	-0.097	0.288	0.181	-0.075	0.277	-0.074	-0.024	0.029	0.219	0.665	0.479

Table 6.4 Discriminant validity – HTMT ratio matrix

	ATTD	DF	EXP	I-t-A	KNW	NA	OE	PA	PB	PBC	PC	PF	PN	PR	PR PER	SN	Trust 1*	Trust2**	Trust 3***
Attitude																			
Distributional fairness	0.122																		
Experience	0.037	0.080																	
Intention to accept	0.549	0.048	0.036																
Knowledge	0.025	0.048	0.377	0.089															
Negat. affect	0.099	0.167	0.019	0.040	0.113														
Outcome efficacy	0.045	0.130	0.112	0.156	0.280	0.004													
Positive affect	0.241	0.229	0.064	0.184	0.219	0.181	0.191												
Perceived benefits	0.400	0.237	0.087	0.606	0.244	0.078	0.374	0.332											
Perceived behavioral c.	0.353	0.081	0.041	0.407	0.070	0.070	0.008	0.045	0.343										
Perceived costs	0.007	0.147	0.087	0.074	0.373	0.263	0.152	0.207	0.204	0.023									
Procedural fairness	0.039	0.073	0.197	0.031	0.419	0.062	0.222	0.035	0.131	0.062	0.133								
Personal norm	0.592	0.135	0.084	0.768	0.110	0.061	0.151	0.196	0.686	0.500	0.037	0.052							
Perceived risk	0.054	0.373	0.149	0.078	0.332	0.110	0.360	0.273	0.503	0.055	0.361	0.214	0.191						
Prob. Percep.	0.402	0.127	0.064	0.539	0.059	0.100	0.132	0.147	0.378	0.289	0.108	0.086	0.618	0.089					
Social norm	0.512	0.042	0.066	0.752	0.095	0.092	0.235	0.299	0.791	0.433	0.044	0.018	0.879	0.229	0.545				
Trust 1*	0.142	0.247	0.157	0.200	0.489	0.105	0.417	0.273	0.588	0.089	0.362	0.321	0.235	0.622	0.135	0.275			
Trust 2**	0.103	0.320	0.124	0.142	0.395	0.212	0.297	0.372	0.354	0.103	0.381	0.293	0.174	0.638	0.126	0.147	0.648		
Trust 3***	0.040	0.239	0.083	0.063	0.424	0.326	0.168	0.234	0.306	0.038	0.440	0.297	0.120	0.532	0.168	0.123	0.564	0.790	

* Reliability & Safety **Transparency & Responsibility ***Environmental & Social Consideration

6.2 Structural Model Results

SmartPLS 4.0 (version 4.0.9) offers an application that includes a cross-validated predictive ability test (CVPAT) to calculate the model's predictive power. The PLSPredict tool (Shmueli et al., 2019), along with CVPAT (Sharma et al., 2022), facilitates the process and provides guidelines for interpreting the results, as explained by Shmueli et al. (2019). The fact that the coefficients of predictive power (Q^2) calculated for endogenous variables are greater than zero indicates that the research model can predict endogenous variables (Hair et al. 2017). The Q^2 values in the table are greater than zero, which is deemed acceptable. Taking into account the Q^2 and PLSPredict results, it can be confidently stated that the research model holds predictive power (Shmueli et al., 2019).

Partial Least Squares Path Analysis (PLS-SEM) was used to analyze the research model. The data were processed through the SmartPLS 4.0 statistical program (Ringle et al., 2022). The PLS algorithm was executed to calculate linearity, path coefficients, R^2, and size effect (f^2). Additionally, PLSPredict analysis was performed to ascertain the predictive power of the research model. To assess the significance of PLS path coefficients, t-values were computed via resampling (bootstrapping) of 10,000 and/or 20,000 sub-samples from the main dataset. The results of R^2, f^2, Q^2, and VIF values for the research are presented in Table 6.5.

Table 6.5 Results for Structural Model - R^2, f^2, Q^2 and VIF values

Constructs		**VIF**	**R^2**	**f^2**	**Q^2**
Experience	Knowledge	1.000	0.097	0.111	0.093
Knowledge	Trust- Environmental & Social Considerations	1.131	0.107	0.056	0.048
Procedural fairness		1.131		0.028	
Knowledge	Trust- Reliability & Safety	1.131	0.134	0.082	0.061
Procedural fairness		1.131		0.028	
Knowledge	Trust-Transparency & Responsibility	1.131	0.103	0.049	0.057
Procedural fairness		1.131		0.031	
Trust- Environmental & social considerations	Negative affect	1.569	0.075	0.040	0.016
Trust- Reliability & safety		1.369		0.001	
Trust-Transparency & responsibility		1.718		0.001	
Distributive fairness		1.113		0.015	
Procedural fairness		1.116		0.000	
Problem perception		1.046		0.001	
Trust- Reliability & safety	Perceived benefits	1.378	0.262	0.091	0.099
Problem perception		1.064		0.079	
Positive affect		1.198		0.027	
Trust-Transparency & responsibility		1.810		0.001	
Distributive fairness		1.144		0.004	
Trust- Environmental & social considerations		1.632		0.003	
Procedural fairness		1.121		0.000	
Negative affect		1.115		0.000	
Trust-Transparency & responsibility	Positive affect	1.718	0.139	0.054	0.041
Distributive fairness		1.113		0.017	
Trust- Reliability & safety		1.369		0.005	
Procedural fairness		1.116		0.004	
Trust- Environmental & social considerations		1.569		0.000	
Problem perception		1.046		0.014	
Negative affect	Perceived costs	1.115	0.199	0.030	0.024
Trust- Reliability & safety		1.378		0.025	
Trust- Environmental & social considerations		1.632		0.025	
Trust-Transparency & responsibility		1.810		0.006	
Problem perception		1.064		0.008	
Positive affect		1.198		0.007	

Table 6.5 Results for Structural Model - R^2, f^2, Q^2 and VIF values (Cont'd)

Constructs		**VIF**	**R^2**	**f^2**	**Q^2**
Procedural fairness		1.121		0.000	
Distributive fairness		1.144		0.000	
Trust-Transparency & responsibility	Perceived risks	1.810	0.297	0.055	0,094
Trust- Reliability & safety		1.378		0.048	
Distributive fairness		1.144		0.033	
Trust- Environmental & social considerations		1.632		0.011	
Negative affect		1.115		0.002	
Problem perception		1.064		0.001	
Positive affect		1.198		0.001	
Procedural fairness		1.121		0.000	
Perceived benefits	Personal norm	1.365	0.370	0.265	0,173
Problem perception		1.137		0.147	
Perceived risks		1.333		0.009	
Distributive fairness		1.168		0.004	
Positive affect		1.187		0.003	
Outcome efficacy		1.224		0.003	
Perceived costs		1.215		0.002	
Procedural fairness		1.084		0.002	
Negative affect		1.117		0.000	
Perceived benefits	Attitude	1.365	0.162	0.131	0,053
Positive affect		1.183		0.028	
Perceived risks		1.331		0.015	
Perceived costs		1.194		0.006	
Outcome efficacy		1.221		0.006	
Negative affect		1.115		0.005	
Distributive fairness		1.162		0.003	
Procedural fairness		1.076		0.001	
Social norm	Intention to accept	1.796	0.495	0.116	0,365
Personal norm		1.928		0.070	
Attitude		1.403		0.069	
Perceived behavioral control		1.273		0.009	
Intention to accept	Acceptance	1.000	0.357	0.560	0,175

f^2	**< 0,02**	**no effect**	**0,02 – 0,15**	**Low**	**0,15 – 0,35**	**Medium**	**> 0,35**	**High**

When the VIF (Variance Inflation Factor) values between the variables were analyzed, it was understood that there was no linearity problem between the variables since the values were below the threshold value of 5 (Hair et al., 2017).

When the R^2 values obtained from the model were examined, it was found that the variance in knowledge was explained by 9.7%, trust-environmental & social considerations by 10.7%, trust-reliability & safety by 13.4%, trust-transparency & responsibility by 10.3%, negative affect was by 7.5%, perceived risks by 29.7%, perceived benefits by 26.2%, perceived costs by 19.9%, positive affect by 13.9%, personal norm by 37.0%, attitude by 16.2%, intention to accept by 49.5% and acceptance by 35.7%.

An effect size coefficient (f^2) of 0.02 and above is considered low, 0.15 and above is considered medium, and 0.35 and above is considered high (Cohen, 1988). Sarstedt et al. (2017) state that coefficients below 0.02 do not indicate a significant effect. When the effect size coefficients (f^2) of the model were analyzed, it was observed that the intention-to-accept to social acceptance has a high effect size. The perceived benefits and problem perception on personal norm has a medium effect size. Additionally, attitude to intention to accept, distributional fairness to perceived risks, experience to knowledge, knowledge and procedural fairness to trust (all pillars), negative affect to perceived costs, positive affect to attitude and perceived benefits, perceived benefits to attitude, the personal norm to intention to accept, problem perception to the personal norm and perceived benefits, the social norm to intention to accept, trust-reliability & safety to perceived benefits, costs and risks, trust-transparency & responsibility to perceived risks and positive affect, trust-environmental & social considerations to perceived risks and negative affect have low effect sizes, and the rest has no effect.

Table 6.6 Structural Model Direct Effect Coefficients

Independent Variable	Dependent Variable	Standardize β	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Hypothesis Supported
Experience	Knowledge	0.316	0.317	0.052	6.090	0.000	Yes
Knowledge	Trust- Environmental & Social Considerations	0.236	0.240	0.050	4.721	0.000	Yes
Procedural fairness		0.168	0.167	0.054	3.128	0.002	Yes
Knowledge	Trust- Reliability & Safety	0.282	0.285	0.047	6.008	0.000	Yes
Procedural fairness		0.165	0.164	0.051	3.207	0.001	Yes
Knowledge	Trust-Transparency& Responsibility	0.223	0.226	0.049	4.553	0.000	Yes
Procedural fairness		0.176	0.175	0.053	3.335	0.001	Yes
Trust- Environmental & social cons.	Negative affect	0.240	0.240	0.063	3.823	0.000	Yes
Trust- Reliability & safety		-0.039	-0.039	0.059	0.662	0.508	No
Trust-Transparency & responsibility		0.033	0.036	0.062	0.541	0.588	No
Distributive fairness		0.122	0.120	0.054	2.239	0.025	Yes
Procedural fairness		-0.007	-0.007	0.050	0.146	0.884	No
Problem perception		-0.034	-0.035	0.048	0.707	0.480	No
Trust- Reliability & safety	Perceived benefits	0.301	0.302	0.063	4.780	0.000	Yes
Problem perception		0.247	0.251	0.052	4.766	0.000	Yes
Positive affect		0.152	0.153	0.052	2.932	0.003	Yes
Trust-Transparency & responsibility		0.044	0.043	0.055	0.792	0.429	No
Distributive fairness		0.061	0.062	0.051	1.196	0.232	No
Trust- Environmental & social cons.		0.064	0.063	0.056	1.138	0.255	No

Table 6.6 Structural Model Direct Effect Coefficients (Cont'd)

Independent Variable	Dependent Variable	Standardize β	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Hypothesis Supported
Procedural fairness		0.006	0.005	0.048	0.114	0.909	No
Negative affect		-0.012	-0.014	0.052	0.237	0.812	No
Trust-Transparency & responsibility	Positive affect	0.279	0.281	0.063	4.470	0.000	Yes
Distributive fairness		0.125	0.124	0.053	2.339	0.019	Yes
Trust- Reliability & safety		0.075	0.075	0.056	1.333	0.183	No
Procedural fairness		-0.059	-0.059	0.050	1.174	0.240	No
Trust- Environmental & social cons.		0.009	0.008	0.059	0.149	0.882	No
Problem perception		0.111	0.111	0.046	2.422	0.015	Yes
Negative affect	Perceived costs	0.161	0.159	0.051	3.181	0.001	Yes
Trust- Reliability & safety		0.164	0.165	0.053	3.109	0.002	Yes
Trust- Environmental & social cons.		0.178	0.178	0.064	2.795	0.005	Yes
Trust-Transparency & responsibility		0.091	0.091	0.061	1.491	0.136	No
Problem perception		-0.084	-0.084	0.043	1.971	0.049	Yes
Positive affect		0.082	0.083	0.049	1.668	0.095	Yes
Procedural fairness		0.003	0.003	0.049	0.070	0.944	No
Distributive fairness		0.015	0.015	0.050	0.301	0.763	No
Trust-Transparency & responsibility	Perceived risks	0.262	0.264	0.066	4.001	0.000	Yes
Trust- Reliability & safety		0.214	0.216	0.055	3.911	0.000	Yes
Distributive fairness		0.162	0.161	0.044	3.709	0.000	Yes

Table 6.6 Structural Model Direct Effect Coefficients (Cont'd)

Independent Variable	**Dependent Variable**	**Standardize β**	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**	**Hypothesis Supported**
Trust- Environmental & Social Cons.		0.111	0.111	0.063	1.766	0.077	Yes
Negative affect		-0.036	-0.037	0.045	0.793	0.428	No
Problem perception		0.030	0.031	0.039	0.772	0.440	No
Positive affect		0.024	0.023	0.046	0.512	0.609	No
Procedural fairness		0.016	0.017	0.049	0.333	0.739	No
Perceived benefits	Personal norm	0.472	0.473	0.050	9.425	0.000	Yes
Problem perception	Personal norm	0.320	0.323	0.055	5.826	0.000	Yes
Perceived risks	Personal norm	-0.084	-0.084	0.049	1.724	0.085	Yes
Distributive fairness	Personal norm	-0.050	-0.050	0.048	1.049	0.294	No
Positive affect	Personal norm	0.045	0.045	0.048	0.955	0.340	No
Outcome efficacy	Personal norm	-0.047	-0.046	0.043	1.094	0.274	No
Perceived costs	Personal norm	-0.040	-0.039	0.039	1.038	0.299	No
Procedural fairness	Personal norm	0.035	0.035	0.042	0.848	0.396	No
Negative affect	Personal norm	0.003	0.003	0.044	0.075	0.940	No
Perceived benefits	Attitude	0.369	0.372	0.055	6.669	0.000	Yes
Positive affect	Attitude	0.165	0.163	0.055	3.002	0.003	Yes
Perceived risks	Attitude	-0.126	-0.128	0.057	2.201	0.028	Yes
Perceived costs	Attitude	-0.074	-0.071	0.050	1.472	0.141	No
Outcome efficacy	Attitude	-0.075	-0.073	0.052	1.449	0.147	No

Table 6.6 Structural Model Direct Effect Coefficients (Cont'd)

Independent Variable	**Dependent Variable**	**Standardize β**	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**	**Hypothesis Supported**
Negative affect		0.065	0.065	0.052	1.245	0.213	No
Distributive fairness		0.054	0.054	0.054	1.004	0.316	No
Procedural fairness		0.036	0.035	0.049	0.739	0.460	No
Social norm	Intention to accept	0.322	0.324	0.057	5.645	0.000	Yes
Personal norm		0.260	0.262	0.072	3.620	0.000	Yes
Attitude		0.220	0.216	0.061	3.592	0.000	Yes
Perceived behavioral control		0.077	0.077	0.043	1.793	0.073	Yes
Intention to accept	Acceptance	0.599	0.605	0.045	13.267	0.000	Yes

The following results were obtained:

All path coefficients in the model and their corresponding statistical significance levels were analyzed to evaluate the hypotheses. For this purpose, the bootstrap sampling method was used to analyze the hypothesis. A bootstrap procedure was applied using 10,000/20,000 samples. During the bootstrapping process, both direct and indirect effects were calculated. The direct effects are presented in Table 6.6, while the indirect effects are displayed in Table 6.7. By calculating the indirect effects, the mediation roles of the constructs could also be estimated.

In the study aiming to measure the social acceptance of food-waste-to-energy systems, it was found that “outcome efficacy”, “perceived costs”, and “negative affect” cannot explain the social acceptance of these systems. Most of the approved hypotheses were supported with a 99% confidence interval. Hypotheses 12d-e, 16a-b, and 19 were supported with a 95% confidence interval, and hypotheses 15d, 22, 26d, and 31c were supported with a 90% confidence interval. The statistical analysis of the structural model results in Table 6.6 indicates that some of the hypothesized relationships to explain the social acceptance of the food-waste-to-energy systems could not be confirmed. The results reveal that intention-to-accept is the strongest factor influencing the social acceptance of food-waste-to-energy systems. The figure in Appendix B shows the paths representing the statistically significant causal relationships. However, the hypothesized relationships between certain constructs that were not found to be statistically significant are not included in the figure. Table 6.7 shows the hypotheses, whether supported or not supported.

Table 6.7 Hypotheses Assessment Based on Analysis Results Analysis

Hypothesis No	Expression	Supported
Hypothesis 1	If there is more experience related to food-waste-to-energy systems, society will become more knowledgeable about the technology. Therefore, there is a positive causal relationship between experience and knowledge.	YES
Hypothesis 2a	Knowledge increases trust in actors, procedures, etc. Therefore, a positive causal relationship exists between knowledge and Trust- Environmental & social considerations.	YES
Hypothesis 2b	Knowledge increases trust in actors, procedures, etc. Therefore, knowledge and Trust- Reliability & safety have a positive causal relationship.	YES
Hypothesis 2c	Knowledge increases trust in actors, procedures, etc. Therefore, knowledge and trust-transparency & responsibility have a positive causal relationship.	YES
Hypothesis 3a	There is a positive relationship between trust-environmental & social considerations and perceived benefits.	NO
Hypothesis 3b	A positive relationship exists between trust- reliability & safety, and perceived benefits.	YES
Hypothesis 3c	There is a positive relationship between trust-transparency & responsibility and perceived benefits.	NO
Hypothesis 4a	There is a negative relationship between trust-environmental & social considerations and perceived risks.	YES
Hypothesis 4b	A negative relationship exists between trust- reliability & safety, and perceived risks.	YES
Hypothesis 4c	There is a negative relationship between trust-transparency & responsibility, and perceived risks.	YES
Hypothesis 5a	There is a negative relationship between trust-environmental & social considerations and perceived costs.	NO
Hypothesis 5b	There is a negative relationship between trust-reliability & safety and perceived costs.	NO
Hypothesis 5c	There is a negative relationship between trust-transparency & responsibility and perceived costs.	NO
Hypothesis 6a	Trust- Environmental & social considerations have a direct impact on positive affect.	NO
Hypothesis 6b	Trust- reliability & safety has a direct impact on positive affect.	NO
Hypothesis 6c	Trust-transparency & responsibility has a direct impact on positive affect.	YES
Hypothesis 7a	Trust- Environmental & social considerations have an adverse impact on negative affect.	NO
Hypothesis 7b	Trust-reliability & safety has an adverse impact on negative affect.	NO
Hypothesis 7c	Trust-transparency & responsibility has an adverse impact on negative affect.	NO
Hypothesis 8a	Perceived fairness in the decision process positively affects trust-environmental & social considerations.	YES
Hypothesis 8b	Perceived fairness in the decision process positively affects trust-reliability & safety.	YES
Hypothesis 8c	Perceived fairness of the decision process positively affects trust-transparency & responsibility.	YES
Hypothesis 9	Distributive fairness of the process has a positive effect on attitudes	NO
Hypothesis 10	Perceived fairness in the decision process has a positive effect on personal norms.	NO
Hypothesis 11	If the belief that one's views are influential in shaping policies related to waste-to-energy production is dominant, the attitude toward the acceptance of the food-waste-to-energy systems will increase.	NO

Table 6.7 Hypothesis Assessment Based on Analysis Results Analysis (Cont'd)

Hypothesis No	**Expression**	**Supported**
Hypothesis 12a	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, the tendency to support energy from food waste will increase.	YES
Hypothesis 12b	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, perceived benefits will increase.	YES
Hypothesis 12c	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, perceived risk will decrease.	NO
Hypothesis 12d	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, perceived costs will decrease.	NO
Hypothesis 12e	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, positive affect will increase.	YES
Hypothesis 12f	As long as global warming is perceived as a threat and energy supply is perceived as a constraint, negative affect will decrease.	NO
Hypothesis 13	The lower the perceived costs associated with food-waste-to-energy systems, the more likely individuals are to develop a personal norm that supports the social acceptance of these systems.	NO
Hypothesis 14a	Positive affects influence attitudes.	YES
Hypothesis 14b	Negative affects influence attitudes.	NO
Hypothesis 15a	The greater the perceived benefits associated with food-waste-to-energy systems, the more likely individuals are to develop a personal norm that supports the social acceptance of these systems.	YES
Hypothesis 15b	Positive affects influence personal norms.	NO
Hypothesis 15c	Negative affects influence personal norms.	NO
Hypothesis 15d	The lesser the perceived risks associated with food-waste-to-energy systems, the more likely individuals are to develop a personal norm that supports the social acceptance of these systems.	YES
Hypothesis 16a	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences positive affect.	YES
Hypothesis 16b	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences negative affect.	NO
Hypothesis 16c	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences perceived costs.	NO
Hypothesis 16d	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences perceived risks.	YES
Hypothesis 16e	The distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences perceived benefits.	NO
Hypothesis 17	The perceived distributive fairness of the sharing of benefits and disadvantages of food-waste-to-energy systems significantly influences individuals' norms related to the systems.	NO
Hypothesis 18	A higher cost perception leads to a decrease in attitudes towards waste-to-energy systems.	NO
Hypothesis 19	A higher risk perception leads to a decrease in attitudes towards waste-to-energy systems.	YES
Hypothesis 20	A higher perception of benefits leads to increased attitudes towards food waste-to-energy systems.	YES
Hypothesis 21	If an individual perceives that their social network approves of accepting waste-to-energy, they have a greater intention to accept it.	YES

Table 6.7 Hypothesis Assessment Based on Analysis Results Analysis (Cont'd)

Hypothesis No	Expression	Supported
Hypothesis 22	The perceived difficulty of preventing climate change will affect the intention to accept food waste-to-energy systems.	YES
Hypothesis 23	Having an attitude about energy production positively influences the intention to accept.	YES
Hypothesis 24	If an individual perceives that accepting food waste-to-energy systems aligns with their personal norms and values, they have a positive attitude toward that behavior and a greater intention to engage.	YES
Hypothesis 25	Intention to accept has a positive effect on acceptance.	YES
Hypothesis 26a	Negative affects influence on perceived costs.	NO
Hypothesis 26b	Negative affects influence on perceived risks.	NO
Hypothesis 26c	Negative affects influence on perceived benefits.	NO
Hypothesis 26d	Positive affects influence on perceived costs.	NO
Hypothesis 26e	Positive affects influence on perceived risks.	NO
Hypothesis 26f	Positive affects influence on perceived benefits.	YES
Hypothesis 27a	If the belief that one's views are influential in shaping policies related to waste-to-energy production is dominant, the personal norms toward the acceptance of the technology will increase.	NO
Hypothesis 27b	If the belief that one's views are influential in shaping policies related to waste-to-energy production is dominant, the attitude toward the acceptance of the technology will increase.	NO
Hypothesis 28a	Perceived fairness of the decision process decreases the negative affect.	NO
Hypothesis 28b	Perceived fairness in the decision process increases the positive affect.	NO
Hypothesis 28c	Perceived fairness in the decision process has a positive effect on perceived benefits.	NO
Hypothesis 28d	Perceived fairness in the decision process has a negative effect on perceived risks.	NO
Hypothesis 28e	Perceived fairness of the decision process has a negative effect on perceived cost.	NO
Hypothesis 29a	Trust-environmental & social considerations mediate the relationship between procedural fairness and positive affect.	NO
Hypothesis 29b	Trust-reliability & safety mediates the relationship between procedural fairness and positive affect.	NO
Hypothesis 29c	Trust-transparency & responsibility mediates the relationship between procedural fairness and positive affect.	YES
Hypothesis 29d	Trust-environmental & social considerations mediate the relationship between procedural fairness and negative affect.	YES
Hypothesis 29e	Trust-reliability & safety mediates the relationship between procedural fairness and negative affect.	NO
Hypothesis 29f	Trust-transparency & responsibility mediates the relationship between procedural fairness and negative affect.	NO
Hypothesis 29g	Trust-environmental & social considerations mediate the relationship between procedural fairness and perceived costs.	YES
Hypothesis 29h	Trust-reliability & safety mediates the relationship between procedural fairness and perceived costs.	YES
Hypothesis 29i	Trust-transparency & responsibility mediates the relationship between procedural fairness and perceived costs.	NO
Hypothesis 29j	Trust-environmental & social considerations mediate the relationship between procedural fairness and perceived risks.	NO

Table 6.7 Hypothesis Assessment Based on Analysis Results Analysis (Cont'd)

Hypothesis No	**Expression**	**Supported**
Hypothesis 29k	Trust-reliability & safety mediates the relationship between procedural fairness and perceived risks.	YES
Hypothesis 29l	Trust-transparency & responsibility mediates the relationship between procedural fairness and perceived risks.	YES
Hypothesis 29m	Trust-environmental & social considerations mediate the relationship between procedural fairness and perceived benefits.	NO
Hypothesis 29n	Trust-reliability & safety mediates the relationship between procedural fairness and perceived benefits.	YES
Hypothesis 29o	Trust-transparency & responsibility mediates the relationship between procedural fairness and perceived benefits.	NO
Hypothesis 30a	Positive affect mediates the relationship between trust-environmental & social considerations and perceived costs.	NO
Hypothesis 30b	Positive affect mediates the relationship between trust-reliability & safety and perceived costs.	NO
Hypothesis 30c	Positive affect mediates the relationship between trust-transparency & responsibility and perceived costs.	NO
Hypothesis 30d	Positive affect mediates the relationship between trust-environmental & social considerations and perceived risks.	NO
Hypothesis 30e	Positive affect mediates the relationship between trust-reliability & safety and perceived risks.	NO
Hypothesis 30f	Positive affect mediates the relationship between trust-transparency & responsibility, and perceived risks.	NO
Hypothesis 30g	Positive affect mediates the relationship between trust-environmental & social considerations and perceived benefits.	NO
Hypothesis 30h	Positive affect mediates the relationship between trust-reliability & safety and perceived benefits.	NO
Hypothesis 30i	Positive affect mediates the relationship between trust-transparency & responsibility, and perceived benefits.	YES
Hypothesis 30j	Negative affect mediates the relationship between trust-environmental & social considerations and perceived costs.	YES
Hypothesis 30k	Negative affect mediates the relationship between trust-reliability & safety and perceived costs.	NO
Hypothesis 30l	Negative affect mediates the relationship between trust-transparency & responsibility, and perceived costs.	NO
Hypothesis 30m	Negative affect mediates the relationship between trust-environmental & social considerations and perceived risks.	NO
Hypothesis 30n	Negative affect mediates the relationship between trust-reliability & safety and perceived risks.	NO
Hypothesis 30o	Negative affect mediates the relationship between trust-transparency & responsibility and perceived risks.	NO
Hypothesis 30p	Negative affect mediates the relationship between trust-environmental & social considerations and perceived benefits.	NO
Hypothesis 30q	Negative affect mediates the relationship between trust-reliability & safety and perceived benefits.	NO
Hypothesis 30r	Negative affect mediates the relationship between trust-transparency & responsibility, and perceived benefits.	NO
Hypothesis 31a	Positive affect mediates the relationship between problem perception and perceived costs.	NO
Hypothesis 31b	Positive affect mediates the relationship between problem perception and perceived risks.	NO
Hypothesis 31c	Positive affect mediates the relationship between problem perception and perceived benefits.	YES

Table 6.7 Hypothesis Assessment Based on Analysis Results Analysis (Cont'd)

Hypothesis No	Expression	Supported
Hypothesis 31d	Positive affect mediates the relationship between problem perception and personal norms.	NO
Hypothesis 32a	Negative affect mediates the relationship between problem perception and perceived costs.	NO
Hypothesis 32b	Negative affect mediates the relationship between problem perception and perceived risks.	NO
Hypothesis 32c	Negative affect mediates the relationship between problem perception and perceived benefits.	NO
Hypothesis 32d	Negative affect mediates the relationship between problem perception and personal norms.	NO
Hypothesis 33a	Perceived costs mediate the relationship between positive affect and attitude.	NO
Hypothesis 33b	Perceived risks mediate the relationship between positive affect and attitude.	NO
Hypothesis 33c	Perceived benefits mediate the relationship between positive affect and attitude.	YES
Hypothesis 34a	Perceived costs mediate the relationship between negative affect and attitude.	NO
Hypothesis 34b	Perceived risks mediate the relationship between negative affect and attitude.	NO
Hypothesis 34c	Perceived benefits mediate the relationship between negative affect and attitude.	NO
Hypothesis 35a	Perceived costs mediate the relationship between positive affect and personal norms.	NO
Hypothesis 35b	Perceived risks mediate the relationship between positive affect and personal norms.	NO
Hypothesis 35c	Perceived benefits mediate the relationship between positive affect and personal norms.	YES
Hypothesis 36a	Perceived costs mediate the relationship between negative affect and personal norms.	NO
Hypothesis 36b	Perceived risks mediate the relationship between negative affect and personal norms.	NO
Hypothesis 36c	Perceived benefits mediate the relationship between negative affect and personal norms.	NO
Hypothesis 37a	Positive affect mediates the relationship between distributive fairness and perceived costs.	NO
Hypothesis 37b	Positive affect mediates the relationship between distributive fairness and perceived risks.	NO
Hypothesis 37c	Positive affect mediates the relationship between distributive fairness and perceived benefits.	NO
Hypothesis 38a	Negative affect mediates the relationship between distributive fairness and perceived cost.	NO
Hypothesis 38b	Negative affect mediates the relationship between distributive fairness and perceived risks.	NO
Hypothesis 38c	Negative affect mediates the relationship between distributive fairness and perceived benefits.	NO
Hypothesis 39a	Perceived benefits mediate the relationship between problem perception and personal norms.	YES
Hypothesis 39b	Perceived cost mediates the relationship between problem perception and personal norms.	NO
Hypothesis 39c	Perceived risks mediate the relationship between problem perception and personal norms.	NO
Hypothesis 40	People living near waste treatment facilities such as Mamak and Çankaya show more social acceptance than others.	NO

6.3 Importance-Performance Map Analysis

Unlike similar studies, this study employed an Importance-Performance Map Analysis (IPMA) to extract the importance and performance graph of the models' structures. This analysis provides an additional perspective for assessing the constructs and explaining the relationships. This analysis is presented as a graph with two axes, one representing the importance of structures and the other showing their performance.

