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-RESEARCH ARTICLE-

GREEN TRANSITION FOR THE SERVICE INDUSTRY: DETERMINATION OF PRIORITY ACTIONS BASED ON BALANCED SCORECARD BY HYBRID FUZZY SIWEC-TOPSIS METHOD

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Abstract

As concerns about environmental sustainability deepen, demands for green transition increase. In this context, regulations on environmental sustainability are mostly aimed at the manufacturing sector or large companies. Service sector SMEs, which lie outside strong regulatory frameworks, must respond to these demands in the context of stakeholder theory. However, studies indicate that SMEs, perceived to have low individual environmental impacts, exert high collective impacts. In addition, green transition offers a path of resilience for structurally vulnerable SMEs. SMEs need simplified standards or unique solutions for the green transition. Based on the question of which steps should be taken first regarding the green transition, which includes a comprehensive list of practices and the necessity of creating a roadmap, this study aims to provide guidelines for professional services industry SMEs to select the optimum green transition practices based on the balanced scorecard framework. The steps to be taken within the scope of green transition are considered a decision problem in a holistic context covering financial, stakeholder, business process, employee, and environmental performance metrics. The fuzzy SIWEC method was preferred to determine the importance of the balanced scorecard performance metrics. The fuzzy TOPSIS method was selected to choose the optimal green transition practices. The findings show that operational arrangements constitute the most critical green transition practice. Then, it is followed by employee awareness training, sustainability reports, and environmental impact assessments, which have similar weight values. Environmental corporate social responsibility (CSR) activities are of the lowest importance. In a field where information flow is limited, the holistic perspective on the subject and the method used constitute the originality and contribution of the study.

Keywords: *Green transition, Service industry, SME, Multi-criteria decision making, SIWEC.*

JEL Codes: *M1, O3, Q5.*

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HİZMET SEKTÖRÜ İÇİN YEŞİL DÖNÜŞÜM: ÖNCELİKLİ EYLEMLERİN DENGELİ PUAN KARTINA DAYALI OLARAK HİBRİT BULANIK SIWEC-TOPSIS YÖNTEMİ İLE BELİRLENMESİ [2]

Öz

Çevresel sürdürülebilirliğe yönelik endişeler derinleşirken, endüstrilerin yeşil dönüşümüne ilişkin talepler de artmaktadır. Bu doğrultuda, çevresel sürdürülebilirliğe yönelik mevzuat çoğunlukla imalat sektörüne ya da büyük firmalara yöneliktir. Mevzuatın güçlü olduğu çemberin dışında kalan hizmet sektörü KOBİ'leri ise, paydaş teorisi bağlamında bu taleplere yanıt vermek durumundadır. Bununla birlikte bilimsel çalışmalar, tekil olarak düşünüldüğünde çevresel etkileri düşük gibi algılanan KOBİ'lerin, toplu olarak ele alındıklarında çevresel etkilerinin yüksekliğine işaret etmektedir. Bunların yanı sıra çeşitli zayıflıkları ve kırılganlıkları olan KOBİ'ler için yeşil dönüşüm, bir dayanıklılık yolu sunmaktadır. KOBİ'ler yeşil dönüşüm konusunda basitleştirilmiş standartlara ya da özel çözümlere ihtiyaç duymaktadırlar. Geniş bir uygulama listesini içeren yeşil dönüşüme ilişkin, öncelikli olarak hangi adımların atılması gerektiği sorunsalından ve yol haritası oluşturulması gerekliliğinden hareketle bu çalışmada, mesleki hizmetler sektörü KOBİ'leri için, dengeli puan kartı çerçevesini temel alarak optimum yeşil dönüşüm uygulamalarının seçilmesine ilişkin yönerge sunulması amaçlanmaktadır. Mesleki hizmetler sektöründe faaliyet gösteren KOBİ'ler için yeşil dönüşüm kapsamında atılacak adımlar, finansal, paydaş, iş süreci, çalışan ve çevresel performans metriklerini kapsayan bütüncül bağlamda bir karar problemi olarak ele alınmaktadır. Dengeli puan kartı performans ölçütlerinin önemini belirlemek için bulanık SIWEC yöntemi tercih edilmiştir. Optimum yeşil dönüşüm uygulamalarını seçmek için ise bulanık TOPSIS yöntemi seçilmiştir. Bulgular, operasyonel düzenlemelerin yeşil dönüşüm uygulamaları arasında en kritik araç olduğunu göstermektedir. Operasyonel düzenlemelerin ağırlık değeri görece en yüksektir. Ardından, benzer ağırlık değerlerine sahip olan çalışan farkındalık eğitimleri, sürdürülebilirlik raporları ve çevresel etki değerlendirmeleri gelmektedir. Çevresel kurumsal sosyal sorumluluk (KSS) faaliyetleri ise en düşük öneme sahip uygulamadır. Bilgi akışının sınırlı olduğu bir alanda konuya ilişkin bütüncül bakış açısı ve kullanılan yöntem çalışmanın özgünlüklerini ve katkılarını oluşturmaktadır.

Anahtar Kelimeler: *Yeşil dönüşüm, Hizmet sektörü, KOBİ, Çok kriterli karar verme, SIWEC.*

JEL Kodları: *M1, O3, Q5.*

"Bu çalışma Araştırma ve Yayın Etiğine uygun olarak hazırlanmıştır."

[2] Genişletilmiş Türkçe Özet, çalışmanın sonunda yer almaktadır.

1. INTRODUCTION

Views on the deterioration and destruction experienced in the ecological environment are also supported by scientific studies, and concerns about the sustainability of the ecological environment are shared worldwide. The concept of sustainability means that natural resources can be transferred to future generations without destruction, and it is generally accepted that the largest share of this destruction belongs to the industries. (Yorulmaz, 2024). Therefore, societies expect companies operating in these industries to organize their activities in accordance with sustainability principles. In parallel with these expectations, various compelling legal regulations aimed at regulating the activities of the companies are also coming into force day by day. All of these necessarily draw companies' attention to this direction, and they turn to a green transition. The concept of green transition, as preferred in this study, refers to the integration of company activities with environmental sustainability. Although conceptual classification is not the subject of this study, concepts such as green transition, green transformation, greening, etc., are frequently encountered in the literature, and there is no agreed concept (Şengüllendi and Şehitoğlu, 2023).

Scientific interest in the green transition has primarily focused on the manufacturing industry and large companies. One of the reasons for this is that the laws put into effect are mainly aimed at the manufacturing industry and directly affect this industry in the first place. In addition, the obligations regarding green transition, such as submitting sustainability reports by companies imposed by the European Union (EU), are mainly aimed at large companies with more than 250 employees, excluding SMEs (Marin et al., 2021). On the other hand, the service industry has a considerable share globally and constitutes a large proportion of OECD country economies (Ström, 2020). Although SMEs are perceived to have low environmental impacts when considered individually, studies indicate that SMEs have high environmental impacts on issues such as waste production, energy use, greenhouse gas emissions, water use, and material consumption when considered collectively (DiBella et al., 2023; Fawcett and Hampton, 2020; Tevapitak and Helmsing, 2019). Therefore, the flow of information on the green transition of SMEs operating in the service industry is limited, and considering the importance of the issue, research in this area is essential.

Considering the high environmental impacts of the service industry and SMEs, this study focuses on the green transition in SMEs operating in the professional services industry. With its focus and results, it aims to contribute to developing the literature in this field and provide practical advice for practitioners. The study is based on stakeholder theory. According to stakeholder theory, businesses should consider all target groups directly or indirectly involved in their activities and decisions to maintain their existence, gain competitive advantage, and strengthen their relationships with them (Freeman, 1984). Therefore, SMEs operating in the service industry should take actions regarding environmental sustainability concerns in societies and take steps towards green transition, even though the legal regulations on this subject are not sufficiently developed.

In addition, SMEs have fragile structures due to various weaknesses such as financial resources and human resources, and it is essential for them to have organizational resilience, which, in its simplest definition, refers to the sustainability of existence under all conditions (Yorulmaz and Baykal, 2023). The literature shows strong evidence that green transformation provides organizational resilience. According to Isensee et al. (2023), organizational resilience increases as environmental sustainability and digitalization increase in firms. Florez-Jimenez et al. (2024) indicate that sustainability, organizational resilience, and corporate purpose ensure the survival of firms. Lu et al. (2022) concluded that firms with better sustainability performance are more resilient and profitable in the long run. According to Miceli et al. (2021), sustainability in firms is an element of organizational resilience. According to Gillespie-Marthaler et al. (2019), firms that take environmental, social, and economic balance into account are more resilient, and commitment to sustainability is essential for firms that want to be resilient.

