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Strategic Factors Affecting Green Building Industry: A Macro-Environmental Analysis Using PESTEL Framework

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Abstract

For the last decade, green buildings have created a new industry of ecological buildings. However, this industry is still newly developing and finds limited implementation opportunities when compared with the traditional building industry. Therefore, for a more preferable green building industry, strategic factors that can have significant effects on the industry should be comprehended. Based on this argument, the present study aims (i) to identify these factors, (ii) to determine their importance levels, and lastly (iii) to find out their current levels of impact on the industry. To this aim, a questionnaire survey was conducted for the Turkish green building industry through 32 industrial practitioners who have an official LEED Credentials. Results obtained were evaluated via the relative importance index method. Consequently, a total of 30 strategic factors were identified. Out of them, 28 were found to be significant while only 16 currently have a significant impact on the industry.

Keywords: Green building, LEED, PESTEL, relative importance index, Turkey

1. INTRODUCTION

Sustainability is one of the major concepts arose due to the increasing population of the world which associated with higher level of demand for water, energy, and natural sources [1]. In addition, it is a fact that buildings and associated construction activities have negative effects on the natural environment and resources [2]. Therefore, there is a growing level of public awareness of green building (GB) [3] and for the last decade, GBs have created a new industry of ecological buildings. In order to promote the transition to a GB sector, many countries, such as the US, the UK, China, etc., are developing GB policies [4]. Nowadays, GB is considered strategically important to firms in the construction sector [5]. Implementation of GB in the construction sector have the potential to promote buildings that are healthy, safe, comfortable, and environmentally friendly [6]. However, this industry is still newly developing and finds limited implementation opportunities when compared with the traditional building industry. Therefore, for a more preferable GB industry, strategic factors that can have significant effects on the industry should be comprehended. In this context, it seems to be important to comprehend strategic factors that can have significant effects on the GB industry. Based on this argument, the present study aims (i) to identify these factors, (ii) to determine their importance levels, and lastly (iii) to find out their current levels of impact on

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the industry. To this aim, a questionnaire survey was conducted for the Turkish GB industry through 32 industrial practitioners who have an official LEED Credentials. Consequently, it is expected to attract industrial practitioners' attention to these factors to contribute to the faster development of the GB industry.

2. LITERATURE REVIEW

In the literature, there are numerous studies which have been addressed the GB industry in terms of strategic issues. For example, Teng et al. [7], analyzed the strategies and approaches for the sustainable development of GBs and summarized potential driving forces of them from four aspects, including market development environment, economic value, the degree of social participation, and ecological value. Darko et al. [8], investigated the influences of various types of barriers, drivers, and promotion strategies on GBs adoption in Ghana. Shen et al. [9], revealed the green technical capabilities and barriers to GB in Thailand from the perspectives of consultants, architects, and engineers, using a questionnaire survey and a case study. Teng et al. [10] investigated GB development in China and they proposed three strategies for three problems such as (i) slow-paced GB development, (ii) imbalanced GB supply and demand, and (iii) low overall green level. Wang et al.[11], examined the factors that affect the adoption of green specifications in China. Deng et al. [12] aimed to identify the key barriers to GB development in Ningbo China and suggested policy improvements to the local government. In addition, there are severeal researches conducted in Turkey on GB technology. Yigit and Ozorhon [13], proposed a methodology to aid designers in satisfying the requirements of government regulations and green building certification programs, while optimizing the energy consumption and maintaining the thermal comfort. Pushkar [14], studied the similarities and differences in performances of LEED 2009 Commercial Interiors and LEED 2009 Core and Shell Development Gold certified projects in Turkey, Spain, and Italy. Ugur and Leblebici [15], conducted a study to assess cost-benefit analysis and payback period of two GBs located in Turkey. Akdag and Beldek [16], aimed to combine the architects green building operations together with the engineers green supply chain management for both reducing the usage of materials, encouraging more effective and efficient usage of energy, water and material currently used, ensure the prevention of any kind of waste, perform environmentally sensible and eco-friendly building design and to be able to reuse, recycle, or recover the waste. Mollaoglu et al. [17], comprehended the ways of knowledge and application of GB guidelines and assessment systems as innovations diffuse in developing countries Architecture Engineering and Construction (AEC) industries.Yigit and Acarkan [18], presented international GB certificate and energy performance certificate (EPC) systems and illustrated the official EPC system for buildings in Turkey with case studies. Suzer [19], examined and underlined the problems regarding the issue of weighting environmental concerns in the Leadership in Energy and Environmental Design (LEED) certification system, which is a US-originated but globally used assessment tool. Aktas and Ozorhon [20], investigated the GB certification process of existing buildings in developing countries. For this purpose, a qualitative case study methodology has been employed to gain a better understanding of the critical success factors of the greening and certification process.