Standard PLS-SEM analyses offer insights into the relative importance of different constructs in explaining the structural model. Understanding the importance of these constructs is crucial for drawing meaningful conclusions. Furthermore, IPMA enhances the findings of PLS-SEM by considering the performance of each construct (Ringle & Sarstedt, 2016; Ringle et al., 2022). SMART-PLS also uses IPMA to evaluate the importance and performance of various factors (service quality, customer satisfaction, social acceptance, and so on). The distribution of factors across these two dimensions is crucial in prioritizing managerial actions in social acceptance studies (Ringle & Sarstedt, 2016; Teeluckdharry et al., 2022). The IPMA results in an importance-performance graph, indicating higher importance factors and those needing performance improvement. These results provide valuable guidance to decision-makers, directing their resource allocation effectively. The performance of structures that are important in explaining social acceptance and have a relatively low performance can be determined. Therefore, IPMA was carried out for all survey participants and separately based on their education levels to enhance result interpretation.

As illustrated in Figure 6.1, within the construct level of the complete model, no constructs directly fell within the priority quadrant (lower left quadrant). Constructs like problem perception, intention to accept, personal and social norms, attitude, and perceived benefits are characterized as highly important and concurrently exhibit high performance. The most important construct is the intention to accept. Since the performance of these structures is sufficient, it needs to be retained. The performance and the importance of positive affect and perceived behavioral control were around the mean. While experience, outcome efficacy, and distributive fairness performed around average, their importance fell short of sufficiency. Conversely, constructs like trust, procedural fairness, negative affect, perceived risks, knowledge, and perceived costs performed below the mean and were not rated as important. Generally, such variables tend to receive lower priority. These results were also similar while calculating IPMA for both university and high school graduates, considering their education levels.

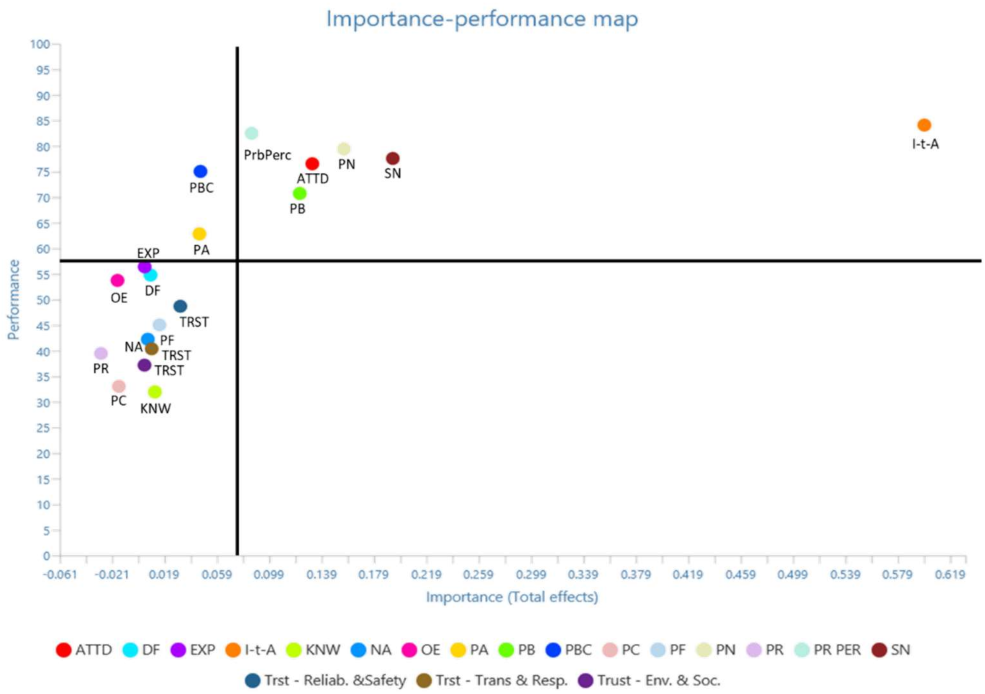


Figure 6.1. IPMA results-construct level

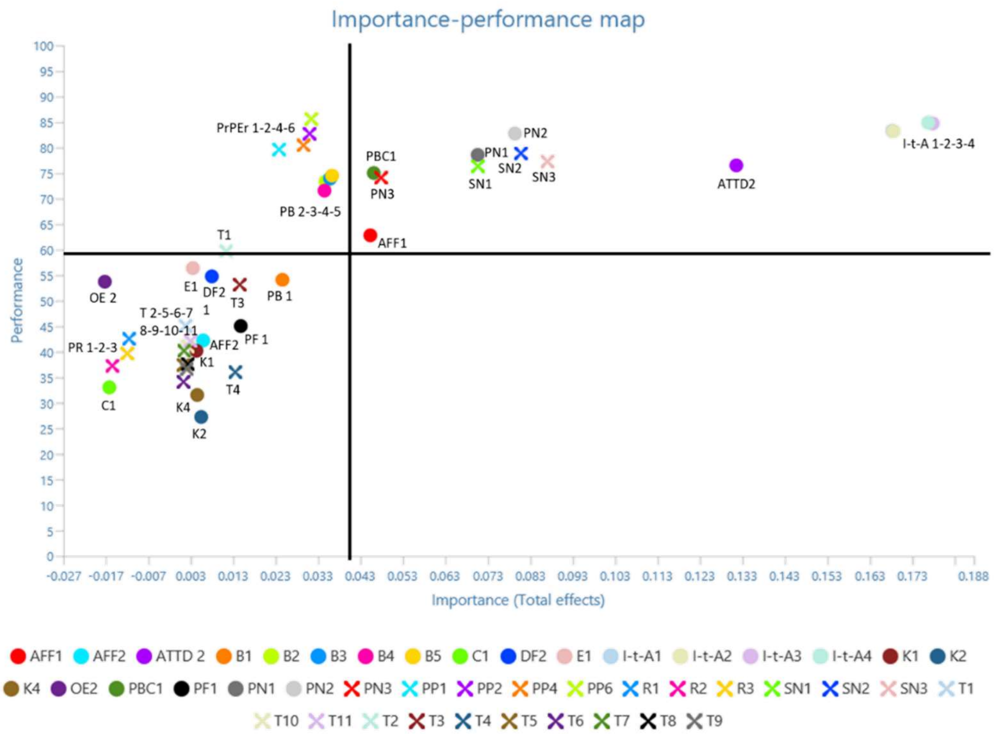


Figure 6.2. IPMA results-indicator level

6.4 Mediation Analysis

While a direct effect might exist between two variables, it is also possible that indirect effects occur through other variables. Such indirect effects are termed mediating effects (Hair et al., 2017). These mediating effects can either amplify or weaken a relationship and, in some cases, even establish a significant relationship in the absence of a direct link. Given the comprehensive nature of the model used in this study, numerous indirect and mediating effects were scrutinized. The mediation analysis procedure was executed adhering to guidelines outlined by Hair et al. (2017). To achieve this, both direct and indirect effects were calculated, with evaluation based on the β values and p values.

- Initially, the significance of the indirect effect was examined.
- If the indirect effect was found to be insignificant, the direct impact was evaluated. If the direct effect also proved to be insignificant, it indicates a

lack of effect and, thus, no mediation. If the direct effect was significant, it signifies the presence of a direct effect and no mediation.

- On the other hand, if the indirect effect was significant, the direct effect was then assessed. If the direct effect was also significant, the path coefficients were multiplied. A positive result indicates complementary partial mediation, while a negative result suggests competitive partial mediation. If the direct effect was not found to be significant, this implies the presence of only an indirect effect-full mediation.

Table 6.8 Mediation Analysis Results

β: Original sample (β); M: Sample mean; B: Standard deviation (STDEV); C: T statistics (|O/STDEV|); P: P values

Specific Indirect Effect						Direct Effect						Total Effect				
Path	**β**	**M**	**B**	**C**	**P**	**Path**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
PF -> Trst - Reliab. &Safety -> PA	0.012	0.012	0.010	1.224	0.221	PF -> PA	-0.0587	-0.0590	0.0500	1.1742	0.2404	0.0044	0.0038	0.0514	0.0860	0.9315
PF -> Trst - Trans & Resp. -> PA	0.049	0.049	0.019	2.607	0.009	PF -> PA	-0.0587	-0.0590	0.0500	1.1742	0.2404	0.0044	0.0038	0.0514	0.0860	0.9315
PF -> Trust - Env. & Soc. -> PA	0.001	0.001	0.010	0.141	0.888	PF -> PA	-0.0587	-0.0590	0.0500	1.1742	0.2404	0.0044	0.0038	0.0514	0.0860	0.9315
PF -> Trst - Reliab. &Safety -> NA	-0.006	-0.006	0.010	0.622	0.534	PF -> NA	-0.0074	-0.0071	0.0505	0.1457	0.8841	0.0324	0.0325	0.0495	0.6543	0.5129
PF -> Trst - Trans & Resp. -> NA	0.006	0.006	0.011	0.520	0.603	PF -> NA	-0.0074	-0.0071	0.0505	0.1457	0.8841	0.0324	0.0325	0.0495	0.6543	0.5129
PF -> Trust - Env. & Soc. -> NA	0.040	0.040	0.017	2.433	0.015	PF -> NA	-0.0074	-0.0071	0.0505	0.1457	0.8841	0.0324	0.0325	0.0495	0.6543	0.5129
PF -> PA -> PB	-0.009	-0.009	0.008	1.060	0.289	PF -> PB	0.0055	0.0047	0.0482	0.1144	0.9089	0.0738	0.0723	0.0510	1.4481	0.1476
PF -> NA -> PB	0.000	0.000	0.003	0.033	0.974	PF -> PB	0.0055	0.0047	0.0482	0.1144	0.9089	0.0738	0.0723	0.0510	1.4481	0.1476
PF -> Trst - Reliab. &Safety -> PB	0.050	0.049	0.019	2.639	0.008	PF -> PB	0.0055	0.0047	0.0482	0.1144	0.9089	0.0738	0.0723	0.0510	1.4481	0.1476
PF -> Trust - Env. & Soc. -> PB	0.011	0.010	0.010	1.037	0.300	PF -> PB	0.0055	0.0047	0.0482	0.1144	0.9089	0.0738	0.0723	0.0510	1.4481	0.1476
PF -> Trst - Trans & Resp. -> PB	0.008	0.007	0.010	0.753	0.451	PF -> PB	0.0055	0.0047	0.0482	0.1144	0.9089	0.0738	0.0723	0.0510	1.4481	0.1476
PF -> Trst - Reliab. &Safety -> PR	0.035	0.035	0.014	2.448	0.014	PF -> PR	0.0164	0.0166	0.0491	0.3334	0.7389	0.1156	0.1151	0.0518	2.2330	0.0256
PF -> Trst - Trans & Resp. -> PR	0.046	0.046	0.017	2.659	0.008	PF -> PR	0.0164	0.0166	0.0491	0.3334	0.7389	0.1156	0.1151	0.0518	2.2330	0.0256
PF -> Trust - Env. & Soc. -> PR	0.019	0.019	0.013	1.473	0.141	PF -> PR	0.0164	0.0166	0.0491	0.3334	0.7389	0.1156	0.1151	0.0518	2.2330	0.0256
PF -> PA -> PR	-0.001	-0.002	0.004	0.363	0.717	PF -> PR	0.0164	0.0166	0.0491	0.3334	0.7389	0.1156	0.1151	0.0518	2.2330	0.0256
PF -> NA -> PR	0.000	0.000	0.003	0.090	0.928	PF -> PR	0.0164	0.0166	0.0491	0.3334	0.7389	0.1156	0.1151	0.0518	2.2330	0.0256
PF -> Trst - Reliab. &Safety -> PC	0.027	0.027	0.012	2.194	0.028	PF -> PC	0.0034	0.0031	0.0492	0.0697	0.9444	0.0819	0.0810	0.0504	1.6251	0.1042
PF -> Trst - Trans & Resp. -> PC	0.016	0.016	0.012	1.383	0.167	PF -> PC	0.0034	0.0031	0.0492	0.0697	0.9444	0.0819	0.0810	0.0504	1.6251	0.1042

Table 6.7 Mediation Analysis Results (Cont'd)

Specific Indirect Effect						Direct Effect						Total Effect				
Path	**β**	**M**	**B**	**C**	**P**	**Path**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
PF -> Trust - Env. & Soc. -> PC	0.030	0.030	0.015	1.983	0.047	PF -> PC	0.0034	0.0031	0.0492	0.0697	0.9444	0.0819	0.0810	0.0504	1.6251	0.1042
PF -> NA -> PC	-0.001	-0.001	0.009	0.139	0.890	PF -> PC	0.0034	0.0031	0.0492	0.0697	0.9444	0.0819	0.0810	0.0504	1.6251	0.1042
PF -> PA -> PC	-0.005	-0.005	0.006	0.858	0.391	PF -> PC	0.0034	0.0031	0.0492	0.0697	0.9444	0.0819	0.0810	0.0504	1.6251	0.1042
Trust - Env. & Soc. -> NA -> PR	-0.009	-0.009	0.012	0.743	0.457	Trust - Env. & Soc. -> PR	0.1112	0.1113	0.0630	1.7665	0.0773	0.1028	0.1028	0.0621	1.6544	0.0981
Trst - Reliab. &Safety -> NA -> PR	0.001	0.002	0.004	0.357	0.721	Trst - Reliab. &Safety -> PR	0.2142	0.2157	0.0548	3.9112	0.0001	0.2174	0.2189	0.0546	3.9835	0.0001
Trst - Trans & Resp. -> NA -> PR	-0.001	-0.002	0.004	0.295	0.768	Trst - Trans & Resp. -> PR	0.2624	0.2637	0.0656	4.0008	0.0001	0.2678	0.2687	0.0641	4.1762	0.0000
Trust - Env. & Soc. -> NA -> PB	-0.003	-0.003	0.013	0.230	0.818	Trust - Env. & Soc. -> PB	0.0640	0.0629	0.0562	1.1384	0.2550	0.0624	0.0614	0.0559	1.1153	0.2647
Trst - Reliab. &Safety -> NA -> PB	0.000	0.000	0.004	0.128	0.898	Trst - Reliab. &Safety -> PB	0.3007	0.3021	0.0629	4.7804	0.0000	0.3126	0.3140	0.0635	4.9253	0.0000
Trst - Trans & Resp. -> NA -> PB	0.000	-0.001	0.004	0.110	0.913	Trst - Trans & Resp. -> PB	0.0435	0.0434	0.0550	0.7915	0.4287	0.0857	0.0858	0.0561	1.5274	0.1267
Trust - Env. & Soc. -> PA -> PB	0.001	0.001	0.010	0.139	0.890	Trust - Env. & Soc. -> PB	0.0640	0.0629	0.0562	1.1384	0.2550	0.0624	0.0614	0.0559	1.1153	0.2647
Trst - Reliab. &Safety -> PA -> PB	0.011	0.012	0.010	1.138	0.255	Trst - Reliab. &Safety -> PB	0.3007	0.3021	0.0629	4.7804	0.0000	0.3126	0.3140	0.0635	4.9253	0.0000
Trst - Trans & Resp. -> PA -> PB	0.043	0.043	0.018	2.405	0.016	Trst - Trans & Resp. -> PB	0.0435	0.0434	0.0550	0.7915	0.4287	0.0857	0.0858	0.0561	1.5274	0.1267
Trust - Env. & Soc. -> PA -> PC	0.001	0.001	0.006	0.127	0.899	Trust - Env. & Soc. -> PC	0.1776	0.1784	0.0635	2.7949	0.0052	0.2170	0.2173	0.0643	3.3762	0.0007
Trst - Reliab. &Safety -> PA -> PC	0.006	0.006	0.007	0.947	0.344	Trst - Reliab. &Safety -> PC	0.1640	0.1648	0.0528	3.1087	0.0019	0.1639	0.1647	0.0538	3.0459	0.0023
Trst - Trans & Resp. -> PA -> PC	0.023	0.023	0.015	1.529	0.126	Trst - Trans & Resp. -> PC	0.0906	0.0915	0.0608	1.4908	0.1361	0.1190	0.1206	0.0624	1.9087	0.0563
Trst - Reliab. &Safety -> NA -> PC	-0.006	-0.006	0.010	0.625	0.532	Trst - Reliab. &Safety -> PC	0.1640	0.1648	0.0528	3.1087	0.0019	0.1639	0.1647	0.0538	3.0459	0.0023
Trst - Trans & Resp. -> NA -> PC	0.005	0.006	0.010	0.515	0.606	Trst - Trans & Resp. -> PC	0.0906	0.0915	0.0608	1.4908	0.1361	0.1190	0.1206	0.0624	1.9087	0.0563
Trust - Env. & Soc. -> NA -> PC	0.039	0.038	0.016	2.394	0.017	Trust - Env. & Soc. -> PC	0.1776	0.1784	0.0635	2.7949	0.0052	0.2170	0.2173	0.0643	3.3762	0.0007

Table 6.7 Mediation Analysis Results (Cont'd)

Specific Indirect Effect						Direct Effect						Total Effect				
Path	**β**	**M**	**B**	**C**	**P**	**Path**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
Trst-Relb.&Safety->PA -> PR	0.002	0.002	0.005	0.393	0.695	Trst-Relb. &Safety -> PR	0.2142	0.2157	0.0548	3.9112	0.0001	0.2174	0.2189	0.0546	3.9835	0.0001
Trst-Trans&Resp.-> PA -> PR	0.007	0.007	0.014	0.491	0.624	Trst-Trans&Resp. -> PR	0.2624	0.2637	0.0656	4.0008	0.0001	0.2678	0.2687	0.0641	4.1762	0.0000
Trust-Env. & Soc. -> PA -> PR	0.000	0.001	0.003	0.066	0.947	Trust-Env. & Soc. -> PR	0.1112	0.1113	0.0630	1.7665	0.0773	0.1028	0.1028	0.0621	1.6544	0.0981
PR PER -> PA -> PC	0.009	0.009	0.007	1.324	0.186	PR PER -> PC	-0.0841	-0.0845	0.0426	1.9711	0.0487	-0.0804	-0.0809	0.0430	1.8686	0.0617
PR PER -> NA -> PC	-0.006	-0.005	0.008	0.672	0.502	PR PER -> PC	-0.0841	-0.0845	0.0426	1.9711	0.0487	-0.0804	-0.0809	0.0430	1.8686	0.0617
PR PER -> NA -> PR	0.001	0.001	0.003	0.383	0.702	PR PER -> PR	0.0304	0.0306	0.0394	0.7719	0.4402	0.0343	0.0342	0.0391	0.8774	0.3803
PR PER -> PA -> PR	0.003	0.002	0.006	0.463	0.644	PR PER -> PR	0.0304	0.0306	0.0394	0.7719	0.4402	0.0343	0.0342	0.0391	0.8774	0.3803
PR PER -> PA -> PB	0.017	0.017	0.010	1.775	0.076	PR PER -> PB	0.2469	0.2510	0.0518	4.7662	0.0000	0.2642	0.2685	0.0510	5.1817	0.0000
PR PER -> NA -> PB	0.000	0.000	0.003	0.131	0.896	PR PER -> PB	0.2469	0.2510	0.0518	4.7662	0.0000	0.2642	0.2685	0.0510	5.1817	0.0000
PR PER -> NA -> PN	0.000	0.000	0.003	0.042	0.966	PR PER -> PN	0.3204	0.3225	0.0550	5.8259	0.0000	0.4504	0.4542	0.0561	8.0322	0.0000
PR PER -> PA -> PN	0.005	0.005	0.006	0.834	0.404	PR PER -> PN	0.3204	0.3225	0.0550	5.8259	0.0000	0.4504	0.4542	0.0561	8.0322	0.0000
PR PER -> PB -> PN	0.117	0.118	0.027	4.328	0.000	PR PER -> PN	0.3204	0.3225	0.0550	5.8259	0.0000	0.4504	0.4542	0.0561	8.0322	0.0000
PR PER -> PC -> PN	0.003	0.003	0.004	0.828	0.408	PR PER -> PN	0.3204	0.3225	0.0550	5.8259	0.0000	0.4504	0.4542	0.0561	8.0322	0.0000
PR PER -> PR -> PN	-0.003	-0.003	0.004	0.610	0.542	PR PER -> PN	0.3204	0.3225	0.0550	5.8259	0.0000	0.4504	0.4542	0.0561	8.0322	0.0000
PA -> PC -> ATTD	-0.006	-0.006	0.006	1.053	0.292	PA -> ATTD	0.1655	0.1628	0.0551	3.0018	0.0027	0.2126	0.2113	0.0536	3.9649	0.0001
PA -> PB -> ATTD	0.056	0.057	0.022	2.520	0.012	PA -> ATTD	0.1655	0.1628	0.0551	3.0018	0.0027	0.2126	0.2113	0.0536	3.9649	0.0001
PA -> PR -> ATTD	-0.003	-0.003	0.007	0.448	0.654	PA -> ATTD	0.1655	0.1628	0.0551	3.0018	0.0027	0.2126	0.2113	0.0536	3.9649	0.0001
PF -> NA -> ATTD	0.000	0.000	0.004	0.114	0.909	PF -> ATTD	0.0359	0.0355	0.0487	0.7385	0.4602	0.0454	0.0447	0.0500	0.9072	0.3643

Table 6.7 Mediation Analysis Results (Cont'd)

	Specific Indirect Effect					Direct Effect						Total Effect				
Path	**β**	**M**	**B**	**C**	**P**	**β**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
PF -> PA -> ATTD	-0.010	-0.010	0.009	1.063	0.288	PF -> ATTD	0.0359	0.0355	0.0487	0.7385	0.4602	0.0454	0.0447	0.0500	0.9072	0.3643
PF -> PB -> ATTD	0.002	0.002	0.018	0.112	0.911	PF -> ATTD	0.0359	0.0355	0.0487	0.7385	0.4602	0.0454	0.0447	0.0500	0.9072	0.3643
PF -> PC -> ATTD	0.000	0.000	0.004	0.058	0.953	PF -> ATTD	0.0359	0.0355	0.0487	0.7385	0.4602	0.0454	0.0447	0.0500	0.9072	0.3643
PF -> PR -> ATTD	-0.002	-0.002	0.007	0.295	0.768	PF -> ATTD	0.0359	0.0355	0.0487	0.7385	0.4602	0.0454	0.0447	0.0500	0.9072	0.3643
NA -> PC -> ATTD	-0.012	-0.011	0.009	1.281	0.200	NA -> ATTD	0.0650	0.0652	0.0522	1.2448	0.2132	0.0531	0.0540	0.0533	0.9959	0.3193
NA -> PB -> ATTD	-0.005	-0.005	0.019	0.234	0.815	NA -> ATTD	0.0650	0.0652	0.0522	1.2448	0.2132	0.0531	0.0540	0.0533	0.9959	0.3193
NA -> PR -> ATTD	0.005	0.005	0.007	0.670	0.503	NA -> ATTD	0.0650	0.0652	0.0522	1.2448	0.2132	0.0531	0.0540	0.0533	0.9959	0.3193
PF -> PA -> PN	-0.003	-0.003	0.004	0.606	0.545	PF -> PN	0.0353	0.0345	0.0417	0.8480	0.3965	0.0575	0.0557	0.0473	1.2155	0.2242
PA -> PC -> PN	-0.003	-0.003	0.004	0.779	0.436	PA -> PN	0.0454	0.0446	0.0476	0.9547	0.3398	0.1120	0.1117	0.0527	2.1244	0.0337
PF -> PR -> PN	-0.001	-0.001	0.005	0.283	0.777	PF -> PN	0.0353	0.0345	0.0417	0.8480	0.3965	0.0575	0.0557	0.0473	1.2155	0.2242
PF -> PB -> PN	0.003	0.002	0.023	0.113	0.910	PF -> PN	0.0353	0.0345	0.0417	0.8480	0.3965	0.0575	0.0557	0.0473	1.2155	0.2242
PF -> NA -> PN	0.000	0.000	0.002	0.011	0.991	PF -> PN	0.0353	0.0345	0.0417	0.8480	0.3965	0.0575	0.0557	0.0473	1.2155	0.2242
PA -> PB -> PN	0.072	0.072	0.026	2.746	0.006	PA -> PN	0.0454	0.0446	0.0476	0.9547	0.3398	0.1120	0.1117	0.0527	2.1244	0.0337
PF -> PC -> PN	0.000	0.000	0.003	0.050	0.960	PF -> PN	0.0353	0.0345	0.0417	0.8480	0.3965	0.0575	0.0557	0.0473	1.2155	0.2242
PA -> PR -> PN	-0.002	-0.002	0.005	0.425	0.671	PA -> PN	0.0454	0.0446	0.0476	0.9547	0.3398	0.1120	0.1117	0.0527	2.1244	0.0337
NA -> PB -> PN	-0.006	-0.006	0.025	0.236	0.813	NA -> PN	0.0033	0.0029	0.0442	0.0753	0.9400	-0.0060	-0.0067	0.0493	0.1207	0.9039
NA -> PC -> PN	-0.006	-0.006	0.007	0.945	0.345	NA -> PN	0.0033	0.0029	0.0442	0.0753	0.9400	-0.0060	-0.0067	0.0493	0.1207	0.9039
NA -> PR -> PN	0.003	0.003	0.005	0.646	0.518	NA -> PN	0.0033	0.0029	0.0442	0.0753	0.9400	-0.0060	-0.0067	0.0493	0.1207	0.9039