Considering all these points, the green transition is necessary as a management strategy for SMEs operating in the service industry to meet stakeholder demands and ensure organizational resilience. However, similar to the lack of consensus on the concept of green transition, it is unclear what falls within the scope of green transition or which activities should be included (Yorulmaz and Eti, 2024). Many activities aimed at reducing the environmental impact of the business can be included in the scope of the green transition. There are various studies in the literature on green transition practices in the service industry. In the study of Memiş (2019), several practices regarding green transition in accommodation businesses were weighted according to their order of importance. Maheshwari's (2016) and Aithal and Jeevan's (2016) studies are aimed at exploring green practices in various sub-branches of the service industry. Tan et al. (2019) conducted a qualitative study on green practice steps for the restaurant sector. In addition, guides on designing green business models (Antal et al., 2018) and green transition in the European service industry (Ström, 2020) also address the steps and practices related to green transition.

Various alternative practices for green transition are presented in the existing literature. However, there are multiple barriers to green transition at the SME scale based on financial, technical, and human resource weaknesses (Seidel-Sterzik et al., 2018). Some of these are the perception that the return will be low compared to the investment made (Kumar et al., 2023), the perception that it may conflict with growth strategies by leading to negative performance (Escoto et al., 2022), the perception that employees may resist changing existing business processes and technologies in a sustainable way (Alayón et al., 2022), and the weak measurement of benefits (Abdullah et al., 2023). In the literature, some studies address SMEs and focus on the effects of green practices on customers' service experience (Jiang et al., 2023), environmental performance (Huang and Li, 2017), financial performance (Boakye et al., 2020), and employee performance (Faeni, 2024). Existing studies primarily focus on the effects of sustainable practices on one or two parameters by considering them from a general perspective.

SMEs need simplified standards or unique solutions regarding green transition (Ortiz et al., 2024). When the literature is examined, there is a need for studies that provide empirical-based solutions and practical suggestions with a holistic view, taking into account the barriers in this regard and the steps to be taken by SMEs for the green transition. In this context, in this research, green transition practices for SMEs operating in the professional services industry are weighted using the balanced scorecard framework. Fuzzy simple weight calculation (SIWEC) and TOPSIS multi-criteria decision-making techniques were combined in a hybrid approach for the evaluation process. Thus, guidelines for the optimum implementation steps of green transition for SMEs operating in the service industry are presented. The balanced scorecard is a multi-dimensional performance measurement and management tool for companies' strategic goals (Kaplan and Norton, 1992). It is a valuable tool for overcoming SMEs' green transition barriers with its dimensions of financial performance, stakeholder performance, business process performance, employee performance, and environmental performance (Kaplan and McMillan, 2021). This study addresses the steps to be taken within the scope of green transition for SMEs operating in the professional services industry as a decision problem in a holistic context covering financial, stakeholder, business process, employee, and environmental performance metrics.

Despite the growing importance of green transition initiatives, service-sector SMEs remain underexplored in both regulatory frameworks and empirical research. These firms face unique constraints in adopting comprehensive sustainability practices due to limited resources, simplified operational structures, and the absence of sector-specific guidelines. Therefore, there is a clear need for a structured yet practical decision-making framework that enables professional service SMEs to prioritize green transition practices aligned with their strategic performance dimensions. This study is motivated by this gap and aims to provide an integrated and applicable roadmap for green transition decision-making in the professional services industry. In this context, the research seeks answers to the following questions:

1. When considering the green transition for SMEs operating in the professional services sector, what is the financial, stakeholder, business process, employee, and environmental performance weighting?

2. Based on the weights of financial, stakeholder, business process, employee, and environmental performance metrics, what is the order of importance of green transition practices?

The fuzzy SIWEC method used in the study is a relatively new method developed by Puška et al. in 2024. The method was developed to simplify the work of both decision-makers and calculators compared to other multi-criteria decision-making methods (Puška et al., 2024). Although previous studies have employed multi-criteria decision-making methods in the context of green transition (Eti et al., 2023; Akyol Özcan, 2023), this study offers methodological originality by employing the newly developed fuzzy SIWEC method. In addition, the performance-based prioritization of green

transition practices, considering the barriers of SMEs and their implementation in the context of the service industry, constitutes the originality of the subject. In addition, the research design and the method used provide a valuable tool for researchers to conduct subsequent theoretical research in different sectors or sub-sectors and for sector professionals to apply practical applications.

1.1. Literature Review

Green transition practices cover a wide range, and various studies exist in the literature on these practices. They cover various industries and businesses of various sizes and use various methods. In addition, existing studies also examine green transition practices in the context of their effects on various performance metrics. Among the studies on environmental sustainability in the service industry, Jiang et al. (2023) examine the impact of green practices on customer value creation. The research was conducted on the hotel industry in the context of China. The authors list green practices as efforts to save and recycle various materials used in hotel services, especially energy and water saving. Faeni (2024) conducted a study on the transportation service industry in Indonesia proves the positive effects of green management practices, such as green human resources management, waste management and recycling, energy management, and various savings practices, on employee performance.

The findings of the study conducted by Huang and Li (2017), who examined the effects of green innovation and green product development on environmental and organizational performance in Taiwan's information and communication technology industry within the scope of green practices, are positive. Boakye et al. (2020) confirm the relationships between sustainable environmental practices and financial performance in their research focusing on SMEs in the United Kingdom. The authors define energy efficiency practices, environmental regulations/compliance, waste control, pollution control, material and resource efficiency, and stakeholder engagement as sustainable environmental practices. Addressing the issue through stock market financial performance, Zhou and Zhou (2022) obtained the results that companies with high green transition performance have higher stock market performance. Conducting a study on corporate sustainability reporting of SMEs within the scope of green transformation in Europe, Ortiz et al. (2024) argue that small- and medium-sized accountancy practices have an important role in ensuring sustainable transition.

The study conducted by Maheshwari (2016) on green transition practices in the service industry in the Indian context focuses on green practices and the reasons behind them. The study covers a wide range of sub-sectors in the service industry, such as banking, information technology, education, transportation, health services, hotel industries, telecommunication, and professional services, and emphasizes water management, waste management, energy efficiency, savings, and recycling as green practices. Aithal and Jeevan (2016) analyze green transition practices for various sub-sectors of the service industry using qualitative methods. The authors discuss green transition practices such as solid and liquid waste management and recycling, air and

noise pollution management, renewable energy, eco-construction, nature protection, etc., in terms of sectors.

In the study examining the effects of green transition on customer value in restaurants, Hu et al. (2010) identified various practices for green transition. These are energy, water saving and recycling, waste management, operational procedures, green human resources practices, green marketing practices, green supplier selection, customer communication, and sustainability reports. Tan et al. (2019) investigated the perceptions of green transition in restaurant service establishments in the Malaysian context using qualitative methods. The authors list energy and water efficiency and conservation, recycling and composting, green food, non-toxic cleaning and chemical products, and employee training as green practices.

When the literature is examined from a methodological perspective, various studies using various multi-criteria decision-making techniques on green transition and related issues are encountered. Akyol Özcan (2023), who uses multi-criteria decision-making techniques, focuses on determining the most critical variables on the sustainability of universities in the context of Türkiye. The study used CRITIC, entropy, standard deviation-based, and equal weighting approaches to obtain rankings from multi-criteria decision-making techniques. The study uses infrastructure, energy, climate change, waste, water, and public transportation as sustainability metrics.

Eti et al. (2023) which focuses on the service industry in the context of green transition and uses multi-criteria decision-making methods, aims to determine priority strategies for green building transformation. T-spherical fuzzy TOP-DEMATEL methodology was used in the study. The authors use waste management, emission reduction, innovative design, energy efficiency, renewable energy use, green business processes, sustainable water management, and transportation criteria as indicators for green buildings. Piya et al. (2022) use the fuzzy AHP-TOPSIS method to prioritize green transition practices in the tourism sector in Oman. The authors prioritize various waste management and recycling indicators, green transportation, energy and water efficiency management, environmental awareness, and environmental education criteria.

