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THE MEDIATING EFFECT OF GREEN CLIMATE ON THE RELATIONSHIP BETWEEN STRATEGIC GREEN OPERATIONS PRACTICES AND GREEN PERFORMANCE: A RESEARCH ON TURKEY GREEN PORTS

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Abstract

Environmentalist port management approaches have revealed the green port concept. This study aims to determine the relationship between green operations practices and green performance in green ports and the mediating role of green climate in this relationship. The importance of the research is explaining the role of green operation practices and green climate in green port management at a strategic level, and the principles to be applied to port managers in green ports. The sample of this research is the field of the port harbor with green certificates in Turkey. For the study, data were collected from 180 employees working in green ports by applying a questionnaire between October and December 2020 using the easy sampling method. Frequency analysis, validity analysis, reliability analysis and regression analysis were performed based on the collected data. According to the findings of the research, it was concluded that green operation practices have a statistically positive effect on green performance and that green climate has a partial mediating effect between green operation practices and green performance.

Keywords
Green Port
Strategy
Green Operation Practices
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Green Performance
Mediation Effect

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Research Article

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STRATEJİK YEŞİL OPERASYON UYGULAMALARI İLE YEŞİL PERFORMANS ARASINDAKİ İLİŞKİDE YEŞİL İKLİMİN ARACILIK ETKİSİ: TÜRKİYE YEŞİL LİMANLARINDA UYGULAMA

Öz

Çevreci liman yönetim yaklaşımları yeşil liman kavramını ortaya çıkarmıştır. Bu çalışmanın amacı yeşil limanlarda, yeşil operasyon uygulamaları ile yeşil performans arasındaki ilişkinin ve yeşil iklimin bu ilişkideki aracılık rolünün tespit edilmesidir. Araştırmanın önemi, stratejik düzeyde yeşil liman yönetiminde yeşil operasyon uygulamalarının ve yeşil ikliminin rolü açıklanarak liman yöneticilerine yeşil limanlarda uygulanması gereken esasların ortaya koyulması oluşturmaktadır. Araştırmanın örneklem alanını Türkiye'de yeşil liman sertifikasına sahip limanlar oluşturmaktadır. Araştırma için yeşil limanlarda görev yapan 180 çalışandan Ekim-Aralık 2020 tarihleri arasında kolayda örneklem yöntemi ile anket uygulanarak veri toplanmıştır. Toplanan verilere dayalı frekans analizi, geçerlilik analizi, güvenilirlik analizi, regresyon analizleri yapılmıştır. Araştırma bulgularına göre yeşil operasyon uygulamalarının yeşil performans üzerinde istatistiksel olarak pozitif yönde etkilediği ve yeşil iklimin yeşil operasyon uygulamaları ile yeşil performans arasında kısmi aracılık etkisine sahip olduğu sonucuna ulaşılmıştır.

Anahtar Sözcükler

Yeşil Liman
Strateji
Yeşil Operasyon Uygulamaları
Yeşil İklim
Yeşil Performans
Aracılık etkisi

Makale Hakkında

Araştırma Makalesi

Introduction

Increasing environmental concerns have led countries to take legal measures to prevent environmental pollution. These standard measures regulate the social life of society environmentally and the companies' operational activities. The ports, which are an essential part of maritime trade, are brought into compliance with green port projects' environmental regulations. Green port projects ensure that port operations are handled with an environmentalist perspective. In this study, the relationship between green operation practices and green performance in green ports is discussed. Simultaneously, the necessity of a green working climate in the working environment to ensure green operation activities was emphasized and the mediating role of green climate between green operations practices and green performance was examined.

Green operation practices are the handling of operations inside and outside the port with an environmentalist perspective. The green climate is that the personnel working in the ports act by adopting the green policies created by the port managers. Green performance is the outcome of the policies implemented by ports for environmental protection. In this study, green operations practices, green climate and green performance concepts are examined in a conceptual framework. The conceptual framework for these concepts was drawn and the hypotheses formed based on the literature were tested. In the conclusion section, the results obtained were associated with the literature studies, and suggestions were made to port workers and managers.

1. Conceptual Framework

Ports, which constitute an essential part of maritime logistics, play an active role in the supply chain as the maritime trade's loading and unloading points. Ports consist of complex

structures and consist of many different parts (Bichou & Gray, 2004). These parts in the port are the points where institutions and activities at different levels intersect. Ports, which are the starting point of countries in the international arena, affect social and environmental performances and contribute to countries' international visibility directly and indirectly (Bergqvist and Monios, 2009). Air pollution, water pollution and marine pollution as a natural result of port activities affect environmental performance and affect the habitable environment.