Table 6.7 Mediation Analysis Results (Cont'd)

Specific Indirect Effect						Direct Effect						Total Effect				
Path	**β**	**M**	**B**	**C**	**P**	**Path**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
DF -> NA -> ATTD	0.008	0.008	0.008	1.016	0.310	DF -> ATTD	0.0540	0.0539	0.0538	1.0037	0.3156	0.0880	0.0873	0.0539	1.6337	0.1024
DF -> PA -> ATTD	0.021	0.020	0.011	1.849	0.064	DF -> ATTD	0.0540	0.0539	0.0538	1.0037	0.3156	0.0880	0.0873	0.0539	1.6337	0.1024
DF -> PB -> ATTD	0.023	0.023	0.019	1.174	0.240	DF -> ATTD	0.0540	0.0539	0.0538	1.0037	0.3156	0.0880	0.0873	0.0539	1.6337	0.1024
DF -> PC -> ATTD	-0.001	-0.001	0.004	0.251	0.802	DF -> ATTD	0.0540	0.0539	0.0538	1.0037	0.3156	0.0880	0.0873	0.0539	1.6337	0.1024
DF -> PR -> ATTD	-0.020	-0.021	0.011	1.836	0.066	DF -> ATTD	0.0540	0.0539	0.0538	1.0037	0.3156	0.0880	0.0873	0.0539	1.6337	0.1024
DF -> NA -> PB	-0.002	-0.002	0.007	0.217	0.828	DF -> PB	0.0610	0.0618	0.0510	1.1960	0.2317	0.0785	0.0788	0.0510	1.5383	0.1240
DF -> PA -> PB	0.019	0.019	0.011	1.789	0.074	DF -> PB	0.0610	0.0618	0.0510	1.1960	0.2317	0.0785	0.0788	0.0510	1.5383	0.1240
DF -> NA -> PC	0.020	0.019	0.011	1.808	0.071	DF -> PC	0.0152	0.0150	0.0503	0.3014	0.7631	0.0451	0.0444	0.0492	0.9177	0.3588
DF -> PA -> PC	0.010	0.010	0.008	1.269	0.204	DF -> PC	0.0152	0.0150	0.0503	0.3014	0.7631	0.0451	0.0444	0.0492	0.9177	0.3588
DF -> NA -> PR	-0.004	-0.004	0.006	0.693	0.488	DF -> PR	0.1616	0.1614	0.0436	3.7091	0.0002	0.1601	0.1598	0.0436	3.6692	0.0002
DF -> PA -> PR	0.003	0.003	0.006	0.466	0.641	DF -> PR	0.1616	0.1614	0.0436	3.7091	0.0002	0.1601	0.1598	0.0436	3.6692	0.0002
DF -> NA -> PN	0.000	0.000	0.006	0.070	0.945	DF -> PN	-0.0502	-0.0502	0.0479	1.0487	0.2944	-0.0223	-0.0221	0.0497	0.4480	0.6541
DF -> PA -> PN	0.006	0.005	0.007	0.833	0.405	DF -> PN	-0.0502	-0.0502	0.0479	1.0487	0.2944	-0.0223	-0.0221	0.0497	0.4480	0.6541
DF -> PB -> PN	0.029	0.029	0.024	1.183	0.237	DF -> PN	-0.0502	-0.0502	0.0479	1.0487	0.2944	-0.0223	-0.0221	0.0497	0.4480	0.6541
DF -> PC -> PN	-0.001	0.000	0.003	0.218	0.827	DF -> PN	-0.0502	-0.0502	0.0479	1.0487	0.2944	-0.0223	-0.0221	0.0497	0.4480	0.6541
DF -> PR -> PN	-0.014	-0.013	0.008	1.606	0.108	DF -> PN	-0.0502	-0.0502	0.0479	1.0487	0.2944	-0.0223	-0.0221	0.0497	0.4480	0.6541

6.5 Moderation Analysis

If a third variable influences the relationship between two constructs, it is referred to as a moderation effect of the third variable (Hair et al., 2017). Moderation effects can be categorized as categorical or continuous. In this study, categorical moderation effects were analyzed for different variables. The analysis for categorical moderation involved multi-group analysis and the inclusion of categorical dummy variables. Below, each method is described in detail.

The multi-group analysis allows for comparisons between different groups. For this purpose, the dataset is initially divided into various categories. Subsequently, the analysis is conducted within these groups, facilitating the examination of differences among them (Ringle et al., 2022).

To compare these groups, measurement invariance must first be established as a prerequisite for group comparisons. It has been emphasized that conducting group comparisons without ensuring measurement invariance can yield misleading results (Önen, 2007; Ringle et al., 2022). Therefore, measurement invariance was checked for each group prior to performing multiple group analyses. SMARTPLS provides permutation multi-group analysis and supports the MICOM (Ringle et al., 2022) procedure. Data were categorized based on variables such as gender, age, education, profession, location, and residence (as outlined in Table 6.8) as explained below.

The study participants were categorized into four distinct groups based on their age ranges and gender. These groups were delineated as follows: individuals under 25 years old, males aged 25-64 years, females aged 25-64 years, and individuals older than 64 years. The rationale behind selecting these age groups is connected to working-age segments and age-dependency ranges. Due to the limited number of participants among those under 25 and over 64, gender categorization was not applied to these age groups. Pairwise analyses were conducted to determine the feasibility of comparing these groups separately. As a result of the MICOM test, which assesses measurement invariance for comparisons across age-gender groups, it was established that measurement invariance existed between participants under 25 and males aged 25-64.

It was relatively straightforward to divide participants based on education level high school graduates were grouped together, while university and higher graduates constituted the other group. Furthermore, another category was introduced according to both education level and gender, encompassing subgroups like females with high school diplomas and females with university, master's, or doctoral degrees. Males with high school diplomas and males with university, master's, and doctoral degrees. Although the results were generally similar when comparing women and men while accounting for their education level, certain differences were detected in specific relationships.

According to the occupation categorization, participants were grouped into various categories: public employees (separately for females and males), private sector employees (separately for females and males), municipality employees, and individuals who are out of the labor force (separately for females and males).

After comparing male and female public employees during the categorization stage, the MICOM analysis revealed that these two groups yielded similar results and could be considered pooled data, allowing for them to be combined. This implies that the strength of the relationships does not significantly differ between men and women. Subsequently, the other occupational groups were grouped together, and a measurement invariance test was performed among these groups. Since measurement invariance was not detected as a result of this analysis, allowing private sector employees and people out of the labor force (including retirees, students, and homemakers), along with academics and NGO employees, are to be included in separate groups. Pairwise MICOM analyses were conducted between these two groups and the group of public sector and municipality employees, which is referred to as the public sector group. No measurement invariance was detected in the comparison between the group of public employees and the private sector group. However, measurement invariance was identified in the comparison between the group of public employees and people out of the labor force, academics, and NGO employees. Following this, group comparison analyses were conducted among these occupational groups.

Furthermore, public servants, private sector employees, and people out of the labor force were categorized by gender. Due to insufficient participants in the municipality group, this group was considered without gender categorization. Subsequently, pairwise MICOM analyses were conducted to ascertain measurement invariance. Measurement invariance was identified between "women and men public servants", "municipality workers and men & women private sector employees", "men in private and public", women public & women not in active in the labor force", and "women in the private sector and public".

In the categorization phase, having a house or the house where the participants live was considered as an important socio-economic parameter. Homeowners were considered as a separate group due to their higher number compared to the sum of all other groups, while the rest of the individuals were categorized under another category. However, no measurement invariance was found as a result of the analysis. Then, a new category was determined, and the homeowners were grouped as male and female homeowners and analyzed. Measurement invariance was determined between these groups.

The influence of the location where participants reside on social acceptance was analyzed using both dummy variables and multiple group comparisons.

As explained above, the first step in multiple-group comparisons was to determine measurement invariance. To achieve this objective, the districts were organized into clusters based on hypothesis 40 and the sample sizes in each district. Subsequently, these clusters were assessed to ascertain whether measurement invariance existed.

The measurement invariance test involved conducting pairwise analyses to evaluate the comparability of individual districts. For example, the measurement invariance test for the Mamak district consisted of analyzing Mamak alongside another district and then repeating this for all districts, one at a time. This procedure was systematically followed to cover all districts. When comparing the Çankaya and Mamak districts, the MICOM analysis revealed that the outcomes for the actors in these two groups were similar, allowing for the consideration of pooled data. Consequently, these two groups were merged, and the remaining districts were consolidated into one group. A measurement invariance test was performed between these groups, confirming the presence of measurement invariance.

Furthermore, including dummy variables enables comparisons when there are more than two groups within a single category (Hair et al., 2017). This method was used to compare the differences between districts. In this scenario, Mamak served as the reference district, and the remaining districts were compared against Mamak. The districts were assigned dummy codes as follows: Çankaya, Sincan, Altındağ, Yenimahalle, Keçiören, and Others. For example, the dummy variable for Çankaya takes a value of 1, while the others assume a zero value. These dummy variables were formulated for the specified districts, incorporated into the model, and subsequently analyzed according to the same criteria for reliability, validity, and so on.

Following the measurement invariance tests, the study employed bootstrap analyses for conducting multiple-group comparisons. An additional bootstrap test was performed subsequent to the grouping of districts to facilitate these group comparisons.

Table 6.9 Categories used in moderation analysis

Name of Categorized Group	Cases
Age + Gender	
<25	38
25-35 Men	41
25-35 Women	71
36-45 Men	56
36-45 Women	53
46-55 Men	36
46-55 Women	41
56-64 Men	28
56-64 Women	6
>64	10
Age + Gender 2	
<25	38
25-64 K	171
25-64 E	168
>64	10
Gender	
Men	189
Women	195
Education	
University, master's, doctorate	241
High school	150
Education + Gender	
High school graduated women	60
High school graduate men	85
University & more graduated women	134
University & more graduated men	104
District	
Çankaya, Mamak	197
Yenimahalle, Keçiören, Altındağ, Sincan, Gölbaşı, others	195

Table 6.9 Categories used in moderation analysis (Cont'd)

Profession	
Government + Municipality	156
Persons not in the labor force (inactive population)	105
Private sector	111
Academic, NGO, and others	20
Profession - 2	
Public servant (including municipality)	156
Private sector	111
Others (academics, NGO, inactive population)	125
Profession + Gender	
Municipality + Academic, NGO, others	49
Public servant men	61
Public servant women	64
Inactive population men	43
Inactive population women	59
Private sector men	57
Private sector women	51
Residency and Gender	
Homeowner women	113
Homeowner men	127
Tenant women	64
Tenant men	52
Other residency women	16
Other residency men	19

Table 6.10 Results of the Measurement Invariance

Categories		**Type of Measurement Invariance**
Gender		
Men	Women	Partial
Age + Gender		
25-35 Men	25-35 Women	Partial
25-35 Men	56-64 Men	Full
25-35 Women	36-45 Women	Full
36-45 Men	36-45 Women	Full
46-55 Men	46-55 Women	Full
46-55 Men	56-64 Men	Full
Education		
Under Graduates & Graduates	High school	Partial
Education + Gender		
Under Graduates & Graduates-Women	Under Graduates & Graduates-Men	Partial
District		
Çankaya, Mamak	Altındağ, Etimesgut, Gölbaşı, Polatlı, Pursaklar	Partial
Çankaya, Mamak	Yenimahalle, Keçiören, Sincan	Partial
Yenimahalle, Keçiören, Sincan	Altındağ, Etimesgut, Gölbaşı, Polatlı, Pursaklar	Full
Profession		
Public servants, municipality, academy, NGO	People out of the labor force	Partial
Profession + Gender		
Municipality	Public servant-Women	Partial
Municipality	Public servant-Men	Full
Municipality	People out of the labor force-Men	Partial
Public servant-Men	Public servant-Women	Partial
Public servant-Men	Private sector-Women	Partial
Public servant-Women	People out of labor force-Women	Partial
Residency and Gender		
Home owner-Women	Home owner-Men	Partial

Table 6.11 Moderation analysis results according to the education

(β: Original sample (β); M: Sample mean; B: Standard deviation (STDEV); C: T statistics (|O/STDEV|); P: P values)

Path	**High School**					**University & more**					**Complete**				
	β	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
ATTD -> I-t-A	0.166	0.161	0.073	2.282	0.023	0.239	0.230	0.089	2.686	0.007	0.220	0.216	0.061	3.592	0.000
DF -> ATTD	0.136	0.136	0.086	1.581	0.114	0.036	0.035	0.071	0.503	0.615	0.054	0.054	0.054	1.004	0.316
DF -> NA	0.135	0.137	0.087	1.551	0.121	0.084	0.082	0.070	1.212	0.225	0.122	0.120	0.054	2.239	0.025
DF -> PB	-0.006	-0.006	0.084	0.069	0.945	0.092	0.092	0.068	1.349	0.177	0.061	0.062	0.051	1.196	0.232
DF -> PN	-0.054	-0.053	0.076	0.719	0.472	-0.068	-0.071	0.066	1.034	0.301	-0.050	-0.050	0.048	1.049	0.294
DF -> PR	0.161	0.165	0.073	2.223	0.026	0.156	0.154	0.055	2.854	0.004	0.162	0.161	0.044	3.709	0.000
EXP -> KNW	0.194	0.196	0.092	2.108	0.035	0.379	0.379	0.062	6.073	0.000	0.316	0.317	0.052	6.090	0.000
I-t-A>Soc. Ac.	0.547	0.567	0.068	8.073	0.000	0.646	0.656	0.058	11.191	0.000	0.599	0.605	0.045	13.267	0.000
Knw>Trst-R&Sf.	0.345	0.353	0.075	4.614	0.000	0.267	0.270	0.059	4.542	0.000	0.282	0.285	0.047	6.008	0.000
Knw>T-T.&R.	0.221	0.234	0.073	3.026	0.002	0.264	0.268	0.063	4.217	0.000	0.223	0.226	0.049	4.553	0.000
Knw->T- E&S	0.276	0.286	0.076	3.653	0.000	0.236	0.241	0.068	3.447	0.001	0.236	0.240	0.050	4.721	0.000
NA -> ATTD	0.054	0.057	0.081	0.670	0.503	0.062	0.062	0.067	0.926	0.355	0.065	0.065	0.052	1.245	0.213
NA -> PB	-0.018	-0.021	0.092	0.200	0.841	-0.017	-0.019	0.059	0.284	0.777	-0.012	-0.014	0.052	0.237	0.812
NA -> PC	0.180	0.175	0.082	2.207	0.027	0.154	0.154	0.062	2.486	0.013	0.161	0.159	0.051	3.181	0.001
NA -> PN	0.022	0.022	0.060	0.371	0.711	-0.027	-0.027	0.062	0.439	0.661	0.003	0.003	0.044	0.075	0.940
NA -> PR	-0.092	-0.094	0.080	1.146	0.252	-0.033	-0.033	0.056	0.586	0.558	-0.036	-0.037	0.045	0.793	0.428
OE -> PN	-0.063	-0.062	0.072	0.871	0.384	-0.036	-0.036	0.057	0.629	0.530	-0.047	-0.046	0.043	1.094	0.274
PA -> ATTD	0.234	0.224	0.097	2.417	0.016	0.130	0.127	0.068	1.912	0.056	0.165	0.163	0.055	3.002	0.003

Table 6.11 Moderation analysis results according to the education (Cont’d)

(β: Original sample (β); M: Sample mean; B: Standard deviation (STDEV); C: T statistics (|O/STDEV|); P: P values)

Path	High School					University & more					Complete				
	β	M	B	C	P	β	M	B	C	P	β	M	B	C	P
PA -> PB	0.181	0.183	0.082	2.200	0.028	0.143	0.142	0.068	2.114	0.035	0.152	0.153	0.052	2.932	0.003
PA -> PR	-0.030	-0.035	0.074	0.410	0.682	0.055	0.053	0.060	0.919	0.358	0.024	0.023	0.046	0.512	0.609
PB -> ATTD	0.397	0.407	0.091	4.371	0.000	0.342	0.345	0.075	4.556	0.000	0.369	0.372	0.055	6.669	0.000
PB -> PN	0.490	0.490	0.081	6.018	0.000	0.444	0.447	0.070	6.361	0.000	0.472	0.473	0.050	9.425	0.000
PC -> ATTD	0.008	0.014	0.078	0.099	0.921	-0.109	-0.107	0.065	1.678	0.093	-0.074	-0.071	0.050	1.472	0.141
PC -> PN	-0.058	-0.055	0.060	0.960	0.337	-0.021	-0.018	0.055	0.392	0.695	-0.040	-0.039	0.039	1.038	0.299
PF -> ATTD	0.012	0.008	0.079	0.155	0.877	0.039	0.041	0.059	0.666	0.505	0.036	0.035	0.049	0.739	0.460
PF -> NA	-0.033	-0.035	0.076	0.440	0.660	0.003	0.004	0.066	0.048	0.961	-0.007	-0.007	0.050	0.146	0.884
PF -> PA	-0.137	-0.135	0.081	1.689	0.091	-0.025	-0.026	0.063	0.399	0.690	-0.059	-0.059	0.050	1.174	0.240
PF -> PB	0.086	0.084	0.086	1.006	0.315	-0.046	-0.047	0.057	0.813	0.416	0.006	0.005	0.048	0.114	0.909
PF -> PC	0.043	0.043	0.086	0.501	0.616	-0.005	-0.005	0.058	0.085	0.933	0.003	0.003	0.049	0.070	0.944
PF -> PN	0.096	0.094	0.066	1.446	0.148	-0.014	-0.015	0.057	0.239	0.811	0.035	0.035	0.042	0.848	0.396
PF -> PR	-0.002	-0.003	0.089	0.019	0.985	0.020	0.019	0.059	0.340	0.734	0.016	0.017	0.049	0.333	0.739
PF -> Trst - Trans & Resp.	0.207	0.204	0.088	2.348	0.019	0.147	0.147	0.066	2.238	0.025	0.176	0.175	0.053	3.335	0.001
PF -> Trust - Env. & Soc.	0.212	0.212	0.088	2.410	0.016	0.131	0.130	0.068	1.932	0.053	0.168	0.167	0.054	3.128	0.002
PN -> I-t-A	0.316	0.316	0.094	3.363	0.001	0.227	0.235	0.107	2.132	0.033	0.260	0.262	0.072	3.620	0.000
PR -> ATTD	-0.155	-0.163	0.085	1.817	0.069	-0.086	-0.084	0.077	1.107	0.268	-0.126	-0.128	0.057	2.201	0.028
PR -> PN	-0.129	-0.124	0.072	1.801	0.072	-0.013	-0.013	0.070	0.182	0.856	-0.084	-0.084	0.049	1.724	0.085
PR PER -> NA	-0.076	-0.076	0.079	0.959	0.337	-0.009	-0.009	0.064	0.142	0.887	-0.034	-0.035	0.048	0.707	0.480

Table 6.11 Moderation analysis results according to the education (Cont'd)

(β: Original sample (β); M: Sample mean; B: Standard deviation (STDEV); C: T statistics (|O/STDEV|); P: P values)

Path	High School					University & more					Complete				
	β	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**	**β**	**M**	**B**	**C**	**P**
PR PER -> PA	0.140	0.146	0.074	1.880	0.060	0.088	0.089	0.062	1.436	0.151	0.111	0.111	0.046	2.422	0.015
PR PER -> PB	0.217	0.227	0.089	2.444	0.015	0.261	0.267	0.063	4.153	0.000	0.247	0.251	0.052	4.766	0.000
PR PER -> PN	0.317	0.317	0.089	3.551	0.000	0.309	0.312	0.078	3.987	0.000	0.320	0.323	0.055	5.826	0.000
PR PER -> PR	0.001	-0.004	0.074	0.009	0.993	0.049	0.050	0.049	0.997	0.319	0.030	0.031	0.039	0.772	0.440
SN -> I-t-A	0.354	0.359	0.089	3.984	0.000	0.288	0.288	0.076	3.796	0.000	0.322	0.324	0.057	5.645	0.000
Trst - Reliab. &Safety -> NA	-0.029	-0.030	0.102	0.286	0.775	-0.043	-0.043	0.074	0.576	0.564	-0.039	-0.039	0.059	0.662	0.508
Trst - Reliab. &Safety -> PA	-0.014	-0.011	0.084	0.170	0.865	0.114	0.113	0.072	1.580	0.114	0.075	0.075	0.056	1.333	0.183
Trst - Reliab. &Safety -> PB	0.238	0.239	0.105	2.276	0.023	0.336	0.336	0.080	4.172	0.000	0.301	0.302	0.063	4.780	0.000
Trst - Reliab. &Safety -> PR	0.272	0.272	0.101	2.700	0.007	0.210	0.210	0.066	3.160	0.002	0.214	0.216	0.055	3.911	0.000
Trst - Trans & Resp. -> NA	-0.212	-0.208	0.096	2.193	0.028	0.205	0.205	0.081	2.548	0.011	0.033	0.036	0.062	0.541	0.588
Trst - Trans & Resp. -> PA	0.249	0.244	0.107	2.338	0.019	0.326	0.327	0.077	4.209	0.000	0.279	0.281	0.063	4.470	0.000
Trst - Trans & Resp. -> PB	0.026	0.024	0.100	0.260	0.795	0.071	0.071	0.074	0.960	0.337	0.044	0.043	0.055	0.792	0.429
Trst - Trans & Resp. -> PC	0.142	0.145	0.101	1.410	0.159	0.074	0.074	0.078	0.960	0.337	0.091	0.091	0.061	1.491	0.136
Trust - Env. & Soc. -> PA	-0.023	-0.021	0.109	0.212	0.832	0.006	0.007	0.071	0.088	0.930	0.009	0.008	0.059	0.149	0.882
Trust - Env. & Soc. -> PB	0.143	0.141	0.098	1.464	0.143	0.021	0.021	0.074	0.292	0.771	0.064	0.063	0.056	1.138	0.255
Trust - Env. & Soc. -> PR	0.218	0.209	0.114	1.911	0.056	0.054	0.054	0.073	0.738	0.460	0.111	0.111	0.063	1.766	0.077

CHAPTER 7

DISCUSSION

Waste management systems operate most effectively when there is a strong interaction among waste generators, waste collectors, waste treatment facilities, policymakers/lawmakers, and local government (Ma & Hipel, 2016). The objective of this study was to contribute to the establishment of a sustainable food waste-to-energy system by identifying prominent factors for enhancing and improving the collaboration among these stakeholders. This study focuses explicitly on biodegradable waste within the municipal solid waste stream, originating primarily from residential households. This chapter delves into the findings of the analyses conducted within the model designed to ascertain social acceptance.

While the comprehensive impact of this study on the literature will be more fully appreciated through its incorporation into future research, as the researcher who both conducted this study and reviewed similar works, I assert that this research's distinctive contribution can be listed as follows:

1) The general contribution lies in its ability to pinpoint essential factors that contribute to a more multidimensional understanding of the social acceptance of converting food waste into renewable energy.
2) Although explanations have been made through the model used in this study, the information contained throughout the study provides a wide range of information from a broad perspective in terms of municipal waste management in Türkiye. It will also be a guide for countries to improve their governance strategy.
3) The decision to disaggregate trust into three different categories instead of treating it as a single variable enriches the evaluative scope and increases the

depth and breadth of the analysis. This approach allows for a clearer understanding of how each trust pillar impacts specific variables. The benefits of this approach can be listed briefly:

- By evaluating each category of trust separately, we can examine in more detail which factors interact with each variable individually. This provides much more information than an overall trust measurement.
- Knowing how each trust category performs individually can help in developing specific interventions and strategies.
- Evaluating trust as a single variable can sometimes cause important details to be overlooked. But by breaking it down into separate categories, a more precise measurement of what each category signifies and the corresponding outcomes it entails.
- As a result, breaking trust down into separate categories not only provides a deeper understanding but also allows the development of more effective strategies. This provides much more valuable insights than get based on overall trust alone.

4) The relationships identified in the conceptual model were assessed and examined across various demographic categories. These findings can serve as valuable guidance for policymakers when navigating diverse scenarios. During the study, it became clear that harmony among pillars of social acceptance is crucial. That is, market acceptance should not be addressed in isolation from socio-political or community acceptance, and so on. This provides a more comprehensive and detailed understanding than information derived from generalized findings. By understanding the specific relationships that exist between various demographic groups, it becomes possible to develop customized strategies for these cohorts. This allows for the adoption of more effective and purposeful policy approaches. The research made it clear that consistency between the different pillars of social acceptance is critical. This underlines the idea that it would be insufficient to

address only one aspect of social acceptance in isolation. For example, market acceptance should not be considered in isolation from socio-political or community acceptance. This comprehensive approach facilitates a more holistic understanding of acceptance dynamics. This comprehensive understanding of the links between different demographics and the underpinnings of social acceptance enables policymakers to make informed, effective, and inclusive decisions. As a result, strategies can be formulated that address a broad spectrum of society.

5) Not only direct effects but also indirect effects have been investigated. Investigating indirect impacts provides a more in-depth and holistic understanding and thus facilitates more informed decision-making and risk management. Ignoring indirect impacts can lead to a poor understanding of an issue. Investigating indirect impacts allows the issue to be assessed from a broader perspective. Thus, it goes beyond the effects observed only on the surface and provides a more in-depth examination. Taking indirect effects into account allows for the formulation of more robust and comprehensive strategies. Analyzing indirect impacts can help to identify potential risks and challenges in advance and, in some cases, help decision-makers to take the persuasive rather than the difficult path.

It is expected that policymakers, municipalities, and other stakeholders engaged in this sphere will use the insights gleaned from this study to amplify the utilization of food waste as a renewable energy source, thereby diverting waste away from landfills.

Within the structured model, the relationships identified among constructs were explained while considering the sequence depicted in the visual representation of the model. In other words, the explication of relationships commenced with the construct situated farthest and most distant from the social acceptance construct. Subsequently, the complicated relationships were interpreted.

7.1 Experience-Knowledge-Trust Relationship

A positive causal relationship (Hypothesis 1) between experience and knowledge was identified ($\beta=0.316$; $p<0.01$), as well as between knowledge and three pillars of trust (Hypothesis 2a-2b-2c). Statistical significant values of the relationships are as follows: knowledge and trust-transparency & responsibility ($\beta=0.233$; $p<0.01$), trust-reliability & safety ($\beta=0.283$; $p<0.01$), and trust-environmental & social considerations ($\beta=0.240$; $p<0.01$). This suggests that as actors gain more experience with food-waste-to-energy systems, their understanding of the technology increases. When evaluating this relationship in consideration of the education levels, the R^2 value, which shows the extent to which experience may explain knowledge, was determined to be 3.8% and 14.4% for high school graduates ($\beta=0.194$; $p<0.05$) and for university graduates ($\beta=0.379$; $p<0.01$), respectively. Additionally, the effect size (f^2) of experience on knowledge was found to be small for high school graduates and medium for university graduates. Concerning path coefficients, a positive correlation was observed for both groups; however, the path coefficient was higher for university graduates. This illustrates that experience significantly influences the knowledge level of all participants, with a more significant impact on university graduates compared to high school graduates.