Yorulmaz and Eti (2024) emphasized the importance of collaboration with environmental non-governmental organizations (NGO) in the green transition of service industry SMEs in their study using AHP, one of the multi-criteria decision-making techniques. In another study focusing on the tourism service sector and conducted in the context of Türkiye, Memiş (2019) used entropy, one of the multi-criteria decision-making techniques, to determine and prioritize the criteria for green transition. The study's green transition criteria were defined as recycling and waste management, use of renewable energy, environmentally compatible construction, environmentally sensitive planning practices, energy saving, training on environmental awareness, and water saving. In the study conducted by Prakash et al. (2023) on the hotel service industry in India, green transition practices were prioritized in the context of cost, image, regulations, and stakeholder demand criteria using AHP,

one of the multi-criteria decision-making methods. The study lists water saving, energy saving, waste management, noise pollution, and air pollution as alternative green transition applications.

In the research conducted by Paul et al. (2020) to evaluate transportation service providers in the service industry in the context of economic, social, environmental, and operational sustainability criteria, the best-worst and VIKOR methods were used. In their study, green technology, energy efficiency, recycling guidelines, and energy-efficient transportation were used as environmental sustainability criteria. Karamaşa et al. (2021) employed hybrid ENTROPI and MAUT multi-criteria decision-making methods in the transportation and logistics service sector to identify the most optimal green marketing strategies. In the same study, conducted in the context of Türkiye, product, process, and service evaluation, environmentally focused strategic decisions, environmentally friendly practices, life cycle analysis, and green product design criteria were considered green approach practices.

The existing literature includes numerous studies on green transition practices. Although common or similar green transition practices are listed in these studies, there are differences in industry, context, and research topic. Studies in the literature focus on various business performance metrics by addressing green transition and sustainability practices. These studies mainly focus on a single performance metric. However, more than one performance metric is generally essential for businesses, and there is a knowledge gap regarding the importance of these metrics in green transition.

There are studies in the literature focusing on the service industry or SMEs within the scope of the green transition. Studies focusing on the service industry mostly focus on the tourism, hospitality, and transportation services industries, regardless of the size of the business. Studies focusing on SMEs, on the other hand, address the issue independently of the industries. Therefore, it is seen that the flow of information regarding professional service SMEs is limited. When the literature regarding the service industry is examined from a methodological perspective, there are studies that use various multi-criteria decision-making techniques for green transition and related issues, either single or hybrid. The studies generally provide evaluations based on environmental sustainability metrics for green transition. As a subject requiring the use of hybrid methods, there is a research gap on specific but guiding issues such as determining the most optimal green transition practices that may vary by industry by considering various performance metrics together. While existing studies provide limited understanding in this area, this study aims to fill this gap.

2. METHODOLOGY

In the research, SMEs operating in the professional services industry were considered. Within the scope of the green transition, ranking optimal practices was considered a decision problem by considering the weights of balanced scorecard performance metrics using multi-criteria decision-making techniques. Multi-criteria decision-making techniques are used to make the most appropriate choice in cases where the

criteria or the issues to be considered in selecting alternatives cannot be measured or expressed numerically. The advantage of multi-criteria decision-making techniques over econometric or statistical models is that they can analyze non-numerical data. The ability to handle complex problems makes the model superior to other models.

The study uses the fuzzy SIWEC method to determine the importance weights of balanced scorecard performance metrics. Then, the fuzzy TOPSIS method is used to determine the optimum green transition practices. The most important advantage of using fuzzy numbers is that fuzzy numbers can better represent the uncertainty in linguistic variables (Kayacık et al., 2022). The newly developed fuzzy SIWEC method, used for weighting the criteria, facilitates decision-making with its simple structure and increases decision-makers importance in decision-making by only evaluating the criteria instead of comparing them (Puška et al., 2024). In addition, the fuzzy TOPSIS method used to rank the alternatives enables evaluation based on both positive and negative ideal solutions. Compared to other ranking methods, it is simple, realistic, and characterized by a transparent methodology and a straightforward calculation procedure (Piya et al., 2022).

In multi-criteria decision-making methods, obtaining a small number of opinions with experts in the field and conducting comprehensive analysis using fuzzy numbers are recommended in various studies, and a large number of expert decision-makers (EDM) is criticized because it reduces the reliability of decision-makers (Yüksel and Dinçer, 2023; Özdemirci et al., 2023).

Balanced scorecard performance metrics (Kaplan and McMillan, 2021; Kaplan and Norton, 1992) were used within the scope of the study. Balanced scorecard metrics, descriptions, and coding are presented in Table 1.

Table 1. Balanced Scorecard Criteria, Explanation, and Codes

Criteria	Explanation	Code	Criterion Type
Financial performance	Income, earnings, return on capital, cash flow, etc.	BS1	Benefit
Stakeholder performance (Customer value)	Client devotion, client fulfillment, market share, etc.	BS2	Benefit
Business processes performance	Efficiency and effectiveness, quality metrics, productivity rates, etc.	BS3	Benefit
Employee performance	Morale, knowledge, motivation, efficiency, etc.	BS4	Benefit
Environmental performance	Emissions, energy and water consumption, waste generation, etc.	BS5	Benefit*

*Environmental performance was evaluated in terms of performance improvement (i.e., reduced emissions, lower energy and water consumption, and reduced waste generation); therefore, it was treated as a benefit-based criterion.

In selecting green transition practices that constitute alternatives in the study, the practices in the literature were identified based on a comprehensive literature review. Then, to determine which practices were suitable for the professional service industry and whether they should be included in the research, a group interview was conducted with EDMs, during which nine core green transition practices were identified.

Practices, actions, and coding are listed in Table 2.

Table 2. Green Transition Practices

Green transition practices	Exemplary actions	Code
Environmental impact assessment	* Analyzing the company's environmental impact by obtaining expert support. * Determining areas where the company can reduce its use of resources such as water and energy and minimize waste. * Utilizing this analysis before green transformation actions.	P1
Energy and water management	* Switching to LED lighting. * Light and electricity sensors. * Alternative solutions for high energy-consuming data storage. * Installing automatic shutdown systems for computers. * Installing thermal insulation. * Water-saving faucets.	P2
Waste management	* Eliminate paper or use of recycled paper. * Company-wide printing guidelines. * E-waste management. * Waste and recycling bins. * Reduce, reuse, and recover waste.	P3
Operational arrangements	* Flexible telework options to employees (for carbon reduction) * Video calls instead of business travel * E-marketing instead of direct marketing.	P4
Green supply chain preference	* Choosing green suppliers for sourcing products or any materials. * Choosing a renewable energy supplier.	P5
Employee awareness training	* Providing environmental sustainability training. * Encouraging employees to choose greener transportation options (bicycle, rail, public transport, etc.).	P6
Environmental corporate social responsibility (CSR) activities	* Organizing CSR activities related to the environment by establishing collaborations with environmental NGOs. * Supporting environmental goals through charitable donations.	P7
Stakeholder engagement	* Including stakeholders in the creation and application of a sustainable business model (stakeholder meetings, suggestions, etc.). * Interacting with stakeholders to understand their views and expectations on environmental sustainability.	P8
Sustainability report	* Communicating the sustainability commitment to stakeholders. * Presenting the developments and activities related to the commitment	P9

	through sustainability reports. * Including information about sustainability in marketing materials. * Sharing information about sustainability activities on social media and the website.

In the study, numerical ratings from Puška et al. (2024) were used for the fuzzy SIWEC application, and 9-level fuzzy scale was used for the fuzzy TOPSIS application (Ayhan and Kilic, 2015). The following sections present the application steps of fuzzy SIWEC and fuzzy TOPSIS methods.