Marine logistics constitute 90% of the global supply chain (UNCTAD, 2012). The fact that ports have highly environmentally damaging supply and logistics activities has brought out the necessity for port management to consider the environmental conditions. It is seen in the literature that the concept of a green port is conceptualized to prevent environmental pollution caused by ports and to control the damage caused by activities in ports to the environment (Lam & Notteboom, 2014). The green port is based on the adoption and management of an environmentalist perspective in all processes, from establishing the infrastructure of the ports to the regulation of their operational activities. In this management process, all employees are expected participate, from every individual working at the lowest level to each top manager working at the highest level (Pavlic et al., 2014). Green ports depend on the port authorities' environmentalist port policies and tools to produce practical solutions to environmental problems (Lam and Notteboom, 2014).

Considering the literature studies on green ports, it is seen that there are studies on operation management in green ports (Liu and Ge, 2018), determination and reduction of emission levels (Yu et al., 2017), green port assessments (Asgari et al., 2015), legal regulations and policies (Zheng et al., 2017). Countries with projects carry out the process of transforming ports into green ports. Considering the results of the green port project carried out in Thailand, which takes an active role in maritime trade, it is seen that there has been an improvement of more than 10% in both carbon dioxide emission rates and energy savings between 2013-2019 (Teerawattana and Yang, 2019).

Ministry of Transportation and Infrastructure has executive responsibility for the green port project in Turkey. In order to be eligible for the green port certificate, the ports must have the quality management system certificate (TS EN ISO 9001), the environmental management system certificate (TS EN ISO 14001) and the occupational health and safety system certificate (TS 18001). Borusan port, Aksa port, Egeport, Kumport, Evyapport, Limakport, Petkim, Marport, Solventaş, Port Akdeniz, Asyaport and Bodrum Cruise Port have green harbor certificate in Turkey (Özsevim et al., 2019). TSA (2021) was conducted to determine the objectives of the green port project in Turkey. These include (i) establishing an integrated quality management system, (ii) improving seawater quality, (iii) reducing environmental pollution arising from operational activities, (iv) ensuring energy efficiency and energy savings, (v) reducing greenhouse gas and harmful emissions, (vi) developing renewable energy use and projects, (vii) reducing port waste quantities, (viii) occupational health and safety measures. To achieve the goals set by TSE, this study aimed to determine the effect of operation practices in green ports on green performance and the mediating role of green climate. In the rest of the study, green operation practices, green climate, green performance concepts are discussed and explained.

1.1. Green Operation Strategies

Green operations strategies refer to harmonize companies' production and process strategies with environmental strategies (Marchi et al., 2013; Liu et al., 2017; Liu et al., 2019). In the literature, it is seen that green strategy implementation areas are discussed by separating into areas such as green production, green purchasing, green design, green operation, green policy, green supply chain (Wong et al., 2012; Beske et al., 2014; Sarkis & Dhavale, 2015; Liu et al., 2017). The main goal of green operations strategies is to make company activities sustainable, cause minimum damage the environment, and to think about future generations (Chawla et al., 2020).

Determining the strategies of green operation practices helps select the most robust applications with limited resources within the strategic decision-making process (Wu & Pagell, 2011). This choice also contributes to the elimination of environmental concerns and the establishment of a livable environment. Simultaneously, green operation practices in production and logistics activities provide companies with advantages of efficient use of facilities, reduced energy consumption and prevention of pollution (Deif, 2011). The factors that direct companies to green operation practices are explained by Hui et al. (2002) as the legal regulations regulating emissions, the consumers' preference of green-labeled products and the increasing importance of green certification requirements worldwide. Also, the increasingly widespread use of environmentally friendly consumer habits leads companies to green operation practices.