These results may promote the use of the method of increasing experience to elevate the level of knowledge. Therefore, it is important to enhance knowledge not only by expanding the realm of information but also by accumulating experience. Traditional methods of conveying information, such as door-to-door campaigns, have been used in waste management systems for years rather than relying on experiential learning. However, due to the Covid-19 pandemic, this approach has become impractical. Furthermore, especially in the context of separate collection of recyclables, despite information dissemination being enforced through legislation and local administrations, the practices carried out subsequent to the information have proven to be unsustainable. Legislation might even shift its focus shortly after the information, leading to a change in approach. Consequently, people have gradually begun to dismiss the significance of such information-oriented practices. Additionally, negative experiences have eroded people's trust in the system. For instance, they often recount;

- We diligently separated our recyclables, but there was no follow-up collection.
- As nobody collects the separated recyclables, we place bags containing recyclables on the street for scavengers.
- Recycling bins are scarce due to theft or vandalism (because bins are stolen or burned)

The conclusion that can be drawn from these examples also reinforces the results obtained from the study. Therefore, the findings from this study hold significance and should be taken into consideration by practitioners and policymakers during the planning stage. In essence, the study underscores the importance of experience in conjunction with knowledge and trust.

There are also noteworthy examples of increasing knowledge through experience. When individuals visit waste management facilities to witness the processing of waste from their homes and observe the benefits directly and, if applicable, the drawbacks, it augments both knowledge and trust. The mentioned approach has been successfully implemented at the Mamak landfill for years. As previously mentioned, the study's outcomes also validate the effectiveness of this approach. To facilitate this, educational institutions (including primary and high schools, universities, etc.) have organized campaigns to visit the facility. At the Mamak landfill, there exists a training center to welcome students and individuals interested in understanding the waste management system (see Figure 7.1). Furthermore, within the landfill premises, there is a greenhouse where surplus heat generated by gas motors is utilized to cultivate strawberries, tomatoes, flowers, and potato seeds (refer to Figure 7.2). People are genuinely impressed when they see the transformation of waste into viable produce, including vegetables, flowers, and fruits.

For example, in collaboration with the Directorate of National Education, students were presented with a seminar at the solid waste disposal facility in Mamak, followed by an organized tour of the facility. With this approach, students became acquainted with the waste's journey. Children/students then conveyed their observations and new found knowledge to their parents.

Another noteworthy outcome of these visits pertains to the understanding of fruits and vegetables among urban children, some of whom mistakenly believe that strawberries and or tomatoes grow on trees. This leads to the conclusion that even fundamental information, like the growth of fruits, can be enhanced through hands-on experience. It is evident that creating awareness by witnessing processes in person, such as waste management, which is a highly technical matter and often overlooked in daily life, is more effective than encountering such information daily. Seeing these processes firsthand provides a meaningful context, rendering the information more valuable. This method ensures that individuals not only receive information but also experience it. This approach has the potential to educate individuals across different educational backgrounds and bridge the knowledge gap.

Figure 7.1. Training center in Mamak Landfill[53]

Figure 7.2. Greenhouse at the Mamak Landfill[53]

[53] https://docplayer.biz.tr/109485579-Itc-invest-trading-consulting-ag-entegre-kati-atik-yonetimi-integrated-solid-waste-management.html

7.2 The Effect of Fairness

7.2.1 Procedural fairness

One of the results of the study concerning this issue is the significant relationship between trust and procedural relationship (Hypothesis 8a-8b-8c). It has been established that procedural fairness has a direct and positive impact on each pillar of trust, with small effect sizes observed across all of them.

In the relationship between trust-transparency & responsibility, and procedural fairness, a positively signed path coefficient ($\beta=0.176$; $p<0.01$) was identified. This signifies that when decision-making processes are managed equitably, all actors are afforded the opportunity to express their viewpoints. Furthermore, these processes enable participants to acquire a deeper understanding of the project, thereby facilitating their engagement with food-waste-to-energy production systems and processes, leading to potential impact.

Regarding the relationship between trust-reliability & safety and procedural fairness, a positively signed path coefficient ($\beta=0.165$; $p<0.01$) was determined. By raising awareness about both the reliability and safety of food-waste-to-energy production systems and policymakers, actors are empowered to voice their concerns regarding safety and reliability. The findings suggest that following information dissemination, actors are more likely to have faith in the dependability and safety of their waste management system.

In the relationship between trust-environmental & social considerations and procedural fairness, a positively signed path coefficient ($\beta=0.168$; $p<0.01$) was identified. Participatory processes enable actors to raise environmental and social concerns and to become informed about these issues, mainly if the processes are designed to incorporate an environmental and social perspective. However, the impact of procedural fairness on trust becomes insignificant for women when comparing both gender and profession.

One of the methods applied to engage all actors in the decision-making process involves environmental impact assessment studies and public information and participation meetings. Throughout the environmental impact assessment process, objections are gathered, alternative areas and technologies are evaluated, and the project's impacts are deliberated on paper. Given the investor's eagerness to expedite plant commissioning for increased profitability, it is crucial to closely monitor whether the stipulations outlined in the EIA report are realized during the implementation phase, as there might be a mindset of "we will not do it anyway". It was identified by Bayram (2022) that public information and participation meetings have a minimal effect on the decision-making process.

On the other hand, regarding the environmental impact assessment process, public participation meetings are exclusively required for facilities surpassing certain capacities. In accordance with the EIA regulations, projects-specifically Annex-1 and Annex-2 projects[54]-are classified into categories requiring an EIA report, those that mandate a project introduction file, and those that are exempt from EIA. As stated by Bayram (2022), a shortcoming in the EIA procedure lies in the absence of a systematic approach for designating activities covered by Annex-1 or Annex-2, and this deficiency is compounded by shifts in prioritizing existing investments between these categories. Public participation meetings are held for projects within the scope of Annex-1. Vigilant investors, who want to avoid preparing an EIA report, initially present their facility capacities as low[55,56], thus sidestepping the comprehensive EIA procedure and bypassing public disclosure. If they later choose to expand their capacity or attract the notice of a regulatory body after starting operations, they opt for capacity enhancement at a subsequent stage. At this point, the public can be informed, but the facility is already operational. Table 7.1 lists

[54] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=39647&MevzuatTur=7&MevzuatTertip=5
[55] Ege'de biyogaz oyunları - Yeşil Gazete (yesilgazete.org) (last visited on 31.05.2023)
[56] Köylüler biyogaz projesine karşı: 5 tonluk kurnazlık (gazeteduvar.com.tr) (last visited on 31.05.2023)

some projects that initially received authorization for small capacities and subsequently obtained a positive EIA decision for large capacities.

The process of public participation can foster discussions about essential queries pertaining to the requirement for waste management facilities, not solely restricted to the suitability of a location for a particular facility (Watson & Bulkeley, 2005).

Table 7.1 Some projects that received initial authorization for small capacity and subsequently received EIA positive decision for large capacity.

EIA approval date	Previous EIA decision date	Project	Location
30.10.2017	2.09.2016	Hayvansal Atıklardan ve Bitkisel Atıklardan Biyogaz (Elektrik) ve Gübre Üretim Tesisi Kapasite Artışı (10,67 MWe)	Kırklareli
2.07.2018	1.04.2013	Entegre Katı Atık Bertaraf ve Düzenli Depolama Tesisi, Kapasite Artışı, Yakma Tesisi ve 75 MWe Kapasiteli Elektrik Enerjisi Santrali	Manisa
18.01.2019	2.03.2016	Tire Biyogaz Tesisi Kapasite Artışı (6,57 MWm/6,402 MWm)	İzmir
3.10.2019	8.11.2017	Foça Biyometanizasyon Tesisi (3,201 MWe / 3,285 MWm)	İzmir
19.04.2021	23.05.2018	Burdur İli Entegre Katı Atık Düzenli Depolama ve Bertaraf Tesisi (Biyometanizasyon Tesisi-1 ve 2 ile Elektrik Enerjisi Üretim Tesisi-1 (3,554 MWt/1,556 MWm/1,511 MWe) ve Elektrik Enerjisi Üretim Tesisi-2 (10,863 MWt/4,668 MWm/40515 MWe)	Burdur

One of the issues closely related to procedural fairness is the stability of legislation concerning renewable energy production, waste management, and climate change. There have been changes in legislation pertaining to waste management; legislation has demonstrated inconsistency, as evident in Appendix A. Given the established positive correlation between trust and procedural fairness, it becomes imperative to evaluate this relationship within the context of legislative instability, taking into account the historical trajectory of Türkiye's waste management legislation. The instability within waste management can affect the relationship between trust and procedural fairness. Frequent changes in regulations for waste management and energy production may erode actors' trust in these systems, mirroring the observations made in the connection between experience and knowledge. Legislative uncertainty may lead to apprehensions surrounding transparency, reliability, safety, and the consideration of environmental and social issues (Negash et al., 2021). As a result, actors might perceive the food waste-to-energy systems as inadequately regulated or managed, leading to diminished trust in these systems. For instance, the recent modification in renewable energy legislation encompasses changes to the feed-in tariff, as explained in Section 3.2.2. To benefit from the previous tariff, investors have been given a 6-month extension right. This timeframe was particularly challenging, especially for those who had aligned their investment plans with the prevailing legislation and had not yet started construction. When the investors could not commission their facilities within the specified time, they had to make a decision considering that they had determined their financial feasibility according to the previous tariff and that the economic viability made it quite daunting. These fluctuations generate a sense of insecurity among investors, diminishing their inclination to pursue further investments.

The fact that the legislation constantly changes can underscore the lack of clarity in policies related to these issues. The legislative amendment in 2021 concerning renewable energy generation systems, for instance, has resulted in a decrease in the trend in new licenses[57] (Figure 7.3). After the decline in investments, that is, after this reaction of the actors, the tariff was updated again (Resmî Gazete Cumhurbaşkanı Kararı, 2023). According to Table 3.2, municipalities lack sufficient treatment plants. Despite efforts to increase their number, progress has not been sustained. One of the reasons can be decreased legislative support, which should be researched in detail.

[57] https://www.epdk.gov.tr/Detay/Icerik/5-12885/2023-yili-nihai-yek-listesi

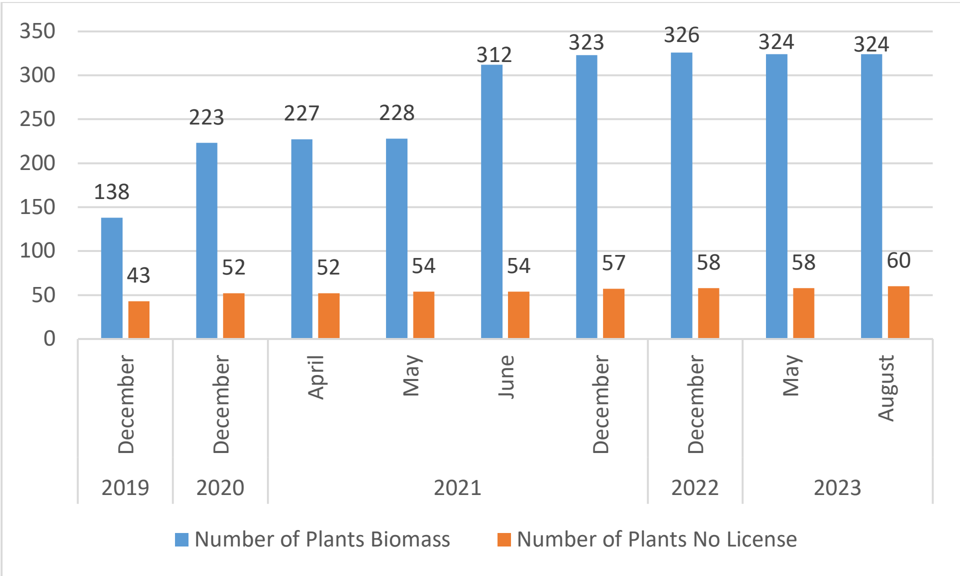


Figure 7.3. Number of biomass (all kinds of biomass, not only MSW) to energy plants between 2020 and 2023 (source TEİAŞ reports; (TEIAS, 2019, 2021; TEİAŞ, 2021b, 2021a, 2023b, 2023a)

It is essential to consider other perspectives on this matter, such as concerns about preventing industrial investors and consumers from incurring additional expenses due to YEKDEM[58]. Therefore, the legislation on this issue must be meticulously evaluated by experts, weighing the significance of various factors-whether, prioritizing alternative energy production or resource importation from abroad is more advantageous. Furthermore, these legislative shifts also affect the construction of waste treatment facilities. Although the government seems to be the most powerful actor in this context (Kılıç et al., 2017), the efficacy of these laws/decisions comes under scrutiny when no entities, whether from the industry or waste management sector, display interest in establishing these facilities. This scenario brings market acceptance and socio-political acceptance to the forefront from a

[58] https://www.emo.org.tr/genel/bizden_detay.php?kod=131691

policy standpoint. As an indication of this, the tariff was updated once again following the decrease in investments (Resmî Gazete Cumhurbaşkanı Kararı, 2023).

While the process of crafting laws, rigorously reviewing them, and ensuring that regulations align with best practices during their creation is a sound approach, it holds even greater importance to formulate legislation that guarantees the realization of technically and financially feasible practices embraced by stakeholders. Concerning Türkiye’s legislative landscape, it is difficult to broadly assert the presence of a legislative deficit. However, it is more difficult to find the actual implementation of this legislation. Locating facilities genuinely constructed in accordance with these regulations is a demanding endeavor. This challenge arises because structures often cannot be built in compliance with the stipulated rules. Consequently, there exists a legislative gap pertaining to practices that are technically feasible, economically viable, and sustainable. The discordance between laws and their application becomes evident, highlighting an incompatibility between the laws and those who have to abide by them. The following issues underscore the reasons that prevent the establishment or success of waste management systems due to legislative constraints:

- Legislation should be crafted with consideration for all actors involved. For example, in Türkiye, there are 30 metropolitan municipalities, 51 provincial municipalities, and 922 district municipalities (comprising 519 metropolitan districts and 403 districts)[59]. The populations, capacities, incomes, and opportunities of municipalities are naturally different from each other. It is not possible for every municipality to uniformly implement the same rules, especially within the context of waste management systems. However, legislation often enforces identical rules for all municipalities. Therefore, inconsistencies arise in practice. The establishment of waste-to-energy production facilities demands a specific volume of waste, a factor that significantly impacts the feasibility of establishing such plants, particularly for

[59] https://www.e-icisleri.gov.tr/Anasayfa/MulkiIdariBolumleri.aspx

small-scale operations. The financial implications for smaller municipalities can be disproportionately burdensome due to the high costs associated with these small-scale plants. The regulatory framework is applied uniformly to all municipalities, irrespective of their population. The same conditions are imposed on municipalities, whether they house people of 10,000 or 1,000,000. The requirement to adhere to each of these mandates poses a significant challenge for small municipalities, especially those with constrained budgets.

Legislation[60] has extended the jurisdictional purview of metropolitan municipalities, compelling them to manage waste collection across significantly expanded territories, including villages, and subsequently transport this waste to a centralized facility within the metropolitan center. This requirement arises from legislation mandating the establishment of a waste separation facility in every municipality, regardless of its size. An unintended consequence of this requirement is the generation of CO_2 emissions due to the transport of waste over extensive distances, often spanning hundreds of kilometers. Therefore, without conducting life cycle assessments and similar evaluations, enforcing uniform regulations in each municipality may not lead to the successful implementation of sustainable waste management systems.

- According to the legislation, each municipality is required to have a sorting plant, regardless of its population and/or waste volume,
- The provision of public services is inadequate in terms of capacity, as the current number of civil servants is insufficient to serve the whole country. Simultaneously, the uniform application of regulations ties up public servants with legislation.

[60] On Dört İlde Büyükşehir Belediyesi ve Yirmi Yedi İlçe Kurulması ile Bazı Kanun ve Kanun Hükmünde Kararnamelerde Değişiklik Yapılmasına Dair Kanun (last visited on 13.08.2023) - https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6360&MevzuatTur=1&MevzuatTertip=5

- Within the legislative frameworks governing the energy, environmental, and agricultural sectors, inconsistencies exist. For instance, environmental regulations unequivocally proscribe any form of preliminary or experimental production during the permit acquisition phase, a restriction not present in corresponding legislation that permits such activities. Furthermore, by referring to the issues related to the EIA regulation mentioned in this section, it is suggested that institutions responsible for granting permits related to renewable energy production thoroughly comprehend the implications of the EIA document/decision. This ensures that the EIA document extends beyond being mere paperwork within a file and instead presents a document compatible with the project's capacity.

Procedural fairness and trust are closely related, with the latter's influence on the former being acknowledged. When legislative instability affects procedural fairness, it can indirectly impact trust as well. For instance, if actors perceive the decision-making processes as unfair due to unpredictable legislation, their trust in the food-waste-to-energy systems may decrease.

Moreover, it was observed that the relationship between trust and procedural fairness yielded distinct path coefficients for university-graduated individuals and those with a high school education. Measurement invariance remained consistent between procedural fairness and trust-transparency & responsibility and trust-environmental & social considerations. Concerning the relationship between trust-transparency & responsibility, and procedural fairness, both education levels have a positive significant effect. However, high school graduate actors' path coefficients ($\beta=0.207$; $p<0.05$) are slightly higher than university graduates ($\beta=0.147$; $p<0.05$). In the case of the relationship between trust-environmental & social considerations and procedural fairness, high school graduated actors' path remained significant at a 95% confidence interval ($\beta=0.212$; $p<0.05$) while the university graduated ones' at a 90% confidence interval ($\beta=0.131$; $p<0.1$). These findings suggest that different actors within the system may hold distinct expectations and assessments regarding trust and decision-making processes. Hence, it becomes essential for every actor within the system to be thoroughly informed and actively engaged in the decision-making process, taking into account their priorities and perceptions, pre-existing beliefs, and socio-economic factors.

In order to gain social acceptance for food waste-to-energy systems, it is imperative for policymakers and energy producers to increase transparency, fairness, and accountability in line with actors' expectations. However, on the contrary, policymakers might opt not to augment public knowledge to avoid potential criticism. This policy change could be presented to actors as a fait accompli, lacking consultation or discourse. They may choose not to provide information… Such practices are often perceived as lacking fairness (Wolsink, 2010).

One of the issues to be addressed between procedural fairness and trust is related to the tender processes executed by local governments when selecting a contractor for energy production from food waste. Municipalities should conduct these tender processes with transparency and openness. Bidding documents should include information on criteria and processes that are accessible to all interested parties. This may increase the trust among the potential bidders toward the municipality. The municipality's transparency, success, and demonstrated experience in similar projects contribute to instilling confidence among bidders in collaborating with the municipality. Regrettably, in the waste management sector, municipalities have the authority to cancel tenders and initiate re-tendering for various reasons, including favoring a specific bidder until they win, a shortage of bidders, insufficient bids, and so forth. When these issues are not present, national or international companies that possess the capacity to execute projects effectively may be more willing to engage in waste treatment and energy production projects.

The tender process should ensure fair and equitable conditions for all participants, guaranteeing equal opportunities. Municipalities should base their decisions on objective criteria, devoid of political pressure, and on impartiality. Qualification requirements ought to align with the specific project the municipality is embarking upon.

Table 7.2 Some of the examples of repeated tenders

Name of the Tender	Date
Konya	
Installation of the Necessary Facilities For The Disposal Of Solid Wastes in Konya Solid Waste Landfill And Operation Of The Site (Konya Katı Atık Düzenli Depolama Sahasında Kati Atıkların Bertaraf Edilerek Elektrik Enerjisi Elde Edilmesi İçin Gerekli Tesislerin Kurulması ve Sahanın İşletilmesi İşi)	24.01.2017[61]
Construction and Operation of Konya Integrated Solid Waste Treatment and Disposal Facilities by Transfer of Concession Rights (İmtiyaz Hakkının Devri Yoluyla Konya Entegre Katı Atık Değerlendirme ve Bertaraf Tesisleri Yapımı ve İşletilmesi İşi İhale Edilecektir)	07.07.2015[62]
Construction and Operation of Konya Integrated Solid Waste Treatment and Disposal Facilities by Transfer of Concession Rights (İmtiyaz Hakkının Devri Yoluyla Konya Entegre Katı Atık Değerlendirme ve Bertaraf Tesisleri Yapımı ve İşletilmesi İşi İhale Edilecektir)	04.10.2014[63]
Muğla	
Establishment of the Right of Overriding Right for 15 Years in the Facility Lands Determined for the Operation of the Existing, Under Construction and Planned Solid Waste Landfill Facilities within the Borders of Muğla Metropolitan Municipality and Implementation of the Integrated Solid Waste Management System (Muğla Büyükşehir Belediyesi Sınırları İçerisinde Mevcut, İnşa Aşamasında Olan ve Planlanan Katı Atık Düzenli Depolama Tesislerinin İşletilmesi ve Entegre Katı Atık Yönetim Sistemi'nin Uygulanması Amacıyla Belirlenen Tesis Arazilerinde 15 Yıl Süreliğine Üst Hakkı Tesis Edilmesi İşi)	25.05.2017[64]
Establishment of the Right of Overriding Right for 15 Years in the Facility Lands Determined for the Operation of the Existing, Under Construction and Planned Solid Waste Landfill Facilities within the Borders of Muğla Metropolitan Municipality and Implementation of the Integrated Solid Waste Management System (Muğla Büyükşehir Belediyesi Sınırları İçerisinde Mevcut, İnşa Aşamasında Olan ve Planlanan Katı Atık Düzenli Depolama Tesislerinin İşletilmesi ve Entegre Katı Atık Yönetim Sistemi'nin Uygulanması Amacıyla Belirlenen Tesis Arazilerinde 15 Yıl Süreliğine Üst Hakkı Tesis Edilmesi İşi)	20.04.2017

On the other hand, municipalities might also face grievances due to incomplete projects. It is also essential to protect the rights of local authorities and the citizens who stand to benefit from the service (Can, 2014). The culmination of the tender process results in a contract binding both parties. Infrastructure investments like food-waste-to-energy systems are grounded in long-term contracts. Even if work is terminated due to contractors failing to complete the job, the periods during which the work is not carried out translate into public losses. Therefore, the tender process and contract preparation should not solely remain within the domain of

[61] https://www.resmigazete.gov.tr/ilanlar/eskiilanlar/2017/01/20170111-3.htm#A01
[62] https://www.resmigazete.gov.tr/ilanlar/eskiilanlar/2015/06/20150611-3.htm#a07
[63] https://www.resmigazete.gov.tr/ilanlar/eskiilanlar/2014/09/20140915-3.htm#A04
[64] https://www.mugla.bel.tr/uploads/duyurutr/Cevre_koruma/7-ekay%20ihale%20ilan%20metni-nihai12.5.2017.pdf

municipalities; these processes should be overseen by an authorized agency, as stated in the tender legislation (Can, 2014).

Another issue related to the capacities of municipalities is that they have inherited institutional structures, capacities, and powers designed based on their responsibilities. These structures have granted them significant control over a minute section of the resource cycle, which pertains to the collection of waste and its subsequent transfer to either recycling contractors or disposal. However, they possess limited authority to promote waste-to-energy practices (Watson & Bulkeley, 2005). Additionally, a dearth of technical expertise among responsible personnel compounds the situation. Organizing technical visits to facilitate an interaction between experience and knowledge is crucial. These visits should be coordinated among the ministry, municipality, and experienced firms/municipalities. As a result, these individuals should facilitate the establishment of facilities suitable for the municipality's requirements.

In the context of municipal waste management, the implementation of procedures and the distribution of outcomes share a strong correlation (Watson & Bulkeley, 2005). Hence, the following section delves into the concept of distributive fairness.

7.2.2 Distributive fairness

Distributive fairness is an important factor in the social acceptance of renewable energy sources (Delicado et al., 2016; del Río & Burguillo, 2008). It is essential to clarify the advantages and disadvantages of food waste-to-energy systems, along with their perception and distribution. In this study, distribution fairness was linked to various constructs, with the significant ones being positive affect (Hypothesis 16a) and perceived risks (Hypothesis 16d). The relationship between distributive fairness and perceived risks exhibited a small effect size. A significant positive relationship emerged between perceived risks and distributive fairness, albeit with a small effect size ($\beta=0.162$; $p<0.01$). Additionally, a significant positive relationship between positive affect and distributive fairness was found ($\beta=0.125$; $p<0.05$), but its effect size remained below the small threshold. During the survey, respondents were asked about their views on the equitable distribution of advantages and disadvantages. Regarding the distributive fairness of advantages, 33.9% responded with “don't know” and “not sure”, 44.5% disagreed/strongly disagreed, and 13.3% agreed/strongly agreed. Concerning the distributive fairness of disadvantages, 41.7% answered “don't know” and “not sure”, 22.9% disagreed/strongly disagreed, and 42.5% agreed/strongly agreed. From these results, it is understood that participants think that while everyone is exposed to the downsides, not everyone benefits from the advantages.

The impact of distributive fairness on positive affect is higher among individuals working in the public sector when compared to others (excluding the private sector). It was also determined that women tend to experience positive affect through distributive fairness, although this relationship was not as robust among men. On the other hand, the correlation between "procedural fairness and trust-environmental & social responsibility" appeared strong for men but was not as conclusive for women. Regarding this observation, it can be inferred that women place a greater emphasis on distributive fairness in terms of their perception of fairness. Furthermore, the study found that women’s significance placed on distributive fairness with higher levels of education. When comparing groups based on occupation, it was noted that women across various sectors, such as public and private sectors, as well as those not currently engaged in the labor force, exhibit a similar impact of distributive fairness on positive affect.

Concerning the benefits and/or drawbacks related to waste management systems, the location of landfills plays a pivotal role. Landfills are typically sited in areas inhabited by lower-income groups, directly exposing residents in those regions to adverse effects (Ferretti, 2010; Zeiss & Atwater, 1987; Watson & Bulkeley, 2005). Detriments include items like nylon bags being blown by the wind, odor problems, explosion risks, water and air pollution, the formation of unstable garbage mounds prone to sliding, in property value depreciation affecting housing and land, an increase in crime rates, and more. For example, due to these factors and others, the Mamak region has long suffered from the stigma of being primarily associated with its landfill (Zeiss & Atwater, 1987). Interestingly, the survey data shows that 52% of respondents in Mamak are either unaware or unsure of where the waste is transported. This suggests that the negative externalities once associated with the Mamak Landfill have been alleviated due to the implementation of waste-to-energy facilities in the area.

In the context of waste management, distributive fairness also deals with the issue of who generates a large amount of waste and where these wastes are treated. For example, in some cases, an area might produce a significant amount of waste, yet the processing and storage processes are often diverted to another area that produces relatively less waste. This places an additional burden on the residents of the latter area, contradicting the principles of distributive fairness. This issue is closely tied to the social-spatial distribution of waste facilities (Watson & Bulkeley, 2005).