2.1. Fuzzy SIWEC

(1-2). In the first stage, certain numerical ratings are selected by the EDMs to rate the criteria. In the second stage, the numerical ratings are converted into triangular fuzzy numbers using the fuzzy numerical scale presented in Table 3 and the following formula:

$$\tilde{x}_{ij} = \left(x_{ij}^{l}, \quad x_{ij}^{m}, \quad x_{ij}^{u}\right)$$

Table 3. Fuzzy SIWEC Evaluation Scale

Numerical terms	Fuzzy Numbers
1	(1,1,1)
2	(1,2,3)
3	(2,3,4)
4	(3,4,5)
5	(4,5,6)
6	(5,6,7)
7	(6,7,8)
8	(7,8,9)
9	(8,9,10)
10	(9,10,10)

(3). With the help of converted fuzzy numbers, the initial decision-making matrix is created.

$$\tilde{X} = [\tilde{x}_{ij}]_{e\times n}$$

(4). Normalization of the first fuzzy decision-making matrix is done according to the formula below.

$$\tilde{n}_{ij} = \left(\frac{x_{ij}^{l}}{\max x_{ij}^{u}}, \quad \frac{x_{ij}^{m}}{\max x_{ij}^{u}}, \quad \frac{x_{ij}^{u}}{\max x_{ij}^{u}}\right)$$

(5-6). In this step, the value of standard deviation for all values of fuzzy numbers is calculated for each EDM. Then Normalized values are multiplied by the standard deviation.

$$\tilde{v}_{ij} = \tilde{n}_{ij} \times stdev_j$$

(7). In this step, the criteria values for fuzzy numbers are summed and the sum of the criteria weights is obtained.

$$\tilde{s}_j = \sum_{j=1}^{n} \tilde{v}_{ij}$$

(8). In this step, the fuzzy values of the criteria weights are calculated according to the formula below.

$$\widetilde{w}_j = \left(\frac{s_{ij}^l}{\sum_{j=1}^n s_{ij}^u}, \quad \frac{s_{ij}^m}{\sum_{j=1}^n s_{ij}^m}, \quad \frac{s_{ij}^u}{\sum_{j=1}^n s_{ij}^l} \right)$$

(9). In the final stage, the defuzzified weight values and ranking of the criteria are created with the help of the formula below.

$$w_{jdef} = \frac{w_{ij}^l + 4w_{ij}^m + w_{ij}^u}{6}$$

2.2. Fuzzy TOPSIS

(1-2). In the first stage, the criteria weights obtained through the fuzzy SIWEC method are used. Subsequently, the alternatives are numerically evaluated by the expert decision-makers, and these evaluations are collected and transformed into triangular fuzzy numbers using the fuzzy numerical scale presented in Table 4 for the fuzzy TOPSIS analysis. Next, the relevant evaluations for TOPSIS are averaged.

Table 4. Fuzzy TOPSIS Evaluation Scale

Numerical Terms	Fuzzy Numbers
1	(1, 1, 2)
2	(1, 2, 3)
3	(2, 3, 4)
4	(3, 4, 5)
5	(4, 5, 6)
6	(5, 6, 7)
7	(6, 7, 8)
8	(7, 8, 9)
9	(8, 9, 9)

Thus, fuzzy decision matrix is obtained.

$$\tilde{D} = \left[\tilde{d}_{ij}\right]_{m\times n}$$

(3). The fuzzy decision matrix of alternatives is normalized using linear scale. In other words, normalized values are calculated regarding to type of criteria, benefit or cost.

$$\tilde{r}_{ij} = \left(\frac{d_{ij}^{l}}{\max d_{ij}^{u}}, \quad \frac{d_{ij}^{m}}{\max d_{ij}^{u}}, \quad \frac{d_{ij}^{u}}{\max d_{ij}^{u}}\right) for\ benefit$$

$$\tilde{r}_{ij} = \left(\frac{min\ d_{ij}^{l}}{d_{ij}^{u}}, \quad \frac{min\ d_{ij}^{l}}{d_{ij}^{m}}, \quad \frac{min\ d_{ij}^{l}}{d_{ij}^{l}}\right) for\ cost$$

(4). The weighted normalized decision matrix is created by multiplying the weights of the criteria with the normalized decision matrix.

$$\tilde{v}_{ij} = \tilde{r}_{ij} \times w_j$$

(5). The fuzzy positive (d_i^+) and negative (d_i^-) ideal solutions are calculated according to the following equations.

$$d_i^+ = \sum_{j=1}^{n} d_v\left(\tilde{v}_{ij}, \tilde{v}_j^+\right)$$

$$d_i^- = \sum_{j=1}^{n} d_v\left(\tilde{v}_{ij}, \tilde{v}_j^-\right)$$

(6). The distance between two fuzzy numbers is given by the following equation.

$$d\left(\tilde{a}, \tilde{b}\right) = \sqrt{\frac{1}{3}\left[(l_{\tilde{a}} - l_{\tilde{b}})^2 + (m_{\tilde{a}} - m_{\tilde{b}})^2 + (u_{\tilde{a}} - u_{\tilde{b}})^2\right]}$$

(7). The closeness coefficient is calculated as follows.

$$CC_i = \frac{d_i^-}{d_i^- + d_i^+}$$

(8). Finally, the ranking of the alternatives is determined according to the closeness coefficient.

3. RESULTS

Four experts constitute the EDM within the scope of the study. In selecting the expert decision-makers, the criterion of having at least 15 years of experience in the professional services industry as a company owner, partner, or strategic decision-maker was required. In addition, one of the experts was an academician with at least 20 years of experience in service industry management and environmental sustainability. Data were collected through structured expert evaluations. Individual evaluations were obtained independently to avoid bias, and the aggregated results were used in the fuzzy MCDM analysis.

3.1. Fuzzy SIWEC Results

The EDMs' ratings of the importance of the criteria using numerical ratings are presented in Table 5.

Table 5. Expert Determinations on Criteria

	BS1	BS2	BS3	BS4	BS5
EDM 1	8	5	7	5	6
EDM 2	8	6	8	6	8
EDM 3	9	6	8	5	7
EDM 4	9	8	9	6	7

The numerical ratings converted to fuzzy numbers and the created fuzzy initial decision-making matrix are given in Table 6.

Table 6. Fuzzy Initial Decision-Making Matrix

	BS1			BS2			BS3			BS4			BS5		
EDM 1	7	8	9	4	5	6	6	7	8	4	5	6	5	6	7
EDM 2	7	8	9	5	6	7	7	8	9	5	6	7	7	8	9
EDM 3	8	9	10	5	6	7	7	8	9	4	5	6	6	7	8
EDM 4	8	9	10	7	8	9	8	9	10	5	6	7	6	7	8

Normalization of the initial fuzzy decision-making matrix, together with the calculated standard deviation value, is presented in Table 7.

Table 7. Normalized Decision-Making Matrix.

	BS1			BS2			BS3			BS4			BS5			*st. dev.*
EDM 1	0,7	0,8	0,9	0,4	0,5	0,6	0,6	0,7	0,8	0,4	0,5	0,6	0,5	0,6	0,7	*0,147*

EDM 2	0,7	0,8	0,9	0,5	0,6	0,7	0,7	0,8	0,9	0,5	0,6	0,7	0,7	0,8	0,9	*0,132*
EDM 3	0,8	0,9	1	0,5	0,6	0,7	0,7	0,8	0,9	0,4	0,5	0,6	0,6	0,7	0,8	*0,169*
EDM 4	0,8	0,9	1	0,7	0,8	0,9	0,8	0,9	1	0,5	0,6	0,7	0,6	0,7	0,8	*0,147*

The normalized values multiplied by the standard deviation are given in Table 8.

Table 8. Normalized Values Multiplied by the Standard Deviation

	BS1			BS2			BS3			BS4			BS5		
EDM 1	0,10	0,12	0,13	0,06	0,07	0,09	0,09	0,10	0,12	0,06	0,07	0,09	0,07	0,09	0,10
EDM 2	0,09	0,11	0,12	0,07	0,08	0,09	0,09	0,11	0,12	0,07	0,08	0,09	0,09	0,11	0,12
EDM 3	0,14	0,15	0,17	0,08	0,10	0,12	0,12	0,14	0,15	0,07	0,08	0,10	0,10	0,12	0,14
EDM 4	0,12	0,13	0,15	0,10	0,12	0,13	0,12	0,13	0,15	0,07	0,09	0,10	0,09	0,10	0,12

The calculation of the sum of the weights of the individual criteria and the fuzzy values of their weights are presented in Table 9.

Table 9. Final Values of the Criteria

	BS1			BS2			BS3			BS4			BS5		
s	0,45	0,51	0,57	0,31	0,37	0,43	0,42	0,48	0,54	0,27	0,33	0,39	0,36	0,42	0,48
w	0,19	0,24	0,32	0,13	0,18	0,24	0,17	0,23	0,30	0,11	0,16	0,21	0,15	0,20	0,26

The weight values and ranking of the criteria are presented in Table 10.

Table 10. The Weight Values and Ranking of the Criteria

Criteria	Weight	Rank
BS1	0,245	1
BS2	0,180	4
BS3	0,230	2
BS4	0,158	5
BS5	0,201	3

The findings show that financial performance is the most important criterion when considering green transition, followed by business process and environmental performance. Stakeholder performance and employee performance have relatively low weights.