Port operation practices play an important role in maritime logistics and procurement activities. The effect of the environmentalist perspective on port operations strategies has brought the concept of the green port to the agenda. Measurement criteria for green ports are determined by Chiu et al., (2014) as follows: (i) air pollution, (ii) water pollution, (iii) noise pollution, (iv) equipment selection, (v) water consumption, (vi) energy use, (vii) general waste operations, (viii) hazardous waste processes, (ix) natural life quality, (x) harbor greenery, (xi) port employee training, (xii) social promotion and training. Chen et al. (2019) stated that ports' main objectives to become green ports are to reduce energy consumption, reduce emissions and reduce pollution. Kuo and Lin (2020) base the evaluation of green operation practices in green ports on three factors. These; green policies, green operations and pollution reduction. Green policies are the regulation of the legal regulations and procedures at the national and firm level. Green operations use environmentally friendly equipment in the logistics and procurement activities of ports, the preference of recyclable and reusable packaging materials, reducing energy consumption and employing environmentally friendly personnel.

1.2. Green Climate

The working environment directly affects the cognitive and emotional states of the employees in the work environment. Gelade and Ivery (2003) found that the working environment directly affects the employees' organizational citizenship and job performance by affecting job satisfaction and job motivation. They also explain that this relation has a significant effect on organizational efficiency and organizational performance. The working environment aims to provide a suitable working environment for the employees. On the other hand, the working climate aims to create successful social relationships within the successful working environments of employees. The excellent working environment and working climate provide social support to the employees and create common goals in the work

environment (Battistelli & Mariani, 2011). At the same time, the right work environment helps employees to combat stress in the work environment.

Green working climate refers to companies designing their work environments according to environmentalist approaches and organizing social relations between employees (Norton et al., 2012; Norton et al., 2014). The green climate is establishing a business environment that helps companies organize their work environments by adopting environmental policies and achieving sustainable goals (Chou, 2014). Psychologically, a green climate is a relationship between people based on employees' perceptions of environmental policies and regulations created by companies (Dumont et al., 2016). Socially, a green climate is a system that helps employees create the perception that they are environmentally friendly and regulates the relationships between people (Tian et al., 2020). The main goal of creating a green climate in companies and institutions' work environments is to address socially accepted beliefs, attitudes and needs with an environmentalist perspective and increase the acceptability levels of employees (Norton et al., 2015). Besides, companies affect collective work actions by placing the environmentalist perspective in the business environment. Thus, companies create social benefits in creating individuals who take climate changes into account and care about protecting the environment (Kuo and Lin, 2020).

1.3. Green Performance

Handling port operation practices with an environmentalist perspective, directly and indirectly, affect the operational performance of ports. It is necessary to determine the green performance success levels to determine the adoption and application levels of green practices. Zsidisin and Siferd (2001) explain the green performance results of the green initiatives companies have made on the internal and external natural environment. Olsthoorn et al. (2001) explain green performance as the degree of harmony and interaction between the firm and the environment. Wagner et al. (2004) express green performance as the balance level of companies and environmental interests.

Green performance shows the success of companies in protecting and making the environment sustainable. Green criteria are expected to be determined in order to make this success measurable. Autry et al. (2013) explained the criteria to be taken into account in determining the green performance levels of ports. These criteria are gathered under five main criteria: air pollution management, noise, and aesthetic pollution management, solid waste pollution management, liquid waste pollution, and protection of marine biology. Ge et al. (2016) determined the variables for green performance criteria. These are explained as reducing noise and odor emissions, reducing air emissions, reduction of waste emissions, reducing substantial waste amounts, reusing water, energy, and non-renewable resources, and reducing severe accident risks. However, to determine the companies' green performance, the criteria suitable for the fields of activity of the companies should be determined. Qualitative and quantitative measurements are made based on financial and non-financial data to measure ports' performance levels. Li et al. (2017) accept green performance quantitative indicators as waste efficiency, water efficiency, carbon efficiency, energy efficiency and green reputation. On the other hand, Kuo and Lin (2020) determined

port performance levels by measuring green performance in ports based on both financial and non-financial conditions.

2. Research Method

2.1. Purpose, Scope and Limitations of the Research

The research aims to determine green operations practices on green performance in green ports and determine the mediating role of green operations in the relationship between green operations practices and green performance. For this purpose, employees working in procurement and port operations activities of green ports were included in the sample. In this context, the survey application created within research scope was sent to green ports between October and December 2020. Following the completion of the survey applications, a total of 203 survey results were reached. Among the obtained questionnaires, 18 questionnaires were not appropriate and the data of 5 questionnaires were excluded from the research application due to the extreme points and statistical analyzes were made on a total of 180 data.

Within the research scope, it is assumed that the sampling area adequately represents the main population, the scales are suitable for this research, the participants answered the expressions in the questionnaire sincerely, and the statistical methods used are suitable for the research. It also has constraints on research time, scales used, number of participants, and cost.