This study differs from past studies as it reveals a sectoral overview of GBs in the macro level and conducts a strategic assessment in terms of GBs.

3. MATERIALS AND METHOD

In order to analyse the external environment of the GB industry, a PESTEL analysis has been utilized. A questionnaire survey was then sent to 168 professionals, who have an official LEED Credentials and extensive knowledge of the industry, via e-mail. Of these professionals, 32 (19.05%) have accepted to respond the survey. Since this number is bigger than 30 ($n \geq 30$), the sample group can be regarded as statistically sufficient to represent the whole.

3.1. Analysis Method

PESTEL is a macro-environmental scanning component in the domain of strategic management used in market research generally. It is also employed to evaluate the profitability and impact of an industry [21]. In other words, it is used to reveal positive and negative factors that can have an impact on an organization by evaluating it in terms of political, economic, social, technological, environmental, and legal aspects.

Political factors focuses on the extent to which a government may affect macro-economy or a certain industry, while economic factors indicate macro- and/or micro-economic performance that has major impacts on a company or an industry. Social factors scrutinize social environment of an industry and gauge theshared beliefs and attitudes of a society. Technological factors pertain to innovative efforts in technology that mayinfluence the operations of a market in a positive or negative manner. Environmental factors comprise the determinants of the surrounding environment. Legal factors point out certain laws and regulations that may affect thebusiness atmosphere in an industry [22].

3.2. Methodology

In this study, a total of 30 sub-factors were categorized under six groups of the external environmental factors, such as (i) political, (ii) economic, (iii) social, (iv) technological, (v) environmental, and (vi) legal, to analyse the green building industry. The required data to determine both the importance level and the current level of impact of these factors were then gathered from respondents via a questionnaire survey. Questions of the survey were designed in the form of a five-point Likert-type scale (Table 1). Respondents determined both the importance level and the current level of impact of factors by choosing one of the options listed in Table 1.

Table 1. Five-point Likert scale

5	4	3	2	1
Very High	High	Moderate	Low	Very Low

The average score of each factor was determined using the following formula of RII where i – category of response, W_i – weight given to ith category ranges from 1 to 5, and X_i – percentage of answers given to i^{th} category (1).

$$RII = \frac{\sum_{i=1}^{S} W_i X_i}{\sum_{i=1}^{S} X_i}, (1 \leq RII \leq 5) \quad (1)$$

The obtained results have been subjected to a different classification during the evaluation process of responses. Because, after the evaluation process, a five-point Likert scale of a question is found to be insufficient to reveal the results. Hence, each expression of the five-point Likert scale was defined at specific intervals as 1.00 ≤ very low (VL) ≤ 1.80, 1.80 < low (L) ≤ 2.60, 2.60 < moderate (M) ≤ 3.40, 3.40 < high (H) ≤ 4.20, and 4.20 < very high (VH) ≤ 5.00. Then, these calculated values were ranked according to their importance indices. If any of these factors have the same scores, percentages of respondents who chose options of 5-4, 3, or 2-1 were determined to rank these factors. These percentages were compared starting from options 5-4 to 1-2, respectively, until determining