3.2. Fuzzy TOPSIS Results

Ratings of the alternatives by EDM are presented in Table 11.

Table 11. Ratings of the Alternatives by EDM's

EDM 1	BS1	BS2	BS3	BS4	BS5	**EDM 3**	BS1	BS2	BS3	BS4	BS5
P1	4	8	2	3	9	P1	7	7	7	6	9
P2	7	4	3	3	9	P2	8	7	8	5	9
P3	6	5	3	3	9	P3	6	8	7	4	9
P4	9	7	9	8	9	P4	8	6	8	8	7
P5	6	2	6	8	9	P5	5	6	6	3	8
P6	6	8	9	9	9	P6	5	7	7	6	8
P7	1	3	2	9	9	P7	2	8	5	4	9
P8	2	3	7	7	9	P8	6	8	8	6	7
P9	5	6	4	8	9	P9	7	7	8	5	8
EDM 2	BS1	BS2	BS3	BS4	BS5	**EDM 4**	BS1	BS2	BS3	BS4	BS5
P1	7	6	6	4	9	P1	6	8	5	5	9
P2	8	5	8	3	8	P2	6	3	3	4	8
P3	6	5	7	2	8	P3	6	5	6	4	8
P4	6	5	8	5	6	P4	7	7	9	9	8
P5	7	6	8	6	8	P5	3	6	3	3	7
P6	8	6	7	7	8	P6	7	3	2	2	5
P7	6	5	6	4	6	P7	2	6	2	6	6
P8	8	5	5	3	5	P8	3	6	4	6	6
P9	7	5	6	2	7	P9	6	8	7	6	6

Afterwards, these numerical ratings are transformed into fuzzy numbers according to Table 4. The fuzzy numbers of experts are illustrated in Table 12.

Table 12. Expert Evaluations Transformed into Triangular Fuzzy Numbers

EDM 1	BS1	BS2	BS3	BS4	BS5	**EDM 3**	BS1	BS2	BS3	BS4	BS5
P1	(3,4,5)	(7,8,9)	(1,2,3)	(2,3,4)	(8,9,9)	P1	(6,7,8)	(6,7,8)	(6,7,8)	(5,6,7)	(8,9,9)
P2	(6,7,8)	(3,4,5)	(2,3,4)	(2,3,4)	(8,9,9)	P2	(7,8,9)	(6,7,8)	(7,8,9)	(4,5,6)	(8,9,9)
P3	(5,6,7)	(4,5,6)	(2,3,4)	(2,3,4)	(8,9,9)	P3	(5,6,7)	(7,8,9)	(6,7,8)	(3,4,5)	(8,9,9)
P4	(8,9,9)	(6,7,8)	(8,9,9)	(7,8,9)	(8,9,9)	P4	(7,8,9)	(5,6,7)	(7,8,9)	(7,8,9)	(6,7,8)
P5	(5,6,7)	(1,2,3)	(5,6,7)	(7,8,9)	(8,9,9)	P5	(4,5,6)	(5,6,7)	(5,6,7)	(2,3,4)	(7,8,9)
P6	(5,6,7)	(7,8,9)	(8,9,9)	(8,9,9)	(8,9,9)	P6	(4,5,6)	(6,7,8)	(6,7,8)	(5,6,7)	(7,8,9)
P7	(1,1,2)	(2,3,4)	(1,2,3)	(8,9,9)	(8,9,9)	P7	(1,2,3)	(7,8,9)	(4,5,6)	(3,4,5)	(8,9,9)
P8	(1,2,3)	(2,3,4)	(6,7,8)	(6,7,8)	(8,9,9)	P8	(5,6,7)	(7,8,9)	(7,8,9)	(5,6,7)	(6,7,8)

P9	(4,5,6)	(5,6,7)	(3,4,5)	(7,8,9)	(8,9,9)	P9	(6,7,8)	(6,7,8)	(7,8,9)	(4,5,6)	(7,8,9)
EDM 2	BS1	BS2	BS3	BS4	BS5	**EDM 4**	BS1	BS2	BS3	BS4	BS5
P1	(6,7,8)	(5,6,7)	(5,6,7)	(3,4,5)	(8,9,9)	P1	(5,6,7)	(7,8,9)	(4,5,6)	(4,5,6)	(8,9,9)
P2	(7,8,9)	(4,5,6)	(7,8,9)	(2,3,4)	(7,8,9)	P2	(5,6,7)	(2,3,4)	(2,3,4)	(3,4,5)	(7,8,9)
P3	(5,6,7)	(4,5,6)	(6,7,8)	(1,2,3)	(7,8,9)	P3	(5,6,7)	(4,5,6)	(5,6,7)	(3,4,5)	(7,8,9)
P4	(5,6,7)	(4,5,6)	(7,8,9)	(4,5,6)	(5,6,7)	P4	(6,7,8)	(6,7,8)	(8,9,9)	(8,9,9)	(7,8,9)
P5	(6,7,8)	(5,6,7)	(7,8,9)	(5,6,7)	(7,8,9)	P5	(2,3,4)	(5,6,7)	(2,3,4)	(2,3,4)	(6,7,8)
P6	(7,8,9)	(5,6,7)	(6,7,8)	(6,7,8)	(7,8,9)	P6	(6,7,8)	(2,3,4)	(1,2,3)	(1,2,3)	(4,5,6)
P7	(5,6,7)	(4,5,6)	(5,6,7)	(3,4,5)	(5,6,7)	P7	(1,2,3)	(5,6,7)	(1,2,3)	(5,6,7)	(5,6,7)
P8	(7,8,9)	(4,5,6)	(4,5,6)	(2,3,4)	(4,5,6)	P8	(2,3,4)	(5,6,7)	(3,4,5)	(5,6,7)	(5,6,7)
P9	(6,7,8)	(4,5,6)	(5,6,7)	(1,2,3)	(6,7,8)	P9	(5,6,7)	(7,8,9)	(6,7,8)	(5,6,7)	(5,6,7)

The fuzzy initial decision matrix is constructed by aggregating the expert evaluations and presented in Table 13.

Table 13. Average Fuzzy Decision Matrix

	BS1			BS2			BS3			BS4			BS5		
P1	5	6	7	6,3	7,3	8,3	4	5	6	3,5	4,5	5,5	9	9	9
P2	6,3	7,3	8,3	3,8	4,8	5,8	4,5	5,5	6,5	2,8	3,8	4,8	8	8,5	9
P3	5	6	7	4,8	5,8	6,8	4,8	5,8	6,8	2,3	3,3	4,3	8	8,5	9
P4	6,8	7,5	8,3	5,3	6,3	7,3	8	8,5	9	6,8	7,5	8,3	6,8	7,5	8,3
P5	4,3	5,3	6,3	4	5	6	4,8	5,8	6,8	4	5	6	7,3	8	8,8
P6	5,5	6,5	7,5	5	6	7	5,5	6,3	7	5,3	6	6,8	6,8	7,5	8,3
P7	2	2,8	3,5	4,5	5,5	6,5	2,8	3,8	4,8	5	5,8	6,5	7	7,5	8
P8	3,8	4,8	5,8	4,5	5,5	6,5	5	6	7	4,5	5,5	6,5	6	6,8	7,5
P9	5,3	6,3	7,3	5,5	6,5	7,5	5,3	6,3	7,3	4,3	5,3	6,3	6,8	7,5	8,3

Table 14 presents the normalized fuzzy decision matrix.

Table 14. Normalized Fuzzy Decision Matrix

	BS1			BS2			BS3			BS4			BS5		
P1	0,61	0,73	0,85	0,76	0,88	1,00	0,44	0,56	0,67	0,42	0,55	0,67	1,00	1,00	1,00
P2	0,76	0,88	1,00	0,45	0,58	0,70	0,50	0,61	0,72	0,33	0,45	0,58	0,89	0,94	1,00
P3	0,61	0,73	0,85	0,58	0,70	0,82	0,53	0,64	0,75	0,27	0,39	0,52	0,89	0,94	1,00

P4	0,82	0,91	1,00	0,64	0,76	0,88	0,89	0,94	1,00	0,82	0,91	1,00	0,75	0,83	0,92
P5	0,52	0,64	0,76	0,48	0,61	0,73	0,53	0,64	0,75	0,48	0,61	0,73	0,81	0,89	0,97
P6	0,67	0,79	0,91	0,61	0,73	0,85	0,61	0,69	0,78	0,64	0,73	0,82	0,75	0,83	0,92
P7	0,24	0,33	0,42	0,55	0,67	0,79	0,31	0,42	0,53	0,61	0,70	0,79	0,78	0,83	0,89
P8	0,45	0,58	0,70	0,55	0,67	0,79	0,56	0,67	0,78	0,55	0,67	0,79	0,67	0,75	0,83
P9	0,64	0,76	0,88	0,67	0,79	0,91	0,58	0,69	0,81	0,52	0,64	0,76	0,75	0,83	0,92

Weighted normalized decision matrix are presented in Table 15.