Initially, landfills were situated far from the urban centers, but as cities expanded, these landfills are now positioned in what can be termed as the city center. Therefore, the benefits and risks become more readily apparent when a waste treatment plant is established in a currently used landfill. Although these regions might not have experienced distributive fairness during the landfill selection process, the individuals who have suffered from the drawbacks of these areas now have the opportunity to reap the advantages of generation from waste through innovative technology. This transition not only eliminates the negatives but also brings forth economic benefits, including job opportunities, local purchasing, and an increase in real estate values. However, a study on wind energy highlighted that environmental concerns often receive more attention than socioeconomic factors, such as employment (del Río & Burguillo, 2008).

How should the benefits or drawbacks be allocated when addressing distributive fairness? Should residents near the waste treatment plant pay lower taxes due to their greater exposure to issues like odors compared to other parts of the city?

When compared to not having an energy production system, food-waste-to-energy production systems have no harm as long as they are made in accordance with the appropriate techniques and laws. Therefore, in the context of food-waste-to-energy systems, the conversation about distribution can extend beyond negatives. This is due to the existence of positive externalities associated with waste-to-energy systems, including their ability to serve as substitutes for fossil fuels. On the other hand, food-waste-to-energy production systems contribute to the reduction of CO_2 emissions by converting methane, a potent GHG, into CO_2. How is this benefit distributed? Will this translate into a decrease in carbon taxes? When and to what extent will the potential risks emerge? This complex issue is interconnected with waste management, carbon management, renewable energy production, and the social acceptance of these systems.

Zeiss and Atwater (1987) showed the distribution of costs and benefits associated with waste facilities (Zeiss & Atwater, 1987). The diagram was subsequently adapted for food waste-to-energy systems, as shown in Figure 7.4. Zeiss & Atwater (1987) initially indicated that benefits and costs were uniform across regions. However, it was proposed that benefits and costs should vary for those in proximity to waste treatment facilities.

When a waste-to-energy conversion facility is built, surplus heat can be generated during the electricity production process. This heat can be utilized for heating purposes in the nearby vicinity, given its technical feasibility and economic viability. In this case, communities previously impacted by the externalities of a landfill could potentially access clean energy instead of relying on fossil fuels and at a more cost-effective rate. An example of this concept can be found at the Mamak site. In close proximity to the landfill, a shopping mall has effectively employed waste heat for emission reduction, substituting it for fossil fuels due to its favorable distance for heat transportation.

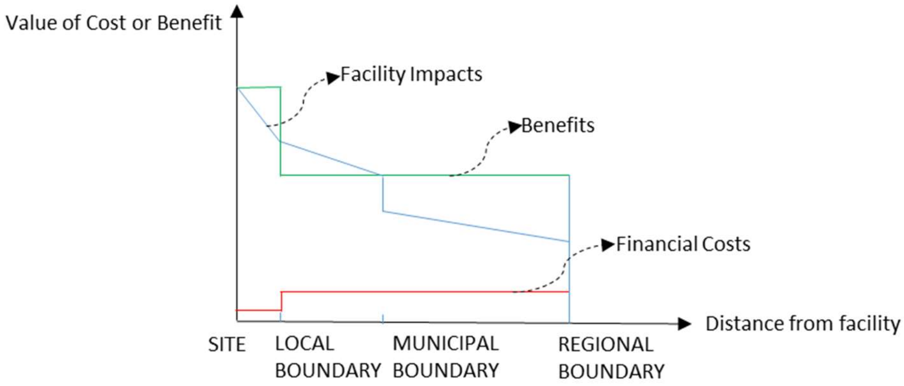


Figure 7.4. Distribution of the cost and benefits of waste-to-energy generation plants (adapted from Zeiss and Atwater, 1987)

Regardless of the plant's location, when addressing the distributive fairness of food-waste-to-energy plants, the allocation of negativity and which negativity is distributed becomes a pivotal consideration (Ferretti, 2010). Waste disposal inevitably gives rise to a range of externalities that impact environmental quality and society at large, as discussed earlier. These externalities encompass both localized effects, such as local pollution, noise, and visual disturbances, and broader concerns spanning transboundary and global pollution (European Commission, 2000).

The crises that occur today, notably climate change, stem from whom? Who is affected by the actions we take, and when? Evaluating distributive fairness involves scrutinizing who bears the brunt of our actions and the potential harm they entail. Various models have been created to calculate the costs of the damage we pass on to future generations, and the allocation of these costs is subject to ongoing discourse. These debates are encapsulated in the context of the social cost of carbon. Although economic models have been devised to address these issues, practical implementation remains pending. It has not been decided which generation should shoulder the financial burden and whether the next generations should be left to figure it out themselves. This study is involved in this topic because of the benefits provided by waste disposal facilities. The responsibility for waste disposal rests with municipalities, and costs should be taken from the waste producers under the polluter pays principle. Food-waste-to-energy production systems play a vital role in the battle against climate change. Therefore, when both situations are considered, citizens seeking to responsibly dispose of waste and avert future climate crises should contribute financially. However, this trajectory must account for social acceptance; proactive steps should be taken only after examining the public willingness to embrace these initiatives and identifying pathways to secure that acceptance. This study underscores that meticulous attention to specific factors can pave the way to achieving social acceptance.

Participants were asked about the feasibility of the public shouldering the costs of alternative energies in the fight against climate change. Among them, 30.2% responded with “don't know” and “not sure”, 41.0% expressed disagreement/strong disagreement, and 28.9% indicated agreement/strong agreement. It appears that actors are not willing to embrace higher bills as a means to combat climate change. This result is compatible with the findings of Konda (2021), who conducted a survey on climate change perception (KONDA, 2021). However, this sentiment did not affect the intention towards social acceptance intention.

7.3 The Effect of Perceived Risks, Benefits, and Positive Affects

The importance of relationships between procedural/distributive fairness, trust, experience, and knowledge has been expounded so far. The following explanations will include the interconnections between the model’s constructs and positive emotions, perceived risks/benefits, as well as their meditating role of them.

When examining the relationship between trust and perceived risk, it was uncovered that each pillar of trust within food waste-to-energy systems exert a direct impact on perceived risks. According to the effect sizes of the three aspects, “transparency and responsibility” ($\beta=0.262$; $p<0.01$) and “reliability and safety” ($\beta=0.214$; $p<0.01$) have a small size effect, and “environmental and social considerations” ($\beta=0.111$; $p<0.1$) has no impact on perceived risks. However, contrary to hypothesize

(Hypothesis 4a-4b-4c), the relationship between trust and perceived risks is positive. This unanticipated result can be explained by contextualizing the situation within the realm of low perceived risks and the role of trust in risky situations (Aldas-Manzano et al., 2011). In cases where perceived risks are low, actors may not heavily rely on trust. This result is compatible with the IPMA results, which showed that trust's low importance and performance. Actors may already have a favorable perception of food-waste-to-energy systems owing to their low-risk nature. As a result, the degree of trust may not be a critical factor influencing their perceptions. The positive relationship between trust and perceived risks could be attributed to trust gaining more prominence in riskier situations.

Facilities that produce energy from food waste, such as biomethanization, differ significantly from thermal treatment facilities like waste incineration plants (Rowe et al., 2016). Therefore, the perceived risks for such plants diverge from those attributed to incineration plants. Typically, the perceived risk linked to incineration plants tends to be higher and attracts more reactions (Ren et al., 2016). It was assumed that individuals who recognize the distinctions in technology might not hold a risk perception as high as that associated with incineration plants.

In food waste-to-energy systems, fostering a positive affect hinges on trust-transparency, and responsibility (Hypothesis 6c). The study revealed that positive affect is influenced solely by trust-transparency and responsibility ($\beta=0.279$; $p<0.01$). Ensuring that trust can alleviate concerns regarding potential hazards or negative consequences (Huijts et al., 2014). Additionally, when people believe that the involved actors are transparent and responsible, they are more likely to harbor positive feelings towards food waste-to-energy systems. This positive affect can further contribute to a favorable perception of the system. When people trust transparent and responsible management or organizations, positive emotions can be triggered. Transparency gives people confidence that they have access to accurate information and ethical, fair dealings. Positive emotions aid people in evaluating the benefits that a process or organization offers more positively, resulting in an elevated perception of benefits. Although the relationship between "trust in transparency and responsibility” and perceived benefits is insignificant, the indirect effect of the relationship via positive affect is significant ($\beta=0.04$; $p<0.05$). Consequently, it can be said that positive affect fully mediates the relationship between “trust in transparency and responsibility” and perceived benefits (Hypothesis 30i). Therefore, trust affects perceived benefits by increasing positive emotions, making the relationship significant.

The impacts of “positive affect on attitude” and “perceived benefits on personal norms” are more pronounced for actors who work for the public in comparison to others (excluding the private sector). For individuals residing outside Çankaya and Mamak, the impact of trust-transparency & responsibility on perceived risks is more substantial for public servants than for private sector employees. Similarly, for those who live outside Çankaya and Mamak, the impact of perceived risks on personal norms, intention-to-accept on social acceptance, and problem perception on positive affect is more pronounced for people out of the labor force compared to private sector employees. Furthermore, the impact of perceived risks on personal norms, intention-to-accept on social acceptance, positive affect on attitude, problem perception on positive affect, and trust-transparency & responsibility on perceived risks have a more significant influence on public servants in comparison to private sector employees.

When evaluating the impact of trust in reliability and safety on perceived benefits (Hypothesis 3b), it becomes evident that these factors play a crucial role. Perceived benefits were solely influenced by trust in reliability and safety ($\beta=0.301$; $p<0.01$). Understanding and valuing a system’s reliability and safety significantly heightens the perceived environmental, economic, and social benefits of these systems, ultimately leading to increased acceptance. When a community sees tangible benefits such as reduced amount of landfilled waste, lower greenhouse gas emissions, and job creation, their confidence in the system’s reliability and safety solidifies. A reliable food waste-to-energy system consistently and efficiently converts waste into energy without frequent breakdowns or interruptions. This steadiness ensures a consistent energy supply and contributes to efficient waste management.

Furthermore, a secure food waste-to-energy system minimizes potential risks to human health and the environment associated with landfills. Trust in the system's safety amplifies perceived benefits by reassuring stakeholders that the system generates energy and manages waste without causing harm. If a system is perceived as unsafe, concerns about potential risks could overshadow its benefits, deterring stakeholders. According to the bootstrapping MGA results for age + gender categorization, only the difference in the relationship between "trust-reliability & safety and perceived benefits" was found to be partially significant. For actors under 25, the impact of trust-reliability & safety on perceived benefits was notably higher. Other relationships did not exhibit statistically significant differences for these groups.

Another crucial aspect to address while discussing the roles of perceived risks, perceived benefits, and positive impact is the mediating effect of trust (Hypothesis 29c-d-h-k-l-n). Connections were established between procedural fairness and these constructs. While the analyses did not reveal a direct significant impact in these relationships, it was observed that trust played a mediating role in them. Trust in transparency and responsibility mediates the relationship between "procedural fairness and positive affect" ($\beta=0.05$; $p<0.01$) as well as "procedural fairness and perceived risks" ($\beta=0.05$; $p<0.01$). Similarly, trust in reliability and safety acts as a mediator in the relationship between "procedural fairness and perceived benefits" ($\beta=0.05$; $p<0.01$) and "procedural fairness and perceived risks" ($\beta=0.04$; $p<0.05$). When comparing the groups of male homeowners and female homeowners, it was found that the actors in these two groups exhibited similar results. As a result of the comparison, it was determined that the difference between the results was statistically significant only in two paths at a 90% confidence interval. One of these paths pertains to the relationship between "perceived behavioral control and intention-to-accept," while the other is linked to the relationship between "trust-environmental & social responsibility and perceived risks". It has been found that the impact is higher for women homeowners in the first path and the impact is higher for men homeowners in the second path. The impact of trust on perceived risks did not show significance when considering the participants' profession and gender.

By cultivating trust in transparency, responsibility, reliability, and safety, organizations and systems can indirectly influence positive affect, perceived risks, and perceived benefits, even though procedural fairness itself does not have direct effects on these variables. Therefore, trust is a factor to which policymakers, regulatory bodies, companies responsible for the treatment, and local authorities should pay particular attention in the context of social acceptance of food waste-to-energy systems.

Given that perceived benefits and risks are regarded as determinants affecting personal norms, a connection was made between them (Hypothesis 15a-15d). Although the results of the analysis indicate that personal norms are affected by perceived benefits ($\beta=0.472$; $p<0.01$), positive affect does not directly affect personal norms. Instead, positive emotions impact personal norms through the mediating role of perceived benefits ($\beta=0.07$; $p<0.01$).

Personal norms were also influenced by perceived risks at a 90% confidence interval ($\beta=-0.084$; $p<0.1$. A negative signed relationship exists between the constructs, and this relationship is statistically significant, albeit with a relatively small effect size. The negative relationship between personal norms and perceived risks suggests that as participants perceive higher risks associated with food waste-to-energy plants (e.g., environmental hazards and air pollution), their personal norms become less supportive or favorable towards the related issues (e.g., energy production from food waste and climate change prevention projects). This finding underscores the role of perceived risks in shaping personal norms and draws attention to the fact that interventions aimed at reducing perceived risks can affect individuals' beliefs and values, thus impacting social acceptance.

It was also found that positive emotions do not directly change actors' personal norms, but they can influence their perception of benefits (Hypothesis 26f) ($\beta=0.152$; $p<0.01$). This change in perceived benefits can then indirectly ($\beta=0.07$; $p<0.01$)

shape personal norms (Hypothesis 35c). The indirect effect through perceived benefits complements the direct effect, contributing to a stronger overall relationship between positive affect and personal norms. People do not feel hopeful about a plant simply because it operates and produces energy. Instead, their sense of hope and behavioral inclination tend to develop after they realize that this plant will lower their bills, reduce the country's dependence on foreign energy sources, and leave a cleaner environment for future generations.

A similar mediation effect exists for the relationship between attitude and positive affect. Although the relationship between attitude and positive affect is significant ($\beta=0.165$; $p<0.01$) (Hypothesis 14a), perceived benefits play a complementary mediating role ($\beta=0.06$; $p<0.05$) (Hypothesis 33c). It has been determined that the effect size of the positive affects on attitudes towards the conversion systems from food waste to energy is small for high school graduates. In contrast, there is no effect observed among university graduates. Regarding structural analysis, while the path coefficients are significant within the 90% confidence interval for university graduates ($\beta=0.130$; $p<0.1$), they were found to be significant within the 95% confidence interval for high school graduates ($\beta=0.234$; $p<0.05$). It can be said that for university graduates, emotions have less impact on attitudes toward food-waste-to-energy generation systems.

Attitude was influenced by perceived risks (Hypothesis 19) and perceived benefits (Hypothesis 20). A negative relationship was found between perceived risks and attitude ($\beta=-0.126$; $p<0.05$). This negative sign indicates that as perceived risks increase, actors pay less attention to how and from which energy source is produced. In other words, the more actors think that facilities producing energy from food waste are dangerous to the environment and contribute to air pollution, the less importance they attach to the energy source. On the other hand, as actors' knowledge and awareness of food-waste-to-energy production systems increase, there may be changes in risk perceptions and attitudes. For individuals outside of Çankaya and Mamak, the impact of perceived benefits on attitudes is more significant among those employed in the private sector compared to public servants.

When considering gender, it appears that men's attitudes are more shaped by positive emotions, while women's attitudes tend to be more influenced by both perceived advantages and potential risks. Among men holding a university degree or higher, their attitudes are more affected by positive emotions, perceived benefits, and perceived risks than those of women.

Upon comparing the male and female groups, it was found that attitudes have a more significant impact on women's intention to accept than on men's. However, this pattern changes for women as their level of education increases. If actors learn that the risks associated with these systems are low and this knowledge is inconsistent with their existing beliefs, they may experience cognitive dissonance (Li et al., 2020).

A positive relationship was discovered between perceived benefits and attitude ($\beta=0.397$; $p<0.01$). This positive effect indicates that as perceived benefits increase, actors pay more attention to how and from which source the energy is produced. In other words, the more actors believe that energy production from food waste has a downward effect on energy bills, reduces foreign energy dependence, creates a more livable environment for future generations, and prevents environmental pollution, the more significance they attribute to it.

Several complicated relationships within the model are linked between positive affects, attitudes, and perceived benefits towards food-waste-to-energy systems. Positive affect can guide actors to view food-waste-to-energy systems as beneficial and valuable solutions to environmental and energy challenges. It also suggests that interventions aimed at increasing positive affect might have an indirect influence on personal norms by affecting perceived benefits.

This study shows that perceived risks and benefits significantly impact the social acceptance of food-waste-to-energy systems. As actors perceive the benefits of these systems more strongly, they attach greater importance to the energy source. Consequently, in order to increase the social acceptance of food waste-to-energy systems, it is important to emphasize the benefits of these systems, effectively manage potential risks, and communicate this information to the actors.

7.4 The Effect of Problem Perception

Perceiving global warming as a threat and recognizing energy supply constraints positively influences support for energy from food waste, perceived benefits (Hypothesis 12b), and positive affect (Hypothesis 12e) while decreasing perceived costs (Hypothesis 12d). A positive signed and statistically significant relationship between problem perception and perceived benefits ($\beta=0.247$; $p<0.01$) was identified, as well as problem perception and positive affect ($\beta=0.111$; $p<0.05$). Increased awareness of issues such as environmental pollution leads to a heightened interest in adopting methods to mitigate these challenges. These results show that food-waste-to-energy systems are acceptable, particularly in the context of addressing unstoppable climate change and energy supply concerns. Food waste-to-energy systems offer an alternative energy source while contributing to climate change mitigation efforts. When individuals understand the severity of climate change and energy constraints, they are more inclined to appreciate the advantages of using food waste for energy production systems and hold favorable attitudes towards implementing such systems. It is clear that actors are aware of the severity of these problems. In terms of gender, men's perception of problems significantly affects positive affect, perceived benefits, and personal norms more than it does for women. Interestingly, the relationship between problem perception and positive affect becomes non-significant as the education level increases. It was also determined that the impact of problem perception on positive affect remains statistically insignificant when categorized by gender and profession.

In the complete model, a positive signed and statistically significant relationship ($\beta=0.320$; $p<0.01$) was identified between problem perception and personal norms (Hypothesis 12a). This correlation can be explained by the way people's understanding of global issues, such as climate change and energy constraints, shapes their values and beliefs. This research has indicated that people view global warming as a risk and are concerned about the limitations of the energy supply. This awareness holds the potential to reshape personal norms by influencing the sense of responsibility to contribute to finding solutions.

On the other hand, the relationship between problem perception and perceived benefits is mediated by positive affect at a 90% confidence interval ($\beta=0.017$; $p<0.1$).; as a complementary partial mediator (Hypothesis 31c). However, for the groups categorized according to education level, no mediation role of positive effect is observed. A direct relationship exists between problem perception and perceived benefits. Since the path coefficient of the mediation effect for the complete model is insufficient, and the groups do not have the mediation effect, it can be concluded that this meditation can be omitted.

There is also a complementary mediation effect (Hypothesis 39a) of perceived benefits between problem perception and personal norms ($\beta=0.117$; $p<0.01$). When people perceive a problem as more significant, they may also recognize the potential positive outcomes of addressing that problem. As issues such as the seriousness of climate change and the scarcity of energy resources become more recognized, personal norms may be shaped in a supportive direction. In other words, actors may be more inclined to support projects that tackle climate change and alternative energy projects. In addition to problem perception, as actors realize the potential benefits of using food waste for energy generation, these perceived benefits may further strengthen their personal norms in a supportive direction. This, in turn, can also increase support for food-waste-to-energy production and climate change projects.

Participants were asked to assess Türkiye’s reliance on foreign suppliers for its alternative energy technology needs and whether there exist local technology providers capable of generating energy from biodegradable waste. The majority of participants believe that there are no local suppliers offering these technologies and that Türkiye heavily depends on foreign sources for alternative technologies. Only 12.6% and 8.5% of the responses were positive regarding the presence of domestic technologies. This result again indicates the importance of experience and knowledge. Domestic firms are indeed capable of developing much of the necessary technology in this field. However, it is apparent that the public perceives it differently due to a lack of this information.

7.5 Intention to Accept and Acceptance

Personal norms, social norms, attitudes, and perceived behavioral control all influence the intention to accept (Hypothesis 21-22-23-24). When comparing the effect sizes of these constructs on intention to accept, the most potent construct is social norms ($\beta=0.322$; $p<0.01$). Although perceived behavioral control has a significant effect on intention-to-accept at a 90% confidence interval ($\beta=0.077$; $p<0.1$), the effect size shows that this impact is negligible. Li et al. (2020) showed that social norms and attitudes were influenced by regulations. If the system is appropriately regulated, actors are more willing to accept it.

The significant relationships between “intention to accept” and attitude ($\beta=0.22$; $p<0.01$) social and personal norms ($\beta=0.26$; $p<0.01$) indicate a consistent approach among actors. They believe that as technology advances, the efficiency and capacity of alternative energies increase. They express an intention to support food waste-to-energy systems, especially if these systems contribute to the national economy, the fight against climate change, and the improvement of air and water quality. However, despite these positive attitudes among the actors, there is an existing implementation problem. This gap is largely attributed to the legislation surrounding food-waste-to-energy production systems. The lack of harmonization and adaptation in legislation, coupled with incompatibilities in legislation related to food waste-to-energy systems, contributes to this issue.

The significant relationship between social norms and intention to accept supports other research on this subject. For example, individuals who perceive that pro-environmental behavior is common among others/close ones tend to support environmental projects (Chan et al., 2022).

While men's intention-to-accept is more affected by personal and social norms than that of women, women's intention-to-accept is more affected by attitudes than men's. Moreover, as the level of education increases, the effect of social norms decreases for men but increases for women. Conversely, the effect of personal norms on intention-to-accept decreases as the level of education increases.

Persuading actors to recognize the necessity of altering the existing system in favor of a more sustainable approach poses a formidable challenge (Hsieh, 2004). Although this research is based on psychological models, the subjects examined are also closely related to social phenomena. Therefore, it is not a coincidence that social norms have been identified as one of the most important and high-performing constructs, serving as the most influential factor in acceptance intention.

The intention to accept food-waste-to-energy systems was found to have a positive effect on acceptance (β=0.599; $p<0.01$). It shows that actors are more willing to support and adopt these systems when energy production from food waste contributes to the country's economy, the fight against climate change, air and water quality improvement, and the reduction of landfill disadvantages (Hypothesis 25). As the benefits of energy production from food waste become better understood, people are more likely to embrace and adopt these systems. For this reason, education and awareness studies are vital for disseminating knowledge about such systems and fostering their acceptance in society. Such efforts will help actors better understand the environmental and economic benefits of energy production from food waste, leading to more favorable attitudes toward these technologies. In this study, it was found that people are willing to bear the economic results of the food-waste-to-energy system. Therefore, future research could delve into determining how much individuals are willing to pay for these systems.

The group comparison between men and women yielded interesting findings. In the relationship between intention-to-accept and social acceptance, a strong effect was identified for both genders, although the effect was slightly higher among women. It was determined that the impact of intention-to-accept on social acceptance increased for both women and men with at least a university education level. Among this group, the impact was most significant for women who were university graduates.

7.6 Evaluating Social Acceptance of Waste Treatment Facilities across Different Residential Proximities

We formulated a hypothesis (Hypothesis 40) suggesting that individuals residing close to waste treatment facilities might exhibit higher social acceptance than their counterparts. However, this hypothesis did not hold true according to the survey data. The results revealed that the highest visitor rates came from Çankaya and Mamak districts, accounting for 6.3% and 2.5%, respectively. Contrary to our initial hypothesis, this finding suggests that inhabitants across the city maintain a similar stance concerning food-waste-to-energy systems. This observation implies a widespread increase in awareness of these systems. It is noteworthy that people may not directly experience the impacts of waste management facilities in their immediate neighborhoods, but they appear to recognize the potential environmental and social benefits. On the other hand, this aspect emphasizes the importance of providing sufficient information and training regarding the perceived impacts and benefits of waste-to-energy systems. Consequently, this finding indicates a broader societal shift towards understanding and supporting the environmental and societal benefits of food-waste-to-energy systems.

After categorizing the groups as Çankaya and Mamak together and the others as one group, the impact of "distributive fairness on positive affect", "trust-environmental & social responsibility on perceived risks", "procedural fairness on trust-transparency & responsibility", "positive affect on perceived benefits," and "perceived risks on personal norms" was found to be statistically insignificant for the Çankaya and Mamak districts group, while being significant for the group of all other districts. Although not statistically significant, the impacts of these paths for the

Çankaya and Mamak districts group are smaller compared to the group of all other districts. This observation can be considered as one of the findings supporting Hypothesis 40. Although not directly affecting social acceptance, it has been determined that actors' perceptions of distributive fairness, procedural fairness, and trust are affected by the region they live in. On the other hand, while the relationship between "intention-to-accept and social acceptance" remained consistent across districts in these two groups, the relationship between "perceived risks and attitude" and "personal norms and intention-to-accept" was found to be significant for Çankaya and Mamak, but not for other districts. Similarly, the relationship between "attitude and intention-to-accept" was found to be stronger for the actors in the Çankaya and Mamak districts. These findings can be considered as one of the findings supporting Hypothesis 40. Actors who have already suffered from the impacts of the Mamak Landfill and have been exposed to various risks and environmental externalities seem to perceive the intention to accept waste-to-energy systems and related risks differently.

As a result, it has been determined that there is no difference in terms of social acceptance of food waste-to-energy systems among actors living in different regions, implying that food-waste-to-energy systems are deemed acceptable for actors from all districts. However, on the other hand, disparities have been found in terms of the factors affecting social acceptance based on the region of residence. We have shown that past experiences and exposures of actors have a significant impact on their perceptions of trust, knowledge, fairness, and risk. Nevertheless, it is concluded that actors still intend to accept systems they perceive positively despite negative past experiences.

7.7 Conceptualizing the Social Acceptance of MSWM

This study outlines the steps taken to identify the factors affecting social acceptance of food waste-to-energy. The findings are summarized in Figure 7.4, which provides the final results. Policymakers can use this information to promote social acceptance for ongoing and planned projects. The questions that were asked were about food-waste-to-energy systems that were already in operation. For other plants and regions that have not been observed or experienced by anybody, the significance of social acceptance in scenarios of this nature cannot be overestimated. Foreknowledge of the acceptability of a project may potentially influence the decision-making process of those responsible for managing it, thereby affecting their ultimate determination as to whether to continue with the endeavor or to abandon it entirely (Sari et al., 2018).

Intention-to-accept, personal norms, social norms, attitude, and perceived benefits are important factors for the actors. Positive affect and perceived benefits are also important due to their mediation role. The present investigation divulges that the boost of the perceived benefits and perceived positive affects could potentially lead to a rise in the actors' perceived fairness and attitude. This trend occurs via the trajectory of social acceptance of food waste-to-energy systems, thereby indicating the possibility of a fruitful outcome when it is utilized.

The concept of social acceptance of systems from food waste to energy encompasses varied acts, support, and approvals, such as attitudes, intentions, and behaviors that can be explained by the beliefs, perceived impacts, and emotions of members of a particular social unit at the macro and meso levels. To ensure a standardized approach, it is crucial to establish a clear portrayal of the social unit consistent with the framework formalized by Wüstenhagen et al. (2007). A social unit can be categorized into one of three dimensions: socio-political acceptance, market, or community. These can include a household, community, town, region, municipality, ministry, nation, technology provider, organization, investor, or financial institution. This will enable a comprehensive understanding of the complex interplay between various factors that contribute to the successful implementation and adoption of food-waste-to-energy systems across diverse social contexts (Gordon et al., 2022; Sari et al., 2023; Upham et al., 2015; Wüstenhagen et al., 2007).

Finally, after all the analyses, Table 7.3 has been prepared to present and comprehensively summarise the discoveries that emerged from the research conducted throughout the study. The constructs have been aligned to highlight factors and actors across the market, socio-political, and community dimensions in the context of social acceptance, as depicted in Table 7.3 (Wüstenhagen et al., 2007; Gordon et al., 2022; Sovacool & Ratan, 2012).

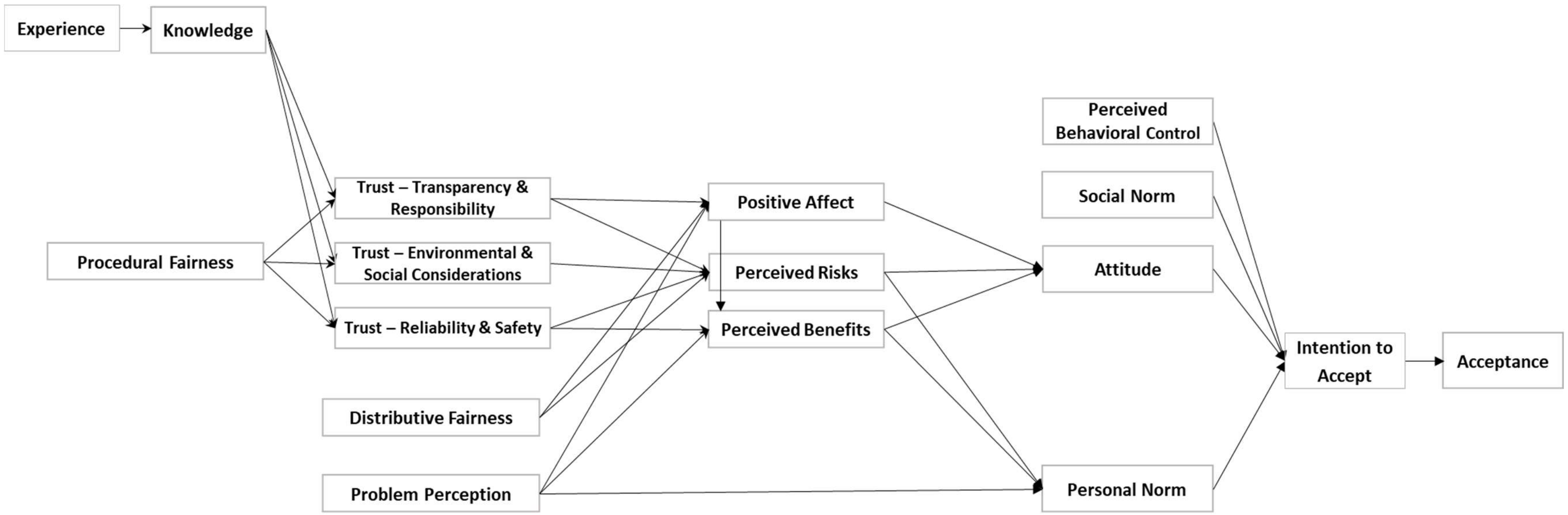


Figure 7.5. Structural model results for the social acceptance of food waste-to-energy

Table 7.3 Criteria, actors, factors, and the way through the social acceptance of food waste to energy systems

Dimension	Criteria	Factors	Actors	The path through the Acceptance
Socio-political acceptance	Institutional Capacity & Political Willingness Strong institutional capacity Political commitment	Institutional support at the national level National targets for food-waste-to-energy Capacity of the governmental agencies Knowledge and experience of the technical personnel in government	Governmental officials Ministries Universities Research Institutes Industrialist Regulatory bodies Policy-makers Planning Authorities Renewable Energy NGOs (Chamber of Electrical Engineers)	Knowledge Experience Trust Procedural Fairness Positive Affect Perceived Benefits Attitude Personal norms Perceived behavioral control Intention-to-accept Trust
		Stability of the purchase of energy produced from food waste Fair determination of energy purchase and sell price by considering all stakeholders		
	Legal & Regulatory Environment Favorable legal and regulatory frameworks	Eliminating the complexity of laws and regulations entry into the food waste conversion to energy market. Regulations are implemented clearly and consistently. Reliable tender Processes EIA procedure duly implemented		
	Environmental Impact & Resilience Diversion of waste from landfills Strengthening resilience for a changing climate	Technologies for the diversion of putrescible wastes from landfills are supported to apply. Application of energy conversion of technologies to produce energy and prevent the methane emissions that potent GHG	Municipal Waste Management Authorities (Environment, Urbanization And Climate Change Ministry) Environmental NGOs (Chamber of Environmental Engineers) Experts	Problem Perception Perceived behavioral control Attitude Personal Norms Social Norms

Table 7.3 Criteria, actors, factors, and the way through the social acceptance of food waste to energy systems (Cont'd)

Dimension	Criteria	Factors	Actors	The path through the Acceptance
Market acceptance	Installation and operation costs	Installation costs of the technology Cost of maintenance Government intensives	Renewable Energy Technology Manufacturers/Suppliers Investors Financial Institutions Manufacturers of gas motors Renewable Energy Associations Investors Waste Management Companies	Knowledge Procedural Fairness Trust Perceived Benefits
	Ways to provide information and receive feedback	Investors and producers can effortlessly obtain precise and reliable information about policies, procedures, etc.		Knowledge Procedural Fairness Trust Perceived Benefits
	Access to financing	Access to sources of low-cost financing		Procedural Fairness Trust Perceived Benefits
Community acceptance	Distributive fairness	How the distribution of costs, externalities, and benefits are allocated?	Local Community Local Governments (Municipalities) Residents Local NGOs Media Renewable Energy Producers	Procedural Fairness Distributive Fairness Perceived Benefits Intention-to-Accept Perceived Risks
	Procedural fairness	Communities are actively engaged in the decision-making process and granting of permits for renewable energy facilities.		Perceived Behavioral Control Problem Perception Procedural Fairness Attitude Positive Affect Perceived Benefits Trust
	Trust	The community has confidence in the information, reliability, technology, and motives of external investors & participants.		
	Awareness of externalities of landfills and fossil fuels and benefits of waste-to-energy conversion.	Environmental impact of usage of fossil fuels Benefits of energy conversion of waste Awareness and acceptance of the public about climate change	Local Community Local NGOs Media Community leaders	Experience Knowledge Perceived Benefits Problem Perception Distributive Fairness Personal Norms, Social Norms Intention-to-Accept

CHAPTER 8

CONCLUSION

There is no doubt that the least desirable option for managing biodegradable waste is its disposal in landfills. The starting point of this research was the recognition that despite efforts to reduce the volume of waste buried in landfills, little progress had been achieved, as explained in Chapter 3. From the point of view of the waste management sector, it is important to realize that while it is not impossible to utilize solid waste in material recovery and energy recovery rather than in landfill, this is an issue that only needs to be well managed from the point of view of all stakeholders (including the local community, investors, politicians, technology providers, municipalities, public, etc.). Although significant steps have been taken and various achievements have been made in terms of both legislation and technology compared to 20 years ago, it is thought-provoking that the vast majority of waste is still being landfilled (In 2002, 92% of waste was deposited in landfills, while in 2020, it was 86%) (TurkStat, 2021). While legislation has been enacted to address this problem, it seems that these measures are not yet sufficient. Therefore, the need for more radical, effective, and sustainable solutions becomes imperative.

The issue of waste management has been regarded as a concern involving multiple stakeholders, and the relationships between these stakeholders have been sought to be understood. The results obtained during this research hold significance for guiding policymakers on which factors to consider.

As the results of the study reveal, various constructs have been identified to have direct or indirect relationships between them. Therefore, it is not easy to conclude that there are superficial connections between these constructs. For policymakers, devising a sustainable system that is both financially feasible and socially acceptable is a highly complicated endeavor when considering all the factors and actors involved. Caniato et al. (2014) underscored the necessity of examining the attributes of various stakeholders to foster social acceptance. The intertwined nature of economic phenomena with societal issues and cultural perspectives has been demonstrated to influence waste culture as well (Bulutay, 2015). Factors like waste quantity, GDP, labor, and population density are instrumental in shaping a nation's waste culture (Halkos & Petrou, 2019). Consequently, each country possesses a unique waste culture influenced inherently by its economic, societal, and cultural characteristics. Due to these reasons, sustainable solutions must be tailored to each country's circumstances. The findings of this study can serve as a guide for policymakers in navigating these complex relationships to formulate effective policies. The focus of this study was on the social acceptance of food-waste-to-energy production systems. Policymakers cannot be expected to focus only on energy production from biodegradable waste. They are also expected to focus on many responsibilities and priorities, including managing various waste types, ensuring sustainable energy production, balancing industrial interests, playing a role in international climate change policies, and more; they are also expected to focus on sustainable MSWM. Achieving sustainable integrated waste management requires a comprehensive approach considering all waste streams and their appropriate disposal methods. This comprehensive approach requires implementing diverse waste management policies, including recycling, zero-waste projects, waste-to-energy projects, etc. To ensure the effectiveness of such strategies, all relevant stakeholders involved in waste management must be considered.

Even when examining a specific topic, such as energy production from biodegradable waste, a multitude of interrelated factors come into play. Consequently, achieving sustainable integrated waste management for a country or a city requires the involvement of experts from various fields and active engagement from all stakeholders. In undertaking this endeavor, it is crucial to conduct studies, such as the one mentioned here, which becomes pivotal, as needed, to facilitate well-informed planning and decision-making. By embracing a holistic approach and incorporating inputs from different perspectives, policymakers can establish effective waste management systems that promote sustainability and address the intricate complexities associated with waste disposal. These kinds of challenges cannot be resolved solely through regulations handling the issue from a technology perspective, which is why this social acceptance study was conducted. Numerous psychological factors influence the attitudes and behaviors of actors, and the study drew upon several theories to comprehend the reactions of these actors. The study's findings suggest that further efforts are required to enhance the knowledge and familiarity of actors with the food-waste-to-energy system.

The study possesses the facilitate to discern crucial elements in the multidimensional comprehension of social acceptance regarding the sustainable production of energy from food waste.

A comprehensive examination of the management of waste at the municipal level in Türkiye is presented, offering guidance to nations in the development of governance strategies and to researchers who wish to delve deeper into this topic.

The classification of trust into three distinct categories has enhanced the thoroughness and scope of the analysis, thereby facilitating a more lucid understanding of how each facet of trust impacts specific variables. Furthermore, new relationships were also analyzed, which differed from the referenced source model.

Additionally, the relationships established in the conceptual model were also scrutinized across various demographic groups.

Not only the direct effects were examined, but also the indirect effects, which provide policymakers with valuable guidance for decision-making that is more well-informed and risk mitigation.

These results suggest that further attention should be given to the following items;

- Simplifying survey questions for actors with lower education levels, as the model's complexity and indicators were not suitable for those with primary school education. Therefore, the results of the study are applicable to individuals with at least a high school degree. Future research can be inclusive for each actor independent from the education. Instead of using questionnaires, other survey methods include focus group meetings. Maybe a simplified questionnaire can be applied for different education levels.

- Public health concerns can be effectively integrated into future surveys to ensure a comprehensive understanding and proactive response.Considering the importance of experience and knowledge, which are influential factors, and incorporating these factors as constructs influencing the overall model, future research could explore these dimensions more comprehensively.
- Investigating the willingness of actors to pay for climate change mitigation or to support the production of energy from waste could provide valuable insights.
- Delving into the incompatibilities between laws and practical implementation for a thorough assessment of market acceptance perspectives could be a promising avenue for future investments.
- Considering alternative waste management solutions, such as in-place innovations or radical approaches like waste minimization, rather than focusing solely on waste disposal methods and their social acceptance.
- Making the same rule mandatory for all municipalities might cause issues. So, it might be best to review the rules while considering each municipality's unique situation.

REFERENCES

Abrelpe & ISWA. (2013). Solid Waste: guidelines for successful planning.

Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Ajzen, I., & Gilbert Cote, N. (2008). Attitudes and the prediction of behavior. In D. W. Crano & R. Prislin (Eds.), Attitudes and Attitude Change (pp. 289–311). Psychology Press. http://journal.um-surabaya.ac.id/index.php/JKM/article/view/2203

Aldas-Manzano, J., Ruiz-Mafe, C., Sanz-Blas, S., & Lassala-Navarré, C. (2011). Internet banking loyalty: Evaluating the role of trust, satisfaction, perceived risk and frequency of use. Service Industries Journal, 31(7), 1165–1190. https://doi.org/10.1080/02642060903433997

Ali, M., Geng, Y., Robins, D., Cooper, D., Roberts, W., & Vogtländer, J. (2019). Improvement of waste management practices in a fast expanding sub-megacity in Pakistan, on the basis of qualitative and quantitative indicators. Waste Management, 85, 253–263. https://doi.org/10.1016/j.wasman.2018.12.030

Almasi, A., Mohammadi, M., Azizi, A., Berizi, Z., Shamsi, K., Shahbazi, A., & Mosavi, S. A. (2019). Assessing the knowledge, attitude and practice of the kermanshahi women towards reducing, recycling and reusing of municipal solid waste. Resources, Conservation and Recycling, 141(November 2018), 329–338. https://doi.org/10.1016/j.resconrec.2018.10.017

Anagnostopoulos, T., Zaslavsky, A., Kolomvatsos, K., Medvedev, A., Amirian, P., Morley, J., & Hadjieftymiades, S. (2017). Challenges and Opportunities of Waste Management in IoT-Enabled Smart Cities: A Survey. IEEE Transactions on Sustainable Computing, 2(3), 275–289. https://doi.org/10.1109/tsusc.2017.2691049

Antonioli, D., Caratù, F., & Nicolli, F. (2018). Waste performance, waste technology and policy effects. Journal of Environmental Planning and Management, 61(11), 1883–1904. https://doi.org/10.1080/09640568.2017.1336431

Arcadis and Trinomics. (2016). The efficient functioning of waste markets in the European Union.

Bartolacci, F., Del Gobbo, R., Paolini, A., & Soverchia, M. (2017). Waste management companies towards circular economy: What impacts on production costs? Environmental Engineering and Management Journal, 16(8), 1789–1796. https://doi.org/10.30638/eemj.2017.195

Bartolacci, F., Paolini, A., Quaranta, A. G., & Soverchia, M. (2018). Assessing factors that influence waste management financial sustainability. Waste Management, 79, 571–579. https://doi.org/10.1016/j.wasman.2018.07.050

Bauman, Z. (1998). Sosyolojik Düşünmek (19th ed.). Ayrıntı.

Bayram, M. (2022). Türkiye'deki Çevresel Etki Değerlendirmesi (ÇED) Süreçlerinin Karar Alma Süreçlerine Etkisinin Atık Yönetim Projeleri Özelinde Araştırılması. Uludağ Üniversitesi.

Becker, G. S., Murphy, K. M., & Topel, R. H. (2010). On the Economics of Climate Policy. The B . E . Journal of Economic Analysis & Policy, 10(2 (Symposium)), Article 19.

Bourdin, S., & Chassy, A. (2023). Are Citizens Ready to Make an Environmental Effort? A Study of the Social Acceptability of Biogas in France. Environmental Management, 2023, 1228–1239. https://doi.org/10.1007/s00267-022-01779-5

Boyle, A. (2018). Climate change, the paris agreement and human rights. International and Comparative Law Quarterly, 67(4), 759–777. https://doi.org/10.1017/S0020589318000222

Bulut, İ. (2017). İdeoloji Olarak Sinizm: İklim Değişikliği ve Giddens Paradoksu.

Bulutay, T. (2015). Büyüme Üzerine Düşünceler. TURKISH ECONOMIC ASSOCIATION Discussion Paper, 3, 1–91.

Can, H. H. (2014). Yerel yönetimlerde imtiyaz uygulamalari. Türk İdare Dergisi, June(478), 381–419.

Caniato, M., Vaccari, M., Visvanathan, C., & Zurbrügg, C. (2014). Using social network and stakeholder analysis to help evaluate infectious waste management: A step towards a holistic assessment. Waste Management, 34(5), 938–951. https://doi.org/10.1016/j.wasman.2014.02.011

Chan, H. W., Udall, A. M., & Tam, K. P. (2022). Effects of perceived social norms on support for renewable energy transition: Moderation by national culture and environmental risks. Journal of Environmental Psychology, 79(June 2021), 101750. https://doi.org/10.1016/j.jenvp.2021.101750

Chanhthamixay, B., Vassanadumrongdee, S., & Kittipongvises, S. (2017). Assessing the Sustainability Level of Municipal Solid Waste Management in Bangkok, Thailand by Wasteaware Benchmarking Indicators. Applied Environmental Research, 39(3), 49–61.

Chen, X., Zheng, X., Pei, Y., Chen, W., Lin, Q., Huang, J., Hou, P., Tang, J., & Han, W. (2022). Process design and techno-economic analysis of fuel ethanol production from food waste by enzymatic hydrolysis and fermentation.

Bioresource Technology, 363(August), 127882. https://doi.org/10.1016/j.biortech.2022.127882

Cheng, H., & Hu, Y. (2010). Municipal solid waste (MSW) as a renewable source of energy: Current and future practices in China. Bioresource Technology, 101(11), 3816–3824.

Choon, S. W., Tan, S. H., & Chong, L. L. (2017). The perception of households about solid waste management issues in Malaysia. Environment, Development and Sustainability, 19(5), 1685–1700. https://doi.org/10.1007/s10668-016-9821-8

Chu, Z., Wang, W., Wang, B., & Zhuang, J. (2016). Research on factors influencing municipal household solid waste separate collection: Bayesian belief networks. Sustainability (Switzerland), 8(2).

Clarke, S. F., Nawaz, W., Skelhorn, C., & Amato, A. (2017). Towards a more sustainable waste management in Qatar: Retrofitting mindsets and changing behaviours. QScience Connect, 4(1), 4.

Cohen, J. (1988). Statistical Power Analysis For The Behavioral Sciences.

Commission, E. (2000). A Study on the Economic Valuation of Environmental Externalities from Landfill Disposal and Incineration of Waste Final Main Report (Issue October).

Concari, A., Kok, G., & Martens, P. (2020). A systematic literature review of concepts and factors related to pro-environmental consumer behaviour in relation towaste management through an interdisciplinary approach. Sustainability (Switzerland), 12(11), 1–50. https://doi.org/10.3390/su12114452

Cordeiro, J. J., Sarkis, J., Vazquez-Brust, D., Frater, L., & Dijkshoorn, J. (2012). An evaluation of technical efficiency and managerial correlates of solid waste management by Welsh SMEs using parametric and non-parametric techniques. Journal of the Operational Research Society, 63(5), 653–664. https://doi.org/10.1057/jors.2011.22

da Silva, L., Marques Prietto, P. D., & Pavan Korf, E. (2019). Sustainability indicators for urban solid waste management in large and medium-sized worldwide cities. Journal of Cleaner Production, 237, 117802.

del Río, P., & Burguillo, M. (2008). Assessing the impact of renewable energy deployment on local sustainability: Towards a theoretical framework. Renewable and Sustainable Energy Reviews, 12(5), 1325–1344. https://doi.org/10.1016/j.rser.2007.03.004

Delicado, A., Figueiredo, E., & Silva, L. (2016). Community perceptions of renewable energies in Portugal: Impacts on environment, landscape and local development. Energy Research and Social Science, 13, 84–93. https://doi.org/10.1016/j.erss.2015.12.007

Demirarslan, K. O., & Çelik, B. Y. (2018). Urban solid waste characterization in the east part of Black Sea region. Global Journal of Environmental Science and Management, 4(2), 167–182. https://doi.org/10.22034/gjesm.2018.04.02.005

Demirbağ, B. C., & Güngörmüş, Z. (2012). Bireylerin Evsel Katı Atık Yönetimine İlişkin Bilgi ve Davranişlari. Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi, 1(3), 127–137.

Di Fiore, G., Specht, K., Rover, O. J., & Zanasi, C. (2022). Stakeholders' social acceptance of a new organic waste management policy in the city of Florianópolis (Brazil). Journal of Cleaner Production, 379(February). https://doi.org/10.1016/j.jclepro.2022.134756

Diamantopoulos, A., Riefler, P., & Roth, K. P. (2008). Advancing formative measurement models. Journal of Business Research, 61(12), 1203–1218. https://doi.org/10.1016/j.jbusres.2008.01.009

Diamantopoulos, A., & Winklhofer, H. M. (2001). Index Construction with Formative Indicators: An Alternative to Scale Development Foll. XXXVIII(May), 269–277.

Doğan, D. (2019). SmartPLS ile Veri Analizi (2nd ed.). Zet Yayıncılık.

Fernando, R. L. S. (2019). Solid waste management of local governments in the Western Province of Sri Lanka: An implementation analysis. Waste Management, 84, 194–203. https://doi.org/10.1016/j.wasman.2018.11.030

Ferretti, M. P. (2010). Risk and distributive justice: The case of regulating new technologies. Science and Engineering Ethics, 16(3), 501–515. https://doi.org/10.1007/s11948-009-9172-z

Fornell, C. ., & Larcker, D. F. (1981). Evaluating Structural Equation Models With Unobservable Variables And Measurement Error, Journal of Marketing Research. Journal of Marketing Research, 18(1), 39–50.

Gebreeyosus, M. A., & Berhanu, W. (2019). Households' preferences for improved solid waste management options in Aksum city, North Ethiopia: An application of choice modelling. Cogent Environmental Science, 5(1), 1–12. https://doi.org/10.1080/23311843.2019.1579456

Genç, N. (2011). Evaluation of Biohydrogen Production Potential of Wastes. Pamukkale Üniversitesi Mühendislik Bilimleri Dergisi, 17(2), 63–77.

Ghosh, P., Sengupta, S., Singh, L., & Sahay, A. (2020). Life cycle assessment of waste-to-bioenergy processes: A review. In Bioreactors: Sustainable Design and Industrial Applications in Mitigation of GHG Emissions (pp. 105–122). INC. https://doi.org/10.1016/B978-0-12-821264-6.00008-5

Giddens, A. (2013). İklim Değişikliği Siyaseti. Phoenix.

Gorard, S. (2003). Quantitative Methods in Social Science. Continuum Books.

Gordon, J. A., Balta-Ozkan, N., & Nabavi, S. A. (2022). Beyond the triangle of renewable energy acceptance: The five dimensions of domestic hydrogen acceptance. Applied Energy, 324(August), 119715. https://doi.org/10.1016/j.apenergy.2022.119715

Güneysu, S. (2020). İstanbul'da Evsel Atık Gıda ve Ambalajlarının COVID - 19 Sürecindeki Değişimi. Ulusal Çevre Bilimleri Araştırma Dergisi, 3(4), 175–180.

Gürbüz, H., & Yılmaz, V. (2018). Investigation of Attitudes and Behaviours of University Students on the Use of Plastic Bags by Structural Equation Modelling. Sosyoekonomi, 26(38), 135–149. https://doi.org/10.17233/sosyoekonomi.2018.04.08

Guthrie, G. (2010). Basic Research Methods An Entry to Social Science Research. SAGE Publications India Pvt Ltd.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). Multivariate Data Analysis, Upper Saddle River. Prentice-Hall, Inc.

Hair, J.F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (2nd ed). SAGE Publicationc Inc.

Hair, Joseph F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Halkos, G., & Petrou, K. N. (2019). Evaluating 22 EU member states' 'waste culture' using Hofstede's and Schwartz's cultural dimensions. International Journal of Sustainable Development and World Ecology, 26(4), 313–328. https://doi.org/10.1080/13504509.2019.1567616

Han, Z., Duan, Q., Fei, Y., Zeng, D., Shi, G., Li, H., & Hu, M. (2018). Factors that influence public awareness of domestic waste characteristics and management in rural areas. Integrated Environmental Assessment and Management, 14(3), 395–406. https://doi.org/10.1002/ieam.4033

He, Z., Chu, Z., Zhao, M., Zhuang, J., & Liu, F. (2018). Policy-making coordination of municipal solid waste policies in China: a content analysis. Journal of Material Cycles and Waste Management, 20(2), 1073–1084. https://doi.org/10.1007/s10163-017-0668-3

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hsieh, T.-S. (2004). To Recycle to or not to Recycle? Analyzing the New Yorj City's Recycling Program Suspension. Interdisciplinary Environmental Review, 6(1), 81–91.

Huijts, N. M. A., Molin, E. J. E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. Renewable and Sustainable Energy Reviews, 16(1), 525–531. https://doi.org/10.1016/j.rser.2011.08.018

Huijts, N. M. A., Molin, E. J. E., & van Wee, B. (2014). Hydrogen fuel station acceptance: A structural equation model based on the technology acceptance framework. Journal of Environmental Psychology, 38, 153–166. https://doi.org/10.1016/j.jenvp.2014.01.008

Ibáñez-Forés, V., Bovea, M. D., Coutinho-Nóbrega, C., & de Medeiros, H. R. (2019). Assessing the social performance of municipal solid waste management systems in developing countries: Proposal of indicators and a case study. Ecological Indicators, 98(October 2018), 164–178.

İlhan, O. A., & Deniz, E. (2021). Anket Metodolojisinde Dört Ana Hata Türüne Giriş. Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi Pamukkale, 42(Özel Sayı 1), Ö199-Ö214.

Jones, N., Evangelinos, K., Halvadakis, C. P., Iosifides, T., & Sophoulis, C. M. (2010). Social factors influencing perceptions and willingness to pay for a market-based policy aiming on solid waste management. Resources, Conservation and Recycling, 54(9), 533–540.

Kânoğlu-Özkan, D. G., & Soytaş, U. (2022). The social acceptance of shale gas development: Evidence from Turkey. Energy, 239. https://doi.org/10.1016/j.energy.2021.122150

Resmî Gazete Cumhurbaşkanı Kararı, 6 (2023).

KILIC, S. (2012). Sample size, power concepts and sample size calculation. Journal of Mood Disorders, 2(3), 140. https://doi.org/10.5455/jmood.20120921043306

Kılıç, Ç., Yılmaz, M., & Sarı, R. (2017). Rüzgâr Enerji Sistemlerinin Sosyal Kabul Dinamiklerini Anlamak. Co, 15(2), 135–156. https://doi.org/10.1501/cogbil_0000000185

Kocaeli Sera Gazı Envanteri ve İklim Değişikliği İnisiyatifi Projesi Sera Gazı Envanteri ve İklim Değişikliği Eylem Planı. (2018).

Kokkinos, K., Karayannis, V., Lakioti, E., & Moustakas, K. (2019). Exploring social determinants of municipal solid waste management: survey processing with fuzzy logic and self-organized maps. Environmental Science and Pollution Research, 26, 35288–35304. https://doi.org/10.1007/s11356-019-05506-2

KONDA. (2021). İklim Değişikliği Algısı Raporu.