2.2. Research Model and Hypotheses

Our research model created within this research's scope to examine the relationships between green operation practices, green climate, and green performance in green ports is presented in Figure-1. According to our research model, the effect of green operations practices on green performance in green ports and the mediating role of green climate in the effect of green operations practices on green performance are discussed.

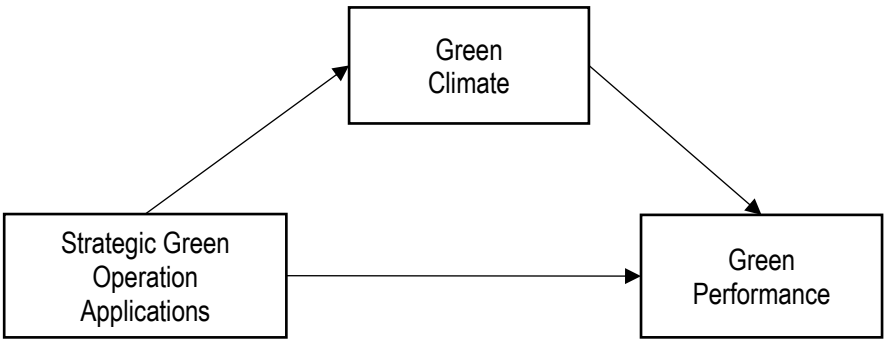

Figure 1. Research Model

Lun (2011) explains a positive relationship between supply chain partners and cooperation within the scope of green management practices. It also explains the

positive relationship between environmentally friendly operations and internal management support practices and firm performance. Wong et al. (2012), in their study on 122 manufacturing companies, found that supplier environmental management ability did not have an intermediary effect on the effect of product management on financial performance (return on assets, return on equity, net earnings and earnings per share). However, it was found to have an intermediary effect between product management and reducing the environmental pollution. The same study concluded that the supplier's environmental management ability has an intermediary effect on financial performance and the reduction of environmental pollution in process management. Munim et al. (2020) determined the green port management criteria in the problem of port selection suitable for green port management. These criteria are determined as internal environmental management, sustainable port operations, environmentally friendly pricing, green technology and supply chain cooperation. Chawla et al. (2020) state that green operation practices' green management approach can be improved, and green operation practices can be developed in a long-term sustainable manner. It also emphasizes carbon emission reduction, quality improvement, efficient energy use, waste management, environmental protection, distance minimization and cost optimization as criteria that affect green operations management. Based on the data obtained from 268 samples, Kuo and Lin (2020) concluded that green operation practices significantly affect green performance in the relationship between green operation practices and green performance at container terminals. Considering the relationship between green operation practices and green performance in the literature, the first hypothesis of our study is as follows: *H_1: Green operations practices have a significant positive effect on green performance.*

In their study in the Kaohsiung green port in Taiwan, Tsai et al. (2017) determined that the green climate variable is divided into green port policies, green communication, green education and green motivation. In the same study, they concluded that green climate dimensions are statistically significant positively on green behavior. Norton et al. (2014) aimed to identify the mediating role of the green working climate in the impact of environmental policies on environmental behavior in a sample of 168 employees. Considering the findings obtained, it is seen that the green climate area has an intermediary role in the implementation of green policies and obtaining green behavior outputs. In the study of Dahiya (2020) conducted on 183 employees, it was determined that the green working climate has an intermediary role in the relationship between the perception of organizational sustainability policies and proactive green employees' green behavior. Suganthi (2019) concluded that green practices mediate the relationship between companies' corporate social responsibility success levels and firm performance. When considered within the scope of green operations practices of green human resources management, Dumont et al. (2017) examined the effect of psychological green climate on employees' in-role green behavior and non-role green behavior. Considering the obtained results, it was seen

that the psychological green climate did not have a mediating effect on green behavior performance in-role. However, the psychological green climate has been shown to affect non-role green behavior. In his study on 327 manufacturing companies, Wang (2019) examined green organizational culture's effect on green performance. Considering the study's findings, it is seen that green organizational culture has a statistically significant positive effect on green performance and provides a competitive advantage to companies. According to the studies in the literature, it has been evaluated that green climate will have a mediating role in the effect of green operation practices on green performance, and our second hypothesis of the research was formed as follows: *H_2: Green climate has a mediating effect on the relationship between green operations practices and green performance.*

2.3. Research Scales

Statements regarding the scale of green operation practices have been taken by Chuang (2014), Autry et al. (2013), Jabbour et al. (2016) and Perramon et al. (2014) and the scale was developed by Kua and Lin (2020). The scale of green operation practices consists of 3 dimensions and a total of 10 statements. These dimensions are green policy (4 statements), green operation (3 statements) and pollution abatement (3 statements).