Table 15. Weighted Normalized Decision Matrix

	BS1			BS2			BS3			BS4			BS5		
P1	0,15	0,18	0,21	0,14	0,16	0,18	0,10	0,13	0,15	0,07	0,09	0,11	0,20	0,20	0,20
P2	0,19	0,22	0,25	0,08	0,10	0,13	0,12	0,14	0,17	0,05	0,07	0,09	0,18	0,19	0,20
P3	0,15	0,18	0,21	0,10	0,13	0,15	0,12	0,15	0,17	0,04	0,06	0,08	0,18	0,19	0,20
P4	0,20	0,22	0,25	0,11	0,14	0,16	0,20	0,22	0,23	0,13	0,14	0,16	0,15	0,17	0,18
P5	0,13	0,16	0,19	0,09	0,11	0,13	0,12	0,15	0,17	0,08	0,10	0,11	0,16	0,18	0,20
P6	0,16	0,19	0,22	0,11	0,13	0,15	0,14	0,16	0,18	0,10	0,11	0,13	0,15	0,17	0,18
P7	0,06	0,08	0,10	0,10	0,12	0,14	0,07	0,10	0,12	0,10	0,11	0,12	0,16	0,17	0,18
P8	0,11	0,14	0,17	0,10	0,12	0,14	0,13	0,15	0,18	0,09	0,11	0,12	0,13	0,15	0,17
P9	0,16	0,19	0,22	0,12	0,14	0,16	0,13	0,16	0,19	0,08	0,10	0,12	0,15	0,17	0,18

As stated by Chen (2000), fuzzy negative and positive ideal solutions were defined as:

$$A+ = [(1, 1, 1), (1, 1, 1), (1, 1, 1), (1, 1, 1), (1, 1, 1)]$$
$$A- = [(0, 0, 0), (0, 0, 0), (0, 0, 0), (0, 0, 0), (0, 0, 0)]$$

The total distances of the alternative's ratings from d+ and d- are presented in Table 16.

Table 16. Distances of the Ratings

	D+	D-
P1	4,250	0,757
P2	4,280	0,727
P3	4,298	0,709
P4	4,113	0,890

P5	4,315	0,693
P6	4,235	0,770
P7	4,426	0,581
P8	4,331	0,677
P9	4,246	0,761

The closeness coefficient computation and ranking are presented in Table 17.

Table 17. Fuzzy TOPSIS Final Table and Outrank of Alternatives

Alternative	Weight	Rank
P1	0,151	4
P2	0,145	5
P3	0,142	6
P4	0,178	1
P5	0,138	7
P6	0,154	2
P7	0,116	9
P8	0,135	8
P9	0,152	3

The findings show that operational arrangements are the most critical tool among green transition practices. The weight value of operational arrangements is relatively the highest. Then, it is followed by employee awareness training, sustainability reports, and environmental impact assessments, which have similar weight values. Environmental CSR activities are seen as the practice with the lowest importance.

4. DISCUSSION AND IMPLICATIONS

According to the findings, the optimum green transition practice is operational arrangements, including flexible work arrangements, especially telework or work from home, and reducing business travel with video calls. Although there are studies in the literature that measure the increase in emissions by reducing office days by relaxing working conditions and increasing non-work travels on days when employees do not go to the office (Cerqueira et al., 2020), there are also studies with the opposite findings (Li et al., 2023; Krasilnikova and Levin-Keitel, 2022). At this point, although concerns arise about the contribution of operational arrangements to environmental sustainability, a general look at the literature shows that although high reductions in energy use are not measured with operational arrangements, their contributions to environmental sustainability in terms of emission release are proven (Akgüç et al., 2023). In line with these contributions, when the issue is viewed from a business perspective, e-marketing preferences or reducing employee's office days will primarily benefit companies in terms of financial performance. These benefits arise from the fact that in sectors with an office-intensive workload, such as the

professional services sector, employees' office energy use, travel fees, food fees, internet and electricity bills, and rental fees and maintenance expenses for large offices (Licite-Kurbe and Leonovica, 2021) constitute high-cost items for these companies.

In the literature, studies conducted on textile SMEs (Yorulmaz, 2023) and the transportation service industry (Paul et al., 2020) show that the most important motivator for green transition is environmental awareness. This importance is also proven in the context of the professional services industry with the findings of this study. In studies on green transition and employee awareness, there is strong evidence that employee performance (Alghamdi, 2021; Khan et al., 2022), executive performance (Ogbu Edeh and Okwurume, 2019), and business performance (Elshaer et al., 2023) increase when employees have high environmental awareness and the green transition is implemented in businesses. This evidence is consistent with the second practice with high importance, employee awareness training. In addition, the study by Singh et al. (2020) supports this and suggests that employee awareness should be created regarding environmental sustainability to meet stakeholder demands. In addition, creating environmental sustainability awareness among employees will contribute to efficiency and savings in energy, water, and material use, especially in office areas. Green transition practices and employee awareness directly impact employees' pro-environmental behavior (Zhang et al., 2019).

Another prominent finding in the study is the publication of sustainability reports. While studies in the literature strongly reveal the desire of businesses to have a green image behind their green transformation motivations (Yorulmaz, 2023; Sarkar et al., 2021), sustainability reports are closely related to creating a green image (Hameed et al., 2022; Khan et al., 2021). Therefore, the high importance of publishing sustainability reports as a green transition practice is consistent with the findings in the literature. Publishing sustainability reports contributes to stakeholder performance as one of the important actors in both responding to stakeholders' environmental sustainability demands and gaining customers with high environmental sensitivity to the company (Yin et al., 2022).

The study's findings show that energy and water management and waste management practices are far from optimum selection. However, some studies in the literature differ from these findings. Memiş (2019) and Piya et al.'s (2022) results similarly emphasize the importance of energy saving, recycling, and waste management, while they attach low significance to training on environmental sustainability. Prakash et al. (2023) study emphasizes water saving. Akyol Özcan (2023) touches on the prominent importance of energy and water management. In the study of Eti et al. (2023), the most important practice is using renewable energy. The different results can be meaningful when evaluated on a sectoral basis. While the studies of Memiş (2019), Piya et al. (2022), and Prakash et al. (2023) are aimed at tourism and hospitality industries where facility management is carried out, Akyol Özcan (2023), similar to them, is aimed at green campuses where facility management is prominent, and Eti et

al. (2023) is aimed at green buildings. The reasons for the different results of these studies can be sought in the differences in sector dynamics.

While Yorulmaz and Eti (2024) present NGO collaborations as a strong alternative to green transition, CSR stands out as the practice with the lowest importance in this study. Some studies show that SMEs engage in fewer CSR activities compared to large enterprises (Johnson, 2015; Lewis et al., 2015). These discrepancies can be interpreted in several ways. First, although CSR is an important practice in green transition (Suganthi, 2019), SMEs are looking for simple practices that are cheap and easily applicable due to their limitations (Russo and Tencati, 2009). In the context of this research, this can be explained by financial concerns and the lack of direct financial return or the fact that it cannot be measured. Secondly, the findings of this research indicate the steps to be taken prior to CSR initiatives in the green transition. From a third perspective, although collaborations with NGOs are commonly associated with CSR activities (Stekelorum et al., 2020), such collaborations may also address issues such as environmental impact assessment or employee awareness training (Harangozó and Zilahy, 2015). SMEs may choose to collaborate with NGOs in order to overcome the difficulties and obstacles to green transformation (Suchek and Franco, 2024). Therefore, clarifying these distinctions requires in-depth research.

Building on these findings, the following section outlines the methodological, practical, and industry-level implications of the study.

4.1. Methodological Implications

From a methodological perspective, this study contributes to the sustainability and decision sciences literature by demonstrating the applicability of an integrated fuzzy SIWEC–fuzzy TOPSIS framework in the context of green transition decision-making for service-sector SMEs. Unlike traditional econometric or statistical approaches, the proposed methodology enables the evaluation of complex and intangible criteria under conditions of uncertainty, which is particularly relevant for SMEs operating in knowledge-intensive service industries.

The integration of the balanced scorecard framework into the fuzzy multi-criteria decision-making process provides a holistic evaluation structure that simultaneously considers financial, stakeholder, internal process, employee, and environmental performance dimensions. This approach extends existing sustainability assessment models by embedding environmental considerations into strategic performance management rather than treating them as isolated outcomes. Moreover, treating environmental performance as a benefit-based criterion through performance improvement evaluations offers a practical methodological solution for handling environmentally oriented indicators in fuzzy decision models.

Overall, the methodological framework proposed in this study can be adapted and extended to other service sectors or SME contexts where data availability is limited and expert judgment plays a critical role in strategic decision-making.

4.2. Practical Implications

The findings of this study offer several practical implications for SME owners, managers, and sustainability practitioners in the professional services industry. First, the prioritization of operational regulations suggests that green transition efforts should primarily focus on improving internal processes, workflows, and resource utilization practices. Such operational adjustments represent relatively low-cost and high-impact interventions that are well aligned with the limited financial and organizational capacities of SMEs.

Second, the importance of employee awareness trainings underscores the critical role of human capital in driving green transformation in service-based organizations. Enhancing employees' environmental awareness and competencies can facilitate behavioral change, improve compliance with sustainability objectives, and support the effective implementation of green practices across daily operations. Similarly, sustainability reporting and environmental impact assessments contribute to organizational transparency, accountability, and strategic learning, enabling SMEs to systematically monitor and improve their environmental performance. And also contributes to stakeholder performance.

By providing a structured prioritization roadmap, the proposed decision-support framework assists practitioners in allocating scarce resources more effectively and avoiding fragmented or symbolic sustainability initiatives.

4.3. Industry Implications

At the industry level, the results highlight the necessity of developing sector-specific green transition guidelines for professional service SMEs. Unlike manufacturing firms, service-sector SMEs often operate outside the direct scope of environmental regulations despite their cumulative environmental impact. The findings suggest that policy makers, industry associations, and professional bodies should promote simplified sustainability standards and tailored support mechanisms that reflect the operational realities of service-based SMEs.

Furthermore, the relatively low priority assigned to environmental CSR activities indicates that externally oriented sustainability actions may be less effective in the absence of strong internal operational foundations. This insight emphasizes the need for industry-level initiatives that encourage SMEs to internalize sustainability practices before engaging in outward-facing CSR activities. The proposed framework can serve as a reference model for industry stakeholders seeking to design practical tools and incentive structures that facilitate green transition processes among professional service SMEs.

CONCLUSION

As concerns about environmental sustainability deepen, demands for green transition of industries also increase. The manufacturing sector is the primary target of

environmental sustainability regulations, while service sector SMEs, which are still outside the circle where legal regulations are strong, must respond to these demands within the context of stakeholder theory. In addition, green transition offers a path of resilience for SMEs with various weaknesses and vulnerabilities. While this situation is desirable for national economies on the one hand, it also creates a double positive effect by contributing to environmental sustainability on the other. However, based on the question of which steps should be taken first regarding green transition, which has a comprehensive action list, and the necessity of creating a roadmap, this study presents guidelines for selecting optimum green transition practices by the balanced scorecard framework in the context of professional services sector SMEs.

The results indicate that professional services sector SMEs should primarily make operational arrangements. In this context, business travel should be reduced as much as possible by taking advantage of technology in these businesses, and office days should be reduced by offering flexible working options to employees. Awareness training on environmental sustainability should be organized for employees. Green transition actions should be visible, and sustainability reports should be published at certain intervals. Detailed reports on reducing environmental impacts can be published, or simple informative presentations can be made on the business's website or social media. The environmental impact of the business should be analyzed, and the expert support that may be required in this direction can be obtained from professional companies or requested free of charge from environmental NGOs. Analyses within the scope of environmental impact assessment can also form the basis of sustainability reports.

The fact that energy and water management and waste management practices are relatively far from optimum should not cause a loss of motivation for their implementation. From an environmental perspective, these activities are the most basic and have simple implementation steps. In addition, the awareness gained among employees can naturally ensure the implementation of these activities. Similarly, CSR activities for the environment are also a practice that is relatively far from optimum in the sector context. Although it seems far from optimum in terms of benefit and cost in the sector, CSR activities may also be carried out with the efforts of top managers or business owners with high environmental awareness.

The main contribution of this research is to provide a methodologically original contribution to an area where the flow of information in the literature is limited. The main limitation is that the evaluation is only for professional service industry SMEs. The methodology used in the research can be applied to different service sub-industries in future studies, and differences arising from sector dynamics can be revealed. Another limitation is that green transition practices are considered as main headings. To eliminate this limitation, evaluations to be made at the level of sub-actions of each practice in future studies can deepen the knowledge in this area.

HİZMET SEKTÖRÜ İÇİN YEŞİL DÖNÜŞÜM: ÖNCELİKLİ EYLEMLERİN DENGELİ PUAN KARTINA DAYALI OLARAK HİBRİT BULANIK SIWEC-TOPSIS YÖNTEMİ İLE BELİRLENMESİ

1. GİRİŞ

Çevresel sürdürülebilirliğe yönelik endişeler derinleşirken, endüstrilerin yeşil dönüşümüne ilişkin talepler de artmaktadır. Buna paralel olarak yasal mevzuat da yürürlüğe koyulmaktadır. Tüm bunlar firmaların ilgisini yeşil dönüşüme çekmektedir. Yeşil dönüşüm kavramı, firma faaliyetlerinin çevresel sürdürülebilirliğe entegrasyonunu ifade etmektedir. Bu konudaki bilimsel ilgi ise çoğunlukla üretim sektörüne ve büyük firmalara yönelmiştir. Bunun nedenlerinden birisi olarak, yürürlüğe giren kanunların çoğunlukla üretim sektörüne ve büyük firmalara yönelik olması gösterilebilir. KOBİ'ler ise her ne kadar tekil olarak düşünüldüğünde çevresel etkileri düşük gibi algılansa da yapılan çalışmalar KOBİ'lerin toplu olarak ele alındıklarında çevresel etkilerinin yüksekliğine işaret etmektedir (DiBella vd., 2023; Fawcett and Hampton, 2020; Tevapitak and Helmsing, 2019). Ayrıca mevzuatın güçlü olduğu çemberin dışında kalan hizmet sektörü KOBİ'leri paydaş teorisi bağlamında, toplumsal taleplere yanıt vermek durumundadır. Dolayısıyla hizmet sektöründe faaliyet gösteren KOBİ'lerin yeşil dönüşümüne yönelik bilgi akışı kısıtlıdır ve bu alanda yapılacak araştırmalar önem arz etmektedir.

Finansal kaynak, insan kaynağı gibi çok çeşitli zayıflıklarından ötürü kırılgan yapılara sahip KOBİ'ler yeşil dönüşüm konusunda basitleştirilmiş standartlara ya da özel çözümlere ihtiyaç duymaktadırlar (Ortiz vd., 2024). Fakat neyin yeşil dönüşüm kapsamına girdiği ya da yeşil dönüşüm kapsamında hangi faaliyetlerin yer alması gerektiği net değildir (Yorulmaz ve Eti, 2024). KOBİ'lerin yeşil dönüşüm konusunda atacakları adımlara yönelik, bu konudaki bariyerleri de hesaba katan bütüncül bakışla ampirik çözümler ve pratiğe yönelik öneriler sunan çalışmalara ihtiyaç bulunmaktadır. Bu çalışmada mesleki hizmetler sektöründe faaliyet gösteren KOBİ'ler için yeşil dönüşüm kapsamında atılacak adımlar, finansal, paydaş, iş süreci, çalışan ve çevresel performans metriklerini kapsayan bütüncül bağlamda bir karar problemi olarak ele alınmaktadır. Bu doğrultuda çok kriterli karar verme teknikleri ile mesleki hizmetler sektöründe faaliyet gösteren KOBİ'lere yönelik yeşil dönüşüm uygulamaları, dengeli puan kartı çerçevesi kullanılarak ağırlıklandırılmaktadır. Böylelikle hizmet sektöründe faaliyet gösteren KOBİ'ler için yeşil dönüşüm optimum uygulama adımlarına yönelik yönerge sunulmaktadır.

2. YÖNTEM

Araştırmada dengeli puan kartı performans metriklerinin önem ağırlıklarının belirlenmesi için bulanık SIWEC yöntemi, sonrasında en optimum yeşil dönüşüm uygulamalarının belirlenmesi için de bulanık TOPSIS yöntemi kullanılmaktadır. Bulanık sayılar kullanılmasının en önemli avantajı, bulanık sayıların dilsel değişkenlerdeki belirsizliği daha iyi temsil edebilmesidir (Kayacık vd., 2022).

Kriterlerin ağırlıklandırılması için kullanılan ve yeni geliştirilen bulanık SIWEC yöntemi, basit yapısıyla karar vermenin kolaylaştırılması, kriterlerin karşılaştırılması yerine sadece değerlendirilerek karar vericilerin karar sürecindeki önemini artırmaktadır (Puška vd., 2024). Ayrıca, alternatiflerin sıralanması için kullanılan bulanık TOPSIS yönteminin diğer sıralama yöntemlerine göre hem pozitif hem de negatif ideallere göre değerlendirme sunması, basit, gerçekçi olması ve açık metodoloji ile basit hesaplama prosedürü bu yöntemin üstünlüğünü oluşturur (Piya vd., 2022).

3. BULGULAR

Bulgular, yeşil dönüşümü değerlendirirken finansal performansın en önemli kriter olduğunu, bunu iş süreci ve çevresel performansın izlediğini göstermektedir. Paydaş performansı ve çalışan performansının ağırlıkları nispeten düşüktür. Yeşil dönüşüm uygulamalarına ilişkin bulgular ise, operasyonel düzenlemelerin en kritik araç olduğunu göstermektedir. Ardından, benzer ağırlık değerlerine sahip çalışan farkındalık eğitimi, sürdürülebilirlik raporları ve çevresel etki değerlendirmeleri gelmektedir. Çevresel CSR faaliyetleri en düşük öneme sahip uygulama olarak görülmektedir.

4. TARTIŞMA

Hizmet sektörü KOBİ'leri için optimum yeşil dönüşüm uygulaması, esnek çalışma, iş seyahatlerinin azaltılarak video görüşmelere dönüştürülmesi gibi aksiyonları içeren operasyonel düzenlemelerdir. Literatürde çalışma koşullarının esnetilerek ofis günlerinin azaltılması ile çalışanların ofise gitmedikleri günlerde iş dışı seyahatlerini artırmak suretiyle emisyon salınımını artırdığını ölçümleyen çalışmalar olsa da (Cerqueira vd. 2020) tam tersi bulgulara sahip çalışmalar da bulunmaktadır (Li vd., 2023; Krasilnikova and Levin-Keitel, 2022). Bu noktada operasyonel düzenlemelerin çevresel sürdürülebilirliğe sunacağı katkıya yönelik endişeler ortaya çıksa da literatüre genel bir bakış operasyonel düzenlemeler ile enerji kullanımında yüksek azalışlar ölçümlenmemekle birlikte emisyon salınımı yönünden çevresel sürdürülebilirliğe sunduğu katkılar kanıtlanmaktadır (Akgüç vd., 2023). Bu katkılar doğrultusunda konuya işletme perspektifinden bakıldığında ise çalışanların ofis günlerini azaltması ya da e-pazarlama gibi tercihler firmalara öncelikle finansal performans açısından fayda sağlayacaktır. Bu faydalar mesleki hizmetler sektörü gibi ofis yoğun bir iş yükünün olduğu sektörlerde çalışanların ofis enerji kullanımı, yol ücretleri, yemek ücretleri, internet ve elektrik faturaları gibi maliyetler ve büyük ofisler için kiralama bedelleri, bakım giderleri (Licite-Kurbe and Leonovica, 2021) bu firmalar için yüksek maliyet kalemlerini oluşturmasından kaynaklanmaktadır.

Literatürde tekstil KOBİ'leri (Yorulmaz, 2023) ve taşımacılık hizmet sektöründe (Paul vd., 2020) yürütülen araştırmalarda yeşil dönüşüme yönelik en önemli motivatörün çevresel farkındalık olduğu bulguları yer almaktadır. Bu çalışmanın bulguları ile mesleki hizmetler sektörü bağlamında da bu önem kanıtlanmaktadır. Yeşil dönüşüm ve çalışan farkındalığına yönelik çalışmalarda, çalışanların çevresel

farkındalığının yüksek olması ve işletmelerde yeşil dönüşüm uygulanması durumunda çalışan performansının (Alghamdi, 2021; Khan vd., 2022), yöneticilerin performansının (Ogbu Edeh and Okwurume, 2019) ve işletme performansının (Elshaer vd., 2023) artış gösterdiğine ilişkin güçlü kanıtlar sunulmaktadır. Bu kanıtlar yüksek önem düzeyine sahip ikinci uygulama olan çalışan farkındalığı eğitimleri ile uyumludur.

Çalışmada öne çıkan bir başka bulgu sürdürülebilirlik raporu yayınlanmasıdır. Literatürde yer alan araştırmalar işletmelerin yeşil dönüşüm motivasyonlarının arkasında yeşil imaja sahip olma isteğini güçlü bir şekilde ortaya koyarken (Yorulmaz, 2023; Sarkar vd., 2021) bu doğrultuda sürdürülebilirlik raporları yeşil imaj oluşturulması ile yakından alakalıdır (Hameed vd., 2022; Khan vd., 2021).

SONUÇ

Sonuçlar mesleki hizmetler sektörü KOBİ'lerinin öncelikli olarak operasyonel düzenlemeler yapmaları gerekliliğine işaret etmektedir. Bu doğrultuda bu işletmelerde teknolojinin imkanlarından da faydalanarak iş seyahatleri mümkün mertebe azaltılmalı, çalışanlara esnek çalışma opsiyonları sunarak ofis günleri azaltılmalıdır. Çalışanlara, çevresel sürdürülebilirliğe yönelik farkındalık eğitimleri organize edilmelidir. Belirli periyotlarla yayınlanacak sürdürülebilirlik raporları ile yeşil dönüşüm aksiyonlarının görünürlüğü sağlanmalıdır. Bu konuda çevresel etkilerdeki azaltıma ilişkin detaylı raporlar yayınlanabileceği gibi, işletmenin web sitesi ya da sosyal medya gibi mecralardan bu yönde yapılacak basit bilgilendirme sunumları da tercih edilebilir. İşletmenin çevresel etkisi analiz edilmelidir, bu doğrultuda gerekebilecek uzman desteği profesyonel firmalardan alınabilir ya da bedelsiz olarak çevreci STK'lardan talep edilebilir. Çevresel etki değerlendirmesi kapsamındaki analizler de sürdürülebilirlik raporlarına temel oluşturabilir. Bunların yanı sıra enerji ve su yönetimi ve atık yönetimi uygulamalarının görece optimuma uzak kalması uygulanmalarına yönelik motivasyon kaybı sağlamamalıdır. Çevreci bir bakışla bu aktiviteler en temel aktiviteler olup, basit uygulama adımlarına sahiptir. Ayrıca çalışanlara kazandırılacak farkındalık da bu aktivitelerin doğal olarak uygulanmasını sağlayabilir.

Bu araştırmanın temel katkısı literatürde bilgi akışının sınırlı olduğu bir alana yönelik metodolojik özgünlüğe sahip bir katkı sunulmasıdır. Temel sınırlılık ise değerlendirmenin yalnızca mesleki hizmetler sektörü KOBİ'lerine yönelik yapılmasıdır. Araştırmanın kullandığı metodoloji sonraki araştırmalarda farklı alt-sektörlerde de uygulanarak sektör dinamiklerinden kaynaklanan farklılıklar ortaya koyulabilir.

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Tasarım / *Design*	Yöntemi, ölçeği ve deseni tasarlamak / *Designing method, scale and pattern*	Halil YORULMAZ
Veri Toplama ve İşleme / *Data Collecting and Processing*	Verileri toplamak, düzenlenmek ve raporlamak / *Collecting, organizing and reporting data*	Halil YORULMAZ
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Literatür Taraması / *Literature Review*	Çalışma için gerekli literatürü taramak / *Review the literature required for the study*	Halil YORULMAZ