Kono, S., Ito, E., & Loucks-Atkinson, A. (2021). Are Leisure Constraints Models Reflective or Formative?: Evidence from Confirmatory Tetrad Analyses. Leisure Sciences, 44(1), 55–76. https://doi.org/10.1080/01490400.2018.1474508

Laila, A., von Massow, M., Bain, M., Parizeau, K., & Haines, J. (2022). Impact of COVID-19 on food waste behaviour of families: Results from household waste composition audits. Socio-Economic Planning Sciences, 82(PA), 101188. https://doi.org/10.1016/j.seps.2021.101188

Lewis, B. (2018). Introduction to Environmental Human Rights and Climate Change. In Environmental Human Rights and Climate Change Current Status and Future Prospects (pp. 1–14). Queensland University of Technology. https://doi.org/10.1007/978-981-13-1960-0_1

Li, W., Jin, Z., Liu, X., Li, G., & Wang, L. (2020). The impact of mandatory policies on residents' willingness to separate household waste: A moderated mediation model. Journal of Environmental Management, 275(May), 111226. https://doi.org/10.1016/j.jenvman.2020.111226

Liao, C., Zhao, D., Zhang, S., & Chen, L. (2018). Determinants and the moderating effect of perceived policy effectiveness on residents' separation intention for rural household solid waste. International Journal of Environmental Research and Public Health, 15(4), 1–17. https://doi.org/10.3390/ijerph15040726

Lin, C. S., & Wu, S. (2015). Exploring antecedents of online group-buying: Social commerce perspective. Human Systems Management, 34(2), 133–147. https://doi.org/10.3233/HSM-150837

Ma, J., & Hipel, K. W. (2016). Exploring social dimensions of municipal solid waste management around the globe – A systematic literature review. Waste Management, 56, 3–12. https://doi.org/10.1016/j.wasman.2016.06.041

Margallo, M., Ziegler-Rodriguez, K., Vázquez-Rowe, I., Aldaco, R., Irabien, Á., & Kahhat, R. (2019). Enhancing waste management strategies in Latin America under a holistic environmental assessment perspective: A review for policy support. Science of the Total Environment, 689, 1255–1275. https://doi.org/10.1016/j.scitotenv.2019.06.393

Marshall, R. E., & Farahbakhsh, K. (2013). Systems approaches to integrated solid waste management in developing countries. Waste Management, 33(4), 988–1003. https://doi.org/10.1016/j.wasman.2012.12.023

Mazzanti, M., & Zoboli, R. (2009). Municipal Waste Kuznets curves: Evidence on socio-economic drivers and policy effectiveness from the EU. Environmental and Resource Economics, 44(2), 203–230. https://doi.org/10.1007/s10640-009-9280-x

Mccrea, R., Walton, A., Jeanneret, T., Lacey, J., & Moffat, K. (2016). Attitudes and social acceptance in the waste and resource recovery sector. Commonwealth Scientific and Industrial Research Organisation (CSIRO), July.

Megersa, N. (2018). Determinants of Effective Household Solid Waste Management Practices in Jimma Town, Ethiopia. International Journal of Advanced Research, 6(4), 242–256. https://doi.org/10.21474/ijar01/6851

Naing, L., Winn, T., & Rusli, B. N. (2006). Practical Issues in Calculating the Sample Size for Prevalence Studies. Archives of Orofacial Sciences, 1(January), 9–14.

Nastase, C., Chașovschi, C. E., State, M., & Scutariu, A.-L. (2019). Municipal Waste Management in Romania in the Context of the Eu. a Stakeholders' Perspective. Technological and Economic Development of Economy, 0(0), 1–27. https://doi.org/10.3846/tede.2019.10295

Nature4Cities. (2018). Nature4Cities a Nature Based Solutions knowledge diffusion and assessment platform for re-naturing citieshttps://www.nature4cities.eu/post/nature4cities-multi-scalar-and-multi-thematic-nature-based-solutions-typology. Nature4Cities.

Negash, Y. T., Hassan, A. M., Tseng, M. L., Wu, K. J., & Ali, M. H. (2021). Sustainable construction and demolition waste management in Somaliland: Regulatory barriers lead to technical and environmental barriers. Journal of Cleaner Production, 297, 126717. https://doi.org/10.1016/j.jclepro.2021.126717

Nicholas Stern. (2007). The Economics of Climate Change: The Stern Review. Cambridge University Press.

Nordhaus, W. (2006). "STERN REVIEW" ON THE ECONOMICS OF CLIMATE CHANGE (Issue December). http://www.whitehouse.gov/news/releases/2001/03/20010314.html

Nordhaus, W. (2019). Climate change: The ultimate challenge for economics. American Economic Review, 109(6), 1991–2014. https://doi.org/10.1257/aer.109.6.1991

Nordhaus, W. D., & Boyer, J. (2000). Warming the world: economic models fo global warming. https://doi.org/10.1038/432677a

Önen, E. (2007). Gruplar Arası Karşılaştırmalarda Ölçme Değişmezliğinin İncelenmesi: Epistemolojik İnançlar Envanteri Üzerine Bir Çalışma. Ege Eğitim Dergisi, 2007(8), 87–109.

Ong, C., Fearnley, L., & Chia, S. B. (2019). Towards a sustainable future: a holistic inquiry of waste management behaviors of Singapore households. International Journal of Sustainable Development and World Ecology, 26(7), 583–596. https://doi.org/10.1080/13504509.2019.1631898

Park, J., & Ha, S. (2014). Understanding Consumer Recycling Behavior: Combining the Theory of Planned Behavior and the Norm Activation Model. Family and Consumer Sciences Research Journal, 42(3), 278–291. https://doi.org/10.1111/fcsr.12061

Park, S. (2018). Factors influencing the citizen cost burden in managing the volume-based waste fee system in South Korea. Waste Management, 82, 285–291. https://doi.org/10.1016/j.wasman.2018.10.026

Pollans, L. B. (2017). Trapped in trash: 'Modes of governing' and barriers to transitioning to sustainable waste management. Environment and Planning A, 49(10), 2300–2323. https://doi.org/10.1177/0308518X17719461

Punch, K. F. (2005). Sosyal Araştırmalara Giriş Nitel ve Nicel Yaklaşımlar (5th 2020). Siyasal Kitabevi.

Purkayasth, D., & Sarkar, S. (2022). Black soldier fly larvae for treatment and segregation of commingled municipal solid waste at different environmental conditions. Journal of Environmental Management, 302(A), 114060.

Raghu, S. J., & Rodrigues, L. L. R. (2020). Behavioral aspects of solid waste management: A systematic review. Journal of the Air and Waste Management Association, 70(12), 1268–1302. https://doi.org/10.1080/10962247.2020.1823524

Ren, X., Che, Y., Yang, K., & Tao, Y. (2016). Risk perception and public acceptance toward a highly protested Waste-to-Energy facility. Waste Management, 48, 528–539.

Ringle, C., M., Wende, S., & Becker, J.-M. (2022). SmartPLS 4. Oststeinbek: SmartPLS. Retrieved from https://www.smartpls.com.

Ringle, C. M., & Sarstedt, M. (2016). Gain more insight from your PLS-SEM results the importance-performance map analysis. Industrial Management and Data Systems, 116(9), 1865–1886. https://doi.org/10.1108/IMDS-10-2015-0449

Rowe, P. G., Wang, L., & Chen, Z. (2016). Technologies for Biochemical Conversion of Biomass. In Academic Press. Metallurgical Industry Press. http://dx.doi.org/10.1016/B978-0-12-802417-1/00001-6

Sari, R., Soytas, U., Kanoglu-Ozkan, D. G., & Sivrikaya, A. (2023). Improving the climate resilience of European cities via socially acceptable nature-based solutions. Npj Urban Sustainability, 3(1), 1–13. https://doi.org/10.1038/s42949-023-00090-4

Sari, R., Ugur, S., Kanoglu, D., Ates, M. A., Islambay, D., & Kilic, C. (2018). D5.3 – Values of Societal Acceptance - Nature Based Solutions for Re-Naturing Cities: Knowledge Diffusion and Decision Support Platform Through New Collaborative Models.

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). Partial Least Squares Structural Equation Modelling, In C. Homburg, M.Klarmann, A.Vomberg (Eds.), Handbook of Market Research.

Satori, M., Megantara, E. N., Primiana, F. M. S. I., & Gunawan, B. (2018). Review of the influencing factors of integrated waste management. International Journal of GEOMATE, 15(48), 34–40. https://doi.org/10.21660/2018.48.55459

Saunois, M., Bousquet, P., Poulter, B., Peregon, A., Ciais, P., Canadell, J. G., Dlugokencky, E. J., Etiope, G., Bastviken, D., Houweling, S., Janssens-Maenhout, G., Tubiello, F. N., Castaldi, S., Jackson, R. B., Alexe, M., Arora, V. K., Beerling, D. J., Bergamaschi, P., Blake, D. R., … Zhu, Q. (2016). The global methane budget 2000-2012. Earth System Science Data, 8(2), 697–751. https://doi.org/10.5194/essd-8-697-2016

Sayıştay. (2007). Türkiye'de Atık Yönetimi.

Schwartz, S. H. (1977). Normative influences on altruism. Advances in Experimental Social Psychology, 10(C), 221–279. https://doi.org/10.1016/S0065-2601(08)60358-5

Shabani, R. A. (2015). FACTORS AFFECTING COMMUNITY PARTICIPATION IN SOLID WASTE MANAGEMENT IN LINDI MUNICIPAL COUNCIL TANZANIA. THE OPEN UNIVERSITY OF TANZANIA.

Sharma, P. N., Liengaard, B. D. D., Hair, J. F., Sarstedt, M., & Ringle, C. M. (2022). Predictive model assessment and selection in composite-based modeling using PLS-SEM: extensions and guidelines for using CVPAT. European Journal of Marketing. https://doi.org/10.1108/EJM-08-2020-0636

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. European Journal of Marketing, 53(11), 2322–2347. https://doi.org/10.1108/EJM-02-2019-0189

Singh, K. (2007). Quantitative Social Research Methods. Sage Publications Pvt. Ltd.

Soland, M., Steimer, N., & Walter, G. (2013). Local acceptance of existing biogas plants in Switzerland. Energy Policy, 61, 802–810. https://doi.org/10.1016/j.enpol.2013.06.111

Sovacool, B. K., & Griffiths, S. (2020). The cultural barriers to a low-carbon future: A review of six mobility and energy transitions across 28 countries.

Renewable and Sustainable Energy Reviews, 119(June 2019), 109569. https://doi.org/10.1016/j.rser.2019.109569

Sovacool, B. K., & Ratan, P. L. (2012). Conceptualizing the acceptance of wind and solar electricity. Renewable and Sustainable Energy Reviews, 16(7), 5268–5279. https://doi.org/10.1016/j.rser.2012.04.048

Soysert, M. K. (2018). "İklim Değişikliğine Karşı Çıkın" Projesi Mezitli ve Toroslar İlçelerinde Seçilen Pilot Bölgelerde Hane Halkı Evsel Nitelikli Katı Atık Geri Dönüşüm Verimlilik Analizi Saha Çalışması Raporu.

Spoann, V., Fujiwara, T., Seng, B., & Lay, C. (2018). Municipal solid waste management: Constraints and opportunities to improve capacity of local government authorities of Phnom Penh Capital. Waste Management and Research, 36(10), 985–992. https://doi.org/10.1177/0734242X18785722

Steg, L., & de Groot, J. (2010). Explaining prosocial intentions: Testing causal relationships in the norm activation model. British Journal of Social Psychology, 49(4), 725–743. https://doi.org/10.1348/014466609X477745

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology, 29(3), 309–317. https://doi.org/10.1016/j.jenvp.2008.10.004

Stocker, T. F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S. K., Boschung, J., Nauels, A., Xia, Y., Bex, V., & Midgley, P. M. (2013). Summary for Policymakers. In IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Vol. AR5, Issue September 2014, p. 1535).

Sukholthaman, P., & Sharp, A. (2016). A system dynamics model to evaluate effects of source separation of municipal solid waste management: A case of Bangkok, Thailand. Waste Management, 52, 50–61. https://doi.org/10.1016/j.wasman.2016.03.026

T.C. Çevre, Ş. ve İ. D. B. (2010). Entegre Atık Yönetim Planı Hakkında Yazışma (p. 2). the Ministry of Environment Urbanization Climate Change,.

T.C. Çevre ve Şehircilik Bakanlığı. (2016). Ulusal Atık Yönetimi ve Eylem Planı 2023. In T.C. Çevre ve Şehircilik Bakanlığı Ulusal Atık Yönetimi ve Eylem Planı 2023.

Tadesse, T., Ruijs, A., & Hagos, F. (2008). Household waste disposal in Mekelle city, Northern Ethiopia. Waste Management, 28(10), 2003–2012. https://doi.org/10.1016/j.wasman.2007.08.015

Tarfasa, S., & Brouwer, R. (2018). Public preferences for improved urban waste management: A choice experiment. Environment and Development Economics, 23(2), 184–197. https://doi.org/10.1017/S1355770X17000432

Teeluckdharry, N. B., Teeroovengadum, V., & Seebaluck, A. K. (2022). A roadmap for the application of PLS-SEM and IPMA for effective service quality improvements. TQM Journal, 1998. https://doi.org/10.1108/TQM-11-2021-0340

TEIAS. (2019). Turkey's Installed Power Report (2019) in Turkish.

TEIAS. (2021). YükTevziDairesi Başkanliği - Kurulu Güç Raporu-Aralik 2021. https://webapi.teias.gov.tr/file/9e6326b1-5273-45c9-8f90-6d511cac882a?download

TEİAŞ. (2021a). Aralık 2021 Kurulu Güç Raporu.

TEİAŞ. (2021b). Yük Tevzi Dairesi Başkanliği - Kurulu Güç Raporu-Mayis 2021.

TEİAŞ. (2023a). Kurulu Güş Raporu-Ağustos 2023.

TEİAŞ. (2023b). Kurulu Güş Raporu-Mayıs 2023.

Tekin, Ö. F. (2020). Evsel Katı Atık Yönetimi ve Geri Dönüşüm (1st ed.). Atlas Akademik Basım Yayın Dağıtım Tic. Ltd. Şti.

Thøgersen, J. (2003). Monetary Incentives and Recycling: Behavioural and Psychological Reactions to a Performance-Dependent Garbage Fee. Journal of Consumer Policy, 26(2), 197–228. https://doi.org/10.1023/A:1023633320485

TMMOB. (2022). Türkiye'nin Enerji Görünümü 2022. http://www.mmo.org.tr

TurkStat. (2021). Belediye Atık Göstergeleri.

Upham, P., Oltra, C., & Boso, À. (2015). Towards a cross-paradigmatic framework of the social acceptance of energy systems. Energy Research & Social Science, 8, 100–112.

Usui, T., & Takeuchi, K. (2014). Evaluating Unit-Based Pricing of Residential Solid Waste: A Panel Data Analysis. Environmental and Resource Economics, 58(2), 245–271. https://doi.org/10.1007/s10640-013-9702-7

van de Poel, I., Fahlquist, J. N., Doorn, N., Zwart, S., & Royakkers, L. (2012). The Problem of Many Hands: Climate Change as an Example. Science and Engineering Ethics, 18(1), 49–67. https://doi.org/10.1007/s11948-011-9276-0

Van Est, R., Walhout, B., & Brom, F. (2012). Risk and technology assessment. In Handbook of Risk Theory: Epistemology, Decision Theory, Ethics, and Social Implications of Risk. https://doi.org/10.1007/978-94-007-1433-5_43

Vassanadumrongdee, S., & Kittipongvises, S. (2018). Factors influencing source separation intention and willingness to pay for improving waste management in Bangkok, Thailand. Sustainable Environment Research, 28(2), 90–99. https://doi.org/10.1016/j.serj.2017.11.003

Veitch, K. (2018). Social policy and the government of waste. Capital and Class, 42(2), 297–313. https://doi.org/10.1177/0309816817723283

Véron, R., Fernando, N., Narayanan, N. C., Upreti, B., Ambat, B., Pallawala, R., Rajbhandari, S., Rao Dhananka, S., & Zurbrügg, C. (2018). Social processes in post-crisis municipal solid waste management innovations: A proposal for research and knowledge exchange in South Asia. Research Ideas and Outcomes, 4. https://doi.org/10.3897/rio.4.e31430

Vineeshiya, M. ., & Mahees, M. T. (2019). Environmental Attitudes and Discourses of Community Participation in Solid Waste Management. International Educational Applied Research Journal (IEARJ), 3(8), 7–14.

Watson, M., & Bulkeley, H. (2005). Just waste? Municipal waste management and the politics of environmental justice. Local Environment, 10(4), 411–426. https://doi.org/10.1080/13549830500160966

Wolsink, M. (2007). Wind power implementation: The nature of public attitudes: Equity and fairness instead of "backyard motives." In Renewable and Sustainable Energy Reviews. https://doi.org/10.1016/j.rser.2005.10.005

Wolsink, M. (2010). Contested environmental policy infrastructure: Socio-political acceptance of renewable energy, water, and waste facilities. Environmental Impact Assessment Review, 30, 302–311. https://doi.org/10.1016/j.eiar.2010.01.001

Wolsink, M. (2018). Social acceptance revisited: gaps, questionable trends, and an auspicious perspective. Energy Research and Social Science, 46(July), 287–295. https://doi.org/10.1016/j.erss.2018.07.034

World Commission on Environment and Development. (1987). Brutland Report.

Wu, J., Zhang, W., Xu, J., & Che, Y. (2015). A quantitative analysis of municipal solid waste disposal charges in China. Environmental Monitoring and Assessment, 187(3). https://doi.org/10.1007/s10661-015-4305-0

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. Energy Policy. https://doi.org/10.1016/j.enpol.2006.12.001

Yıldız, E. (2021). SmartPLS ile Yapısal Eşitlik Modellemesi Reflektif ve Formatif Yapılar (2nd ed.). Seçkin Yayıncılık.

Zeiss, C., & Atwater, J. (1987). Waste Facilities in Residential Communities: Impacts and Acceptance. Journal of Urban Planning and Development, 113(1), 19–34. https://doi.org/10.1061/(asce)0733-9488(1987)113:1(19)

Zoellner, J., Schweizer-Ries, P., & Wemheuer, C. (2008). Public acceptance of renewable energies: Results from case studies in Germany. Energy Policy, 36(11), 4136–4141.

APPENDICES

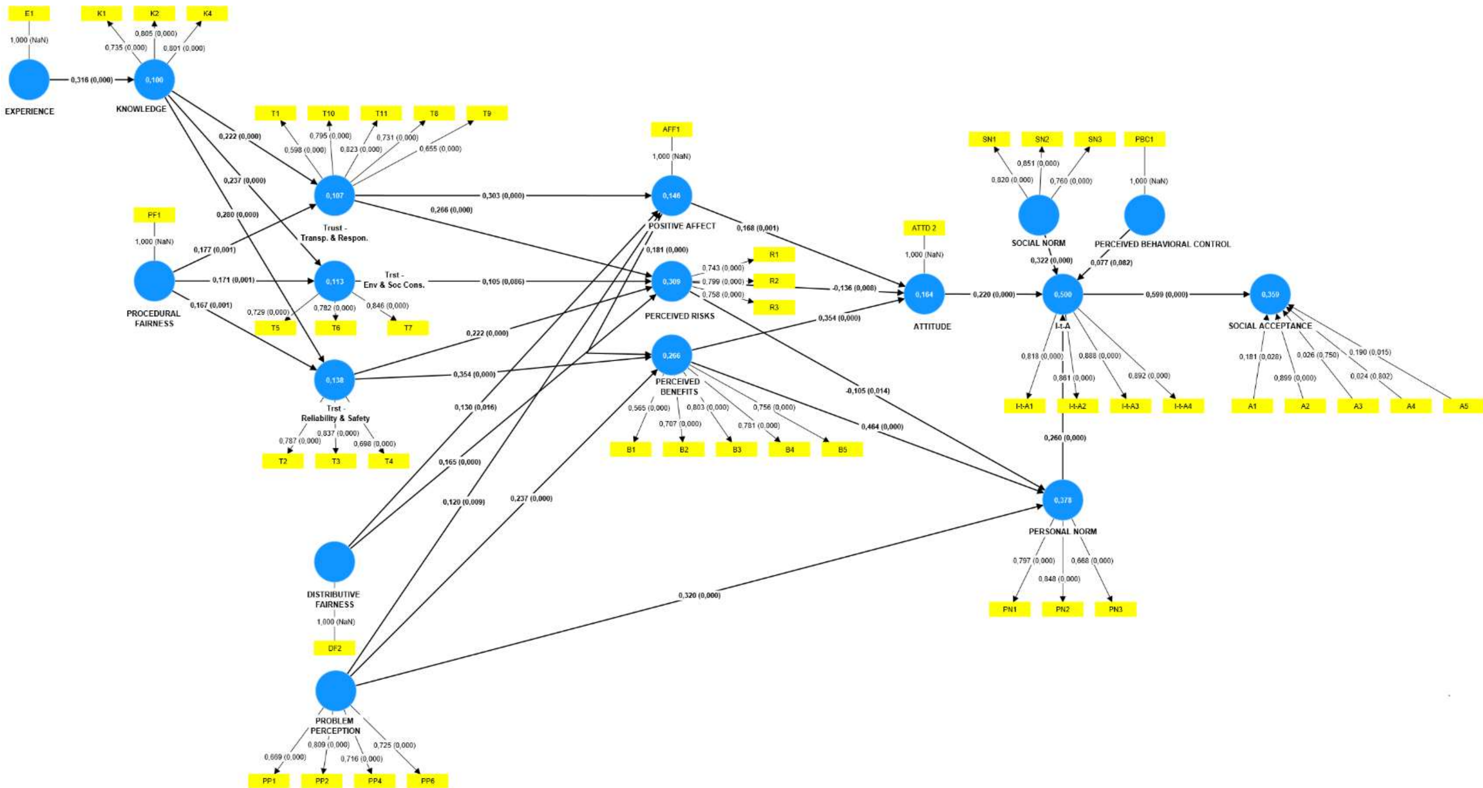
A. Short Chronology of MSW Legislation

Name of the Legislation	History of the Legislation
Ambalaj Atıklarının Kontrolü Yönetmeliği	**26 Haziran 2021 31523** Ambalaj Atıklarının Kontrolü Yönetmeliği **26 Haziran 2021 yürürlükten kaldırıldı** **27.12.2017 - 30283** **24/8/2011 28035** Ambalaj Atıklarının Kontrolü Yönetmeliği **30.03.2010 27537** Ambalaj Atıklarının Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **06.11.2008 27046** Ambalaj Atıklarının Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **24/6/2007 26562** Ambalaj Atıklarının Kontrolü Yönetmeliği **05.04.2005 25777** Ambalaj ve Ambalaj Atıklarının Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **30.07.2004 25538** Ambalaj ve Ambalaj Atıklarının Kontrolü Yönetmeliği
Atıkların Düzenli Depolanmasına Dair Yönetmelik	**RG: 26.03.2010 27533** **11.03.2015 29292** Atıkların Düzenli Depolanmasına Dair Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik
Atıkların Yakılmasına İlişkin Yönetmelik	**RG: 06.10.2010 27721** **07.04.2017 30031** Atıkların Yakılmasına İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik
Bitkisel Atık Yağların Kontrolü Yönetmeliği	**RG: 06.06.2015 29378** **05.11.2013 28812** Bitkisel Atık Yağların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **30.03.2010 27537** Bitkisel Atık Yağların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **31.07.2009 27305** Bitkisel Atık Yağların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **19.04.2005 25791** Bitkisel Atık Yağların Kontrolü Yönetmeliği
Atık Yönetimi Yönetmeliği	**RG: 02.04.2015 29314** **23.03.2017 30016** Atık Yönetimi Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **5/7/2008 tarihli 26927** Atık Yönetimi Genel Esaslarına İlişkin Yönetmelik **14/3/2005 tarihli 25755** Tehlikeli Atıkların Kontrolü Yönetmeliği **14/3/1991 tarihli 20814** Katı Atıkların Kontrolü Yönetmeliği

Name of the Legislation	**History of the Legislation**
Tıbbi Atıkların Kontrolü Yönetmeliği	**RG: 25.01.2017 29959** **21.03.2014 28948** Tıbbi Atıkların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **05.11.2013 28812** Tıbbi Atıkların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik 2013/5544 **03.12.2011 28131** Tıbbi Atıkların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **30.03.2010 27537** Tıbbi Atıkların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **22.07.2005 25883** Tıbbî Atıkların Kontrolü Yönetmeliği **24.06.1998 23382** Tıbbi Atıkların Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **20.05.1993 21586** Tıbbî Atıkların Kontrolü Yönetmeliği
Sıfır Atık Yönetmeliği	**09.10.2021 31623** Sıfır Atık Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik **12.07.2019 30829**
Atıktan Türetilmiş Yakıt, Ek Yakıt ve Alternatif Hammadde Tebliği	**20.06.2014 29036** **13.04.2017 30037** Atıktan Türetilmiş Yakıt, Ek Yakıt ve Alternatif Hammadde Tebliğinde Değişiklik Yapılmasına Dair Tebliğ **23.12.2014 29214** Atıktan Türetilmiş Yakıt, Ek Yakıt ve Alternatif Hammadde Tebliğinde Değişiklik Yapılmasına Dair Tebliğ
Mekanik Ayırma, Biyokurutma ve Biyometanizasyon Tesisleri ile Fermente Ürün Yönetimi Tebliği	**23.09.2020 31253** Mekanik Ayırma, Biyokurutma ve Biyometanizasyon Tesisleri ile Fermente Ürün Yönetimi Tebliğinde Değişiklik Yapılmasına Dair Tebliğ **28.07.2017 30137** **10.10.2015 29498**
Kompost Tebliği	**30.09.2020 31260** Kompost Tebliğinde Değişiklik Yapılmasına Dair Tebliğ **28.07.2017 30137** Kompost Tebliğinde Değişiklik Yapılmasına Dair Tebliğ **05.03.2015 29286**
Bazı Tehlikesiz Atıkların Geri Kazanımı Tebliği	**09.10.2021 31253 yürürlükten kaldırıldı** **11.03.2015 29292** Bazı Tehlikesiz Atıkların Geri Kazanımı Tebliğinde Değişiklik Yapılmasına Dair Tebliğ **17.06.2011 27967**
	1.10.2013 28782 Bazı Tehlikesiz Atıkların Geri Kazanımı Tebliğinde Değişiklik Yapılmasına Dair Tebliğ
Tehlikesiz ve İnert Atıkların Geri Kazanımı Tebliği	**17.06.2011 27967 yürürlükten kaldırıldı** **12.05.2010 27579**
Atık Getirme Merkezi Tebliği	**09.10.2021 31623 yürürlükten kaldırıldı** **31.12.2014 29222**
Atık Ön İşlem ve Geri Kazanım Tesislerinin	**09.10.2021 31623**

Name of the Legislation	History of the Legislation
Genel Esaslarına İlişkin Yönetmelik	
Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelik	**2/2/2021 31383** **2.02.2019 30674** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik **22.05.2018 30428** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılması Hakkında Yönetmelik **25.01.2018 30312** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik **25.01.2017 29959** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik **30.12.2015 29578** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik **23.12.2014 29214** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik **15.02.2013 28560** Atıksu Altyapı ve Evsel Katı Atık Bertaraf Tesisleri Tarifelerinin Belirlenmesinde Uyulacak Usul ve Esaslara İlişkin Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik **27.10.2010 27742**

B. Bootstrapping results



C. Approval of Applied Ethics Research Center

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

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04 AĞUSTOS 2022

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Prof. Dr. Ülkü YETİŞ

Danışmanlığını yürüttüğünüz Tuğba KIRER'in "Atık Yönetimi Sektöründe Sosyal Kabulün Rolü" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **0438-ODTUİAEK-2022** protokol numarası ile onaylanmıştır.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Mine MISIRLISOY
Başkan

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D. Questions used in questionnaire and references

Question	Abbreviations used in the model	Reference
Bir çöp dönüştürme tesisini ziyaret ettiniz mi? (evet /hayır)	E1	N4Cities project
Yemek atıkları bir enerji kaynağı olarak kullanılmaktadır.	E2	Molin, 2005
Su faturalarına yansıtılan çevre temizlik vergisi sadece çöplerin toplanmasını içermektedir.	E3	self-constructed
İklim değişikliğini önlemek için aktif bir şekilde çalışma yürütülmelidir.	PP1	N4Cities project
İklim değişikliği gelişen medeniyetimizin olumsuz bir mirasıdır.	PP2	N4Cities project
Yemek atıklarının verimli bir enerji üretim hammaddesi olduğunu düşünüyorum.	PP3	adapted from R. Kardooni et al., 2016
Toplum tarafından iklim değişikliğinin yeterince önemsenmediği görüşündeyim.	PP4	Konda, 2021
Ülkemizdeki enerji kaynaklarının kısıtlı olduğu kanısındayım.	PP5	Konda, 2021
İklim değişikliğinin etkilerini hissetmekteyim.	PP6	Konda, 2021
Toplanan atıkların nereye götürüldüğünü biliyorum.	K1	V. Ibáñez-Forés et al., 2019
Ankara’da yemek atıklarından enerji üretildiği konusunda yeterli bilgi sahibiyim.	K2	N4Cities project & Irfan et al.,2021
Yemek atıklarından enerji üretilmesi hakkında halkın yeterince bilgilendirildiğini düşünüyorum.	K3	N4Cities project

Question	Abbreviations used in the model	Reference
Atıkların nasıl işlendiğini biliyorum.	K4	adapted from M.J. Kang & H.Park, 2011
Yemek atıklarından enerji üretilmesinin iklim değişikliğiyle mücadelede önemli olduğu görüşündeyim.	K5	Konda, 2021& Wu, 2017
Yemek atıklarından enerji üretim sisteminin planlanması sürecinde söz sahibi olduğumu düşünüyorum.	PF1	N4Cities project
Toplumun hassasiyet gösterdiği konular dikkate alınarak mevcut sistem iyileştirilmektedir.	PF2	N4Cities project
Ankara'da yaşayanlar adına Atık Yönetim Sisteminin gelişmesini ve denetlenmesini sağlayacak bağımsız kuruluşlar vardır.	PF3	adapted from Liu et al., 2018
Yemek atıklarından enerji üretim sistemi planlanırken kamuoyunun hassasiyetleri yeterince dikkate alınır.	OE1	N4Cities project
Yemek atıklarından enerji üretilmesi, enerji konusundaki dışa bağımlılığımızı azaltacak potansiyeldedir.	OE2	adapted from E. Savvanidou et al., 2010 & Wu, 2017
Yemek atıklarından enerji üretimi süreçlerinde resmî kurumlar üzerlerine düşen planlama, denetleme, kamuoyunu bilgilendirme vb. türünden sorumluluklarını olması gerektiği gibi yerine getirirler.	T1	N4Cities project
Enerji üretiminde yemek atıklarının güvenilir bir kaynak olduğunu düşünüyorum.	T2	adapted from F.D. Musall & O.Kuik, 2011 & E. Park, 2019
Yemek atıklarından enerji üretimi güvenli bir yöntemdir.	T3	N4Cities project & Konda, 2021
Yemek atıklarından enerji üretimi konusundaki uygulayıcı firmaların güvenilir olduğunu düşünüyorum.	T4	N4Cities project

Question	Abbreviations used in the model	Reference
Yemek atıklarından enerji üretilirken en üst düzeyde çevreyi koruma hassasiyeti gösterilmektedir.	T5	N4Cities project
Yemek atıklarından enerji üretmenin olumsuzlukları konusunda bilgilendirme faaliyeti yapılmaktadır.	T6	N4Cities project
Yemek atıklarından enerji üreten projeler vatandaşın haklarını gözeten, insan haklarına saygılı biçimde geliştirilmektedir.	T7	N4Cities project
Yetkili makamların çevresel ve sosyal etkileri konusunda tesislerde yeterli denetimleri gerçekleştirdiğini düşünüyorum.	T8	N4Cities project
İlgili firmalarca üretimin çevresel ve sosyal etkileri kamuoyuyla şeffaf bir biçimde paylaşılmaktadır.	T9	N4Cities project
Kanun koyucuların kadroları bu enerji türünün risklerini-faydalarını değerlendirecek ve uygun kararlar verilmesi yönünde bilgi, beceri ve tecrübeye sahiptir.	T10	N4Cities project
Enerji üretim firmalarının kadroları, riskleri-faydaları değerlendirecek ve uygun kararlar verecek bilgi, beceri ve tecrübeye sahiptir.	T11	N4Cities project
Yemek atıklarından enerji üretiminin sağladığı faydalardan herkesin adil bir şekilde yararlandığını düşünüyorum.	DF1	N4Cities project
Atıktan enerji üretiminin neden olduğu olumsuzluklara Ankara'da yaşayan herkesin aynı şekilde maruz kaldığını düşünüyorum.	DF2	N4Cities project
Atık Bertaraf sistemi gelecek için umut veriyor.	AFF1	N4Cities project
Atık Bertarafı gibi sistemleri iklim değişikliği ile mücadelede etkisiz buluyorum.	AFF2	adapted from E. Savvanidou et al., 2010 & J. Yaghoubi et al., 2019

Question	Abbreviations used in the model	Reference
Yemek atıklarından enerji üretiminin yüksek maliyetli olduğunu düşünüyorum.	C1	N4Cities project
Tüm maliyetlere karşın iklim değişikliğiyle mücadelede bu tür enerjilerin üretimi desteklenmelidir.	C2	Konda, 2021
Ankara'da yemek atıklarından enerji üreten tesislerin çevre için tehlike yarattığını düşünüyorum.	R1	N4Cities project & E. Park, 2019
Tesislerin yüksek güvenlikli şekilde faaliyetlerini sürdürdüğüne inanıyorum.	R2	N4Cities project
Üretim esnasında Ankara'nın havasının kirlendiği düşüncesindeyim.	R3	N4Cities project &adapted from R. Kardooni et al., 2016
Yemek atıklarından enerji üretmenin enerji faturalarında aşağı yönde bir etkisinin olacağını düşünüyorum.	B1	N4Cities project & M. Masukujjaman, S.S. Alam, C. Siwar et al., 2021
Alternatif enerjiler ülkenin enerjide dışa bağımlılığını azaltacaktır.	B2	E. Savvanidou et al., 2010
Gelecek nesillere daha yaşanabilir bir çevre sağlanmasında yemek atıklarından enerji üretimi faydalıdır.	B3	N4Cities project & C. Wan et al., 2015
Yemek atıklarının enerji olarak değerlendirilmesi çevre kirliliğini önleyici etkilere sahiptir.	B4	N4Cities project & E. Park, 2019
Enerji üretimiyle çöplerin kokmasına bağlı kirlilik en aza indirilmiş olacaktır.	B5	N4Cities project
Çevremdeki insanların yemek atıklarından enerji üretilmesini desteklediğimi bilmelerini isterim.	SN1	N4Cities project

Question	Abbreviations used in the model	Reference
Çevremdeki insanların iklim değişikliği ile mücadelede alternatif enerjilerin kullanılmasını desteklediğimi bilmelerini isterim.	SN2	N4Cities project
Teknoloji geliştikçe alternatif enerjilerin verimliliğinin ve çözüm kabiliyetinin artacağına inanmaktayım.	SN3	adapted from M. Karatayevetal., 2016
Genel olarak yemek atıklarından enerji üretilmesi konusunu destekleyen tutuma sahibim.	PN1	N4Cities project & K. Revell, 2014
Genel olarak iklim değişikliğini önleyen projeleri destekleyen tutuma sahibim.	PN2	N4Cities project & Konda, 2021
Enerji üretimi işinin devlet tarafından yapılması gerektiğine inanıyorum.	PN3	self constructed
Yemek atıklarından enerji üretilmesi konusuyla ilgilenmiyorum.	ATTD1	adapted from Lee & Paik, 2011 & Xu et al., 2018
Enerjinin nasıl ve hangi kaynaktan üretildiği konusu benim için önemlidir.	ATTD2	Adopted from Musall & Kuik, 2011
Günümüz politikalarıyla iklim değişikliğini önlemenin zor olduğunu düşünüyorum.	PBC1	self constructed
Yemek atıklarından enerji üretebilecek yerli teknolojilere sahip değiliz.	PBC2	M. Karatayevetal.,2016
Alternatif enerji teknolojilerinde dışa bağımlılığımız söz konusudur.	PBC3	Konda, 2021
Ülke ekonomisine getirisi olacaksa yemek atıklarından enerji üretimini desteklerim.	I-t-A1	Konda, 2021
İklim değişikliğiyle mücadeleye katkı sağlayacaksa yemek atıklarından enerji üretimini desteklerim.	I-t-A2	M. Qu et al., 2019

Question	Abbreviations used in the model	Reference
Hava ve su kalitemi arttırmaya katkı sağlayacaksa yemek atıklarından enerji üretimini desteklerim.	I-t-A3	N4Cities project & Konda, 2021
Çöp yığınlarının önlenmesini sağlayacaksa yemek atıklarından enerji üretimini desteklerim.	I-t-A4	adapted from C. Wan et al., 2015
İklim değişikliğini önlemek için geliştirilen alternatif enerjilerin maliyetleri nedeniyle daha fazla fatura ödemeyi kabul edebilirim.	A1	adapted from Murad et al., 2007 & F.D. Musall & O.Kuik, 2011 & M. Pothitou et al.,2016 &
Yemek atıklarından enerji üretimi için geliştirilecek projelere karşı çıkmam.	A2	N4Cities project & Konda, 2021
Projelerin doğamızı korumak adına makul ölçüde çevre tahribatı yaratması kabul edilebilir.	A3	Konda, 2021
İklim değişikliğiyle mücadelede alternatif enerjilerden kaynaklı maliyetlerin halk tarafından karşılanması kabul edilebilir.	A4	Konda, 2021
Ülkemizde hayata geçirilen projeler şeffaf, güvenilir, adaletli, katılımcı olma vb. yönetsel yönlerden kabul edilebilir biçimdedir.	A5	N4Cities project

E. Questionnaire (Turkish version)

"Atık Yönetimi Sektöründe Sosyal Kabulün Rolü" Konulu Doktora Çalışması Anket Formu

ODTÜ doktora öğrencisi *Tuğba KIRER*'in tez çalışmasına, vereceğiniz yanıtlarla katkıda bulunmanız için sizi bu araştırmaya katılmaya davet ediyoruz. Ankara'da her gün evlerden, okullardan ve iş yerlerinden çöpler toplanmakta ve bertaraf edilmektedir. Günlük olarak ortalama 5.000-5.500 ton evsel atık bertaraf edilmektedir ve bunun %50-60 oranında büyük bir miktarını yemek atıkları oluşturmaktadır. Bu araştırmada, evsel katı atıklar içerisindeki yemek atıklarının bertaraf edilerek enerji üretilmesi ve iklim değişikliği ile mücadeleye ilişkin görüşleriniz talep edilmektedir. Katılımınız için teşekkür ederiz.

Anketle ilgili *0 532 405 23 69* nolu telefondan, *kirer.tugba@metu.edu.tr* e-posta adresinden Tuğba Krer ile iletişime geçebilirsiniz.

☐ Bu ankete gönüllü olarak katılmaktayım.
Anketin bir bölümüne veya tamamına katılmamayı seçebileceğimi ve herhangi bir aşamada bir sorunla karşılaşmadan çekilebileceğimi biliyor ve kabul ediyorum.

İlçe:	....	Yaşınız:	....

Cinsiyet:	☐ Kadın	☐ Erkek

Çalışma alanı: Lütfen hangi alanda çalıştığınızı en iyi belirten seçeneği işaretleyiz:				
☐ Akademik	☐ Belediye	☐ Özel Sektör	☐ Devlet Kurumu	☐ Öğrenci
☐ Ev Hanımı	☐ Emekli	☐ Sivil Toplum Kuruluşu/Kar Amacı Gütmeyen Kuruluş		
☐ Tarım	☐ Diğer ………			

Eğitim Durumunuz/en son bitirdiğiniz okul:			
☐ Okur-yazar değil	☐ İlkokul	☐ Ortaokul	☐ İlköğretim
☐ Lise	☐ Üniversite		☐ Yüksek Lisans/Doktora

Aylık hane geliriniz:	....

Oturduğunuz ev:				
☐ Kira	☐ Ev sahibi	☐ Lojman	☐ Yurt	☐ Bir yakınımın evi

Soru Numarası	Sorular	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum	Bilmiyorum
		1	2	3	4	5	0
1	Bir çöp dönüştürme tesisini ziyaret ettiniz mi?	Evet			Hayır		
2	İklim değişikliğinin etkilerini hissetmekteyim.						
3	Yemek atıkları bir enerji kaynağı olarak kullanılmaktadır.						
4	Su faturalarına yansıtılan çevre temizlik vergisi sadece çöplerin toplanmasını içermektedir.						
5	İklim değişikliğini önlemek için aktif bir şekilde çalışma yürütülmelidir.						
6	İklim değişikliği gelişen medeniyetimizin olumsuz bir mirasıdır.						
7	Yemek atıklarının verimli bir enerji üretim hammaddesi olduğunu düşünüyorum.						
8	Toplum tarafından iklim değişikliğinin yeterince önemsenmediği görüşündeyim.						
9	Ülkemizdeki enerji kaynaklarının kısıtlı olduğu kanısındayım.						
10	Toplanan atıkların nereye götürüldüğünü biliyorum.						
11	Ankara'da yemek atıklarından enerji üretildiği konusunda yeterli bilgi sahibiyim.						
12	Yemek atıklarından enerji üretilmesi hakkında halkın yeterince bilgilendirildiğini düşünüyorum.						
13	Atıkların nasıl işlendiğini biliyorum.						
14	Yemek atıklarından enerji üretilmesinin iklim değişikliğiyle mücadelede önemli olduğu görüşündeyim.						
15	Yemek atıklarından enerji üretim sisteminin planlanması sürecinde söz sahibi olduğumu düşünüyorum.						
16	Toplumun hassasiyet gösterdiği konular dikkate alınarak mevcut sistem iyileştirilmektedir.						
17	Ankara'da yaşayanlar adına Atık Yönetim Sisteminin gelişmesini ve denetlenmesini sağlayacak bağımsız kuruluşlar vardır.						

Soru Numarası	Sorular	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum	Bilmiyorum
		1	2	3	4	5	0
18	Yemek atıklarından enerji üretim sistemi planlanırken kamuoyunun hassasiyetleri yeterince dikkate alınır.						
19	Yemek atıklarından enerji üretilmesi enerji konusundaki dışa bağımlılığımızı azaltacak potansiyeldedir.						
20	Yemek atıklarından enerji üretimi süreçlerinde resmî kurumlar üzerlerine düşen planlama, denetleme, kamuoyunu bilgilendirme vb. türünden sorumluluklarını olması gerektiği gibi yerine getirirler.						
21	Enerji üretiminde yemek atıklarının güvenilir bir kaynak olduğunu düşünüyorum.						
22	Yemek atıklarından enerji üretimi güvenli bir yöntemdir.						
23	Yemek atıklarından enerji üretimi konusundaki uygulayıcı firmaların güvenilir olduğunu düşünüyorum.						
24	Yemek atıklarından enerji üretilirken en üst düzeyde çevreyi koruma hassasiyeti gösterilmektedir.						
25	Yemek atıklarından enerji üretmenin olumsuzlukları konusunda bilgilendirme faaliyeti yapılmaktadır.						
26	Yemek atıklarından enerji üreten projeler vatandaşın haklarını gözeten, insan haklarına saygılı biçimde geliştirilmektedir.						
27	Yetkili makamların çevresel ve sosyal etkileri konusunda tesislerde yeterli denetimleri gerçekleştirdiğini düşünüyorum.						
28	İlgili firmalarca üretimin çevresel ve sosyal etkileri kamuoyuyla şeffaf bir biçimde paylaşılmaktadır.						
29	Kanun koyucuların kadroları bu enerji türünün risklerini-faydalarını değerlendirecek ve uygun kararlar verilmesi yönünde bilgi, beceri ve tecrübeye sahiptir.						
30	Enerji üretim firmalarının kadroları, riskleri-faydaları değerlendirecek ve uygun kararlar verecek bilgi, beceri ve tecrübeye sahiptir.						
31	Yemek atıklarından enerji üretiminin sağladığı faydalardan herkesin adil bir şekilde yararlandığını düşünüyorum.						
32	Atıktan enerji üretiminin neden olduğu olumsuzluklara Ankara'da yaşayan herkesin aynı şekilde maruz kaldığını düşünüyorum.						
33	Atık Bertaraf sistemi gelecek için umut veriyor.						
34	Atık Bertarafı gibi sistemleri iklim değişikliği ile mücadelede etkisiz buluyorum.						

Soru Numarası	Sorular	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum	Bilmiyorum
		1	2	3	4	5	0
35	Yemek atıklarından enerji üretiminin yüksek maliyetli olduğunu düşünüyorum.						
36	Tüm maliyetlere karşın iklim değişikliğiyle mücadelede bu tür enerjilerin üretimi desteklenmelidir.						
37	Ankara'da yemek atıklarından enerji üreten tesislerin çevre için tehlike yarattığını düşünüyorum.						
38	Tesislerin yüksek güvenlikli şekilde faaliyetlerini sürdürdüğüne inanıyorum.						
39	Üretim esnasında Ankara'nın havasının kirlendiği düşüncesindeyim.						
40	Yemek atıklarından enerji üretmenin enerji faturalarında aşağı yönde bir etkisinin olacağını düşünüyorum.						
41	Alternatif enerjiler ülkenin enerjide dışa bağımlılığını azaltacaktır.						
42	Gelecek nesillere daha yaşanabilir bir çevre sağlanmasında yemek atıklarından enerji üretimi faydalıdır.						
43	Yemek atıklarının enerji olarak değerlendirilmesi çevre kirliliğini önleyici etkilere sahiptir.						
44	Enerji üretimiyle çöplerin kokmasına bağlı kirlilik en aza indirilmiş olacaktır.						
45	Çevremdeki insanların yemek atıklarından enerji üretilemesini desteklediğimi bilmelerini isterim.						
46	Çevremdeki insanların iklim değişikliği ile mücadelede alternatif enerjilerin kullanılmasını desteklediğimi bilmelerini isterim.						
47	Teknoloji geliştikçe alternatif enerjilerin verimliliğinin ve çözüm kabiliyetinin artacağına inanmaktayım.						
48	Genel olarak yemek atıklarından enerji üretilmesi konusunu destekleyen tutuma sahibim.						
49	Genel olarak iklim değişikliğini önleyen projeleri destekleyen tutuma sahibim.						
50	Enerji üretimi işinin devlet tarafından yapılması gerektiğine inanıyorum.						

Soru Numarası	Sorular	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum	Bilmiyorum
		1	**2**	**3**	**4**	**5**	**0**
51	Yemek atıklarından enerji üretilmesi konusuyla ilgilenmiyorum.						
52	Enerjinin nasıl ve hangi kaynaktan üretildiği konusu benim için önemlidir.						
53	Günümüz politikalarıyla iklim değişikliğini önlemenin zor olduğunu düşünüyorum.						
54	Yemek atıklarından enerji üretebilecek yerli teknolojilere sahip değiliz.						
55	Alternatif enerji teknolojilerinde dışa bağımlılığımız söz konusudur.						
56	Ülke ekonomisine getirisi olacaksa yemek atıklarından enerji üretimini desteklerim.						
57	İklim değişikliğiyle mücadeleye katkı sağlayacaksa yemek atıklarından enerji üretimini desteklerim.						
58	Hava ve su kalitemi arttırmaya katkı sağlayacaksa yemek atıklarından enerji üretimini desteklerim.						
59	Çöp yığınlarının önlenmesini sağlayacaksa yemek atıklarından enerji üretimini desteklerim.						
60	İklim değişikliğini önlemek için geliştirilen alternatif enerjilerin maliyetleri nedeniyle daha fazla fatura ödemeyi kabul edebilirim.						
61	Yemek atıklarından enerji üretimi için geliştirilecek projelere karşı çıkmam.						
62	Projelerin doğamızı korumak adına makul ölçüde çevre tahribatı yaratması kabul edilebilir.						
63	İklim değişikliğiyle mücadelede alternatif enerjilerden kaynaklı maliyetlerin halk tarafından karşılanması kabul edilebilir.						
64	Ülkemizde hayata geçirilen projeler şeffaf, güvenilir, adaletli, katılımcı olma vb. yönetsel yönlerden kabul edilebilir biçimdedir.						

F. Questionnaire (English version)

Questionnaire for Doctoral Study on "The Role of Social Acceptance in Waste Management Sector"

We invite you to participate in this research to contribute to METU PhD student Tuğba KIRER's thesis with your answers. Every day in Ankara, garbage is collected and disposed of from homes, schools and workplaces. An average of 5,000-5,500 tonnes of household waste is disposed of daily, of which 50-60% is food waste. In this research, your opinions are requested regarding the generation of energy by disposing of food waste in municipal solid wastes and combating climate change. Thank you for your participation.

You can contact Tuğba Krer at 0 532 405 23 69, kirer.tugba@metu.edu.tr e-mail address regarding the survey.

☐ I am participating in this survey voluntarily
I understand and accept that I can choose not to participate in part or all of the survey and that I can withdraw at any stage without any problems.

District	....	Age	....

Gender	☐ Female	☐ Male

Field of work: Please choose the option that best describes the field in which you work:				
☐ Academic	☐ Municipality	☐ Private Sector	☐ State	☐ Student
☐ Homemaker	☐ Retired	☐ NGO		
☐ Agriculture	☐ Other			

Your educational status/last school you graduated from:			
☐ Non-literate	☐ Primary school	☐ Secondary school	☐ Primary education
☐ High school	☐ University		☐ Master's/PhD

Monthly household income:	....

The house you live in:				
☐ Rent	☐ Owner	☐ Lodging	☐ Dormitory	☐ Residence of a relative

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not Know
		1	**2**	**3**	**4**	**5**	**0**
1	Have you visited a waste recycling plant?	Evet			Hayır		
2	I feel the effects of climate change.						
3	Food waste is used as an energy source.						
4	The environmental cleaning tax reflected in water bills only covers the collection of rubbish.						
5	We should actively work to prevent climate change.						
6	Climate change is a negative legacy from the development of civilization.						
7	I think food waste is an efficient energy production resource.						
8	I think climate change is not given enough importance by the society.						
9	I believe that energy resources in our country are limited.						
10	I know where the collected waste is taken.						
11	I have sufficient information about energy production from food waste in Ankara.						
12	I think that the public is sufficiently informed about energy production from food waste.						
13	I know how the wastes are processed.						
14	I think that energy production from food waste is important in combating climate change.						
15	I think that I have a say in the planning process of the energy production system from food waste.						
16	The current system is being improved by taking into account the issues that the society is sensitive to.						
17	There are independent organisations that will ensure the development and supervision of the Waste Management System on behalf of the residents of Ankara.						

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not Know
		1	2	3	4	5	0
18	Public sensitivities are adequately taken into account when planning the energy production system from food waste.						
19	Energy production from food waste has the potential to reduce our dependence on foreign energy.						
20	In the processes of energy production from food waste, official institutions fulfil their responsibilities such as planning, supervision, informing the public, etc. as they should.						
21	I think food waste is a reliable source for energy production.						
22	Energy production from food waste is a safe method.						
23	I think that the implementing companies in the field of energy production from food waste are reliable.						
24	While producing energy from food waste, the highest level of environmental protection sensitivity is provided						
25	Informative activities are carried out on the negativities of generating energy from food waste.						
26	Projects generating energy from food waste are developed in a way that respects the rights of citizens and respects human rights.						
27	I think that the competent authorities carry out adequate inspections at the facilities regarding environmental and social impacts.						
28	The environmental and social impacts of production are transparently shared with the public by the relevant companies.						
29	The staff of the legislators have the specialized knowledge, skills and experience to assess the risks and benefits and make adequate decisions.						
30	The staff of energy production companies have specialized knowledge, skills and experience to assess the risks and benefits and make adequate decisions.						
31	I think that distribution of benefits of energy production from food waste with respect to myself and others is fair.						
32	I think that distribution of drawbacks of energy production from food waste with respect to myself and others is fair.						
33	The Waste Disposal system gives hope for the future.						

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not Know
		1	2	3	4	5	0
34	I find systems such as Waste Disposal ineffective in combating climate change.						
35	I think that energy production from food waste is built at high costs.						
36	Despite all the costs, the production of such energy should be supported in the fight against climate change.						
37	I think that the facilities in Ankara that produce energy from food waste pose a danger to the environment.						
38	I believe that the facilities continue their activities with high security.						
39	I believe that Ankara's air is polluted during production.						
40	I think that producing energy from food waste will have a downward effect on energy bills.						
41	Alternative energies will reduce the country's dependence on foreign energy.						
42	Energy production from food waste is useful in providing a more livable environment for future generations.						
43	The utilisation of food waste as energy has the effect of preventing environmental pollution.						
44	With energy production, pollution due to the smell of garbage will be minimised.						
45	I expect that people important to me know that I am strongly in favor of the production of energy from food waste.						
46	I expect that people important to me know that I am strongly support the use of alternative energies in combating climate change.						
47	I believe that the efficiency and solution capability of alternative energies will increase as technology develops.						
48	In general, I support the production of energy from food waste.						
49	I generally support projects that prevent climate change.						
50	I believe that energy production should be done by the government.						

No	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Do not Know
		1	**2**	**3**	**4**	**5**	**0**
51	I am not interested in the production of energy from food waste.						
52	How and from which source the energy is produced is important for me.						
53	I think it is difficult to prevent climate change with today's policies.						
54	We do not have domestic technologies that can produce energy from food waste.						
55	We are dependent on foreign countries for alternative energy technologies.						
56	I support energy production from food waste if it will contribute to the national economy.						
57	I support energy production from food waste if it contributes to the fight against climate change.						
58	I support energy production from food waste if it will contribute to improving my air and water quality.						
59	I support energy production from food waste if it will prevent garbage heaps.						
60	I can accept to pay higher bills due to the costs of alternative energies developed to prevent climate change.						
61	I do not oppose projects to be developed for energy production from food waste.						
62	It is acceptable for the projects to create environmental damage to a reasonable extent in order to protect our nature.						
63	It is acceptable that the costs arising from alternative energies in the fight against climate change are borne by the public.						
64	The projects implemented in our country are transparent, reliable, fair, participatory, etc. in an acceptable manner in terms of administrative aspects.						

CURRICULUM VITAE

Kırer, Tuğba

EDUCATION

Degree	Institution	Year of Graduation
MS	IYTE Environmental Pollution & Control	2002
BS	DEÜ Environmental Engineering	1998
High School	Söke High School, Aydın	1994

FOREIGN LANGUAGES

Advanced English

PUBLICATIONS

Tayfur, G., Kırer, T., and Baba, A. (2008). Groundwater quality and hydrogeochemical properties of Torbali Region, Izmir, Türkiye. Environmental Monitoring and Assessment, 146(1-3), 157-169. doi:10.1007/s10661-007-0068-6

HOBBIES

Cycling, quantum physics