Statements regarding the scale of green culture have been taken by Albrecht et al. (2018), Datta and Singh (2018) and the scale was developed by Kua and Lin (2020). The green climate scale consists of one dimension and 7 statements in total.

Statements regarding the scale of green performance have been taken by Jabbour et al. (2016), Autry et al. (2013), Perramon et al. (2014) and Yang (2018) and the scale was developed by Kua and Lin (2020). The green performance scale consists of 2 dimensions and a total of 10 statements. These dimensions are non-financial performance (6 statements) and financial performance (4 statements). Besides, the 5-point Likert scale ("1" strongly disagree, "2" disagree, "3" undecided, "4" agree, "5" strongly agree) has been implemented. Statistical analysis of the data was carried out using IBM SPSS Statistics 20 package program.

3. Findings and Discussion

3.1. Demographic Findings

The frequency table of the demographic characteristics of the research participants is presented in Table 1. When Table 1 is examined, approximately 90% of the participants are men and 10% are women. This explains that the male population is more dominant than the female population in green ports. Approximately 80% of the participants are married and 20% are single employees according to their marital status. This statistic indicates that the people working in green ports are mostly married. Looking at the participants' age, approximately 80% of the participants are in the highest age group (26-41). When looking at the education levels, approximately 80% of the participants have undergraduate and postgraduate education, while approximately 20% have a pre-graduate education degree.

Table 1. Frequency Table of Demographic Features

Gender	Number	%	Marital status	Number	%
Woman	20	11,1	Married	143	79,4
Man	160	88,9	Single	37	20,6
Total	180	100	Total	180	100
Age	**Number**	**%**	**Education Status**	**Number**	**%**
18-25	13	7,2	High school	10	5,6
26-33	40	22,2	Associate degree	27	15,0
34-41	84	46,7	Undergraduate	127	70,6
42-49	32	17,8	Postgraduate	16	8,9
50 +	11	6,1	Total	180	100
Total	180	100			

3.2. Validity and Reliability Analysis of the Scales

Results of Kaiser Meyer Olkin (KMO) and Bartlett Tests for strategic green operation practices, green climate and green performance measurements are presented in Table 2. It is seen that the Kaiser Meyer Olkin Sampling Adequacy Test of all scales is above 70% and Bartlett Sphericity Test significance levels are lower than $p<0.5$.

Table 3 presents the Kolmogorov-Smirnov normality test results of the scales. According to the Kolmogorov-Smirnov normality test, the green climate scale ($p> 0.05$) is seen to have a normal distribution. Green performance scale ($p<0.05$) and scale for strategic green operation practices ($p<0.05$) do not have normal distribution according to the Kolmogorov-Smirnov normality test. However, when the kurtosis and skewness values of the scales were examined, it was seen that all values were between -1 and +1 (Hair et al., 2013). According to this position, all of our scales show normal distribution.

Table 2. Kaiser Meyer Olkin (KMO) and Bartlett Tests Results of the Scales

			SGOP	GC	GP
Kaiser Meyer Olkin Sampling Adequacy Test			.827	.726	.700
Bartlett Sphericity Test	**Approximate Chi-square**		587.296	160.715	290.714
	Degrees of Freedom (df)		45	21	45
	P		.000	.000	.000
SGOP: Strategic Green Operation Practices, GC: Green Climate, GP: Green Performance					

Table 3. Kolmogorov-Smirnov Normality Test Results

Scales	N	Av.	SD	Test Value	P
SGOP Scale	180	4.18	.34	1.773	.004
GC Scale	185	4.00	.34	1.577	.165
GP Scale	185	4.01	.31	1.116	.014

Reliability analysis results of the scales are presented in Table 4. When the α values of the scales are examined, it is seen that all values are close to .70 and above. This shows that the internal consistency levels of strategic green operation practices, green climate and green performance scales are at acceptable levels.

Table 4. Reliability Analysis Results

Scales	Items	Cronbach's Alfa (α)
SGOP Scale	10	.830
GC Scale	7	.671
GP Scale	10	.679

3.4. Test Analysis of Hypotheses

Simple regression and multiple regression analysis were applied to test the hypotheses formed within the research scope. Regression analysis findings are presented in Table 6. When Table 6 is examined, it is seen that a total of two model applications were made in the study.

Table 6. Regression Analysis Results

Model and Conditions		DV	IV	R	Adj R^2	Beta	S.E.	F	P
Model 1		GP	SGOP	.264	.070	.240	.066	13.336	.000
Model 2	Cond.1	GP	SGOP	.264	.070	.240	.066	13.336	.000
	Cond.2	GC	SGOP	.179	.027	.182	.075	5.911	.016
	Cond.3	GP	GC	.276	.071	.248	.065	14.658	.000
	Cond.4	GP	SGOP	.352	.124	.202	.065	12.486	.002
			GC			.212	.064		.001

Model 1: A simple regression analysis was performed within the model's scope to determine the effect of strategic green operation practices on green performance. According to the results of simple regression analysis, green operation practices have a statistically positive effect on green performance ($F(1,178) = 13.336$, $p < 0.01$). The equation for Model 1 is GP = 3.006 + 0.240 GOP. Besides, it is understood that the SGOP independent variable explains the GP dependent variable by 7% ($R2 = .070$). This finding supports our **H1** hypothesis.

To talk about the existence of a mediating effect between variables, an approach known as the Barron and Kenny method and based on the realization of a total of 4 conditions is used (Burmaoğlu et al., 2013). The first condition is that the independent variable should significantly affect the dependent variable. The second condition is that the independent variable should significantly affect the mediator variable. The third condition should significantly affect the mediating variable on the dependent variable. In the fourth condition, both the mediator and the independent variable on the dependent variable should be examined with multiple regression and the independent variable should not have a significant effect on the dependent variable.

Model 2: The mediating effect of green climate in strategic green operation practices on green performance was performed by multiple regression analysis. According to the results of multiple regression analysis, the statistically significant effect of green operation practices on green performance continues, but the effect level is decreasing ($F(2,177) = 12.486$, $p < 0.05$). This explains that the green climate variable has a *partial mediating effect* between green operations practices and green performance. The equation for Model 2 is GP = 2.318 + 0.202 SGOP + 0.212 GC. It is also understood that the SGOP variable and GC variable explain the GP variable by 12.4% ($R2 = .124$). Thus, our **H2** hypothesis is supported.

Conclusion and Recommendations

To fulfill TSE green port certificate requirements, port infrastructures must be established under environmental standards. However, the arrangement of the infrastructure is not enough to gain a green port feature. In addition to infrastructure, operational activities are expected to be brought into line with green standards. Strategic green operation practices play an essential role in the realization of these standards. Green climate helps strategic green operation practices. The main goal is also to increase green performance levels.

In this study, ports with green port certificates were selected as the sample area and the relationship between green supply chain practices and green performance was examined by Model 1 and the mediating role of green climate in this relationship was examined by Model 2. When we look at the findings of Model 1, it was seen that strategic green operation practices positively affect green performance. This finding we have obtained overlaps with the study's findings conducted by Kuo and Lin (2020). Chawla et al. (2020), the criteria for implementing long-term sustainable port policies at strategic level are determined as carbon emission reduction, quality improvement, efficient energy use, waste management, environmental protection, distance minimization, and cost optimization. When comparisons are made based on these criteria with our Model 1 finding of the research, the increase of strategic green operation practices in port activities supports green performance by fulfilling the criteria. Model 2 of the research determined that green climate partially mediates between strategic green operation practices and green performance. Implementing a green working climate, a part of the green human resources management approach

motivates port employees and helps them adopt strategic green operation practices. Dumont et al. (2017) obtained the finding that green climate has an intermediary role in employees who act by adopting an environmentalist perspective in the relationship between green human resources management and green behavior. This finding supports the finding that we obtained within the scope of our research.

Finally, it can be said that strategic green operations practices and green climate play an active role in green performance in green ports. In this framework, it can be said that port managers should make regulations and practices that adopt the environmental practices of employees in order to achieve environmental practices. It is also recommended that port employees adopt environmentalist practices and carry out their activities accordingly. In general, it is recommended to establish a green working environment in ports and adopt environmentalist approaches in all activities to execute sustainable port operation practices successfully. The total contribution of these applications in increasing environmental performance should be taken into consideration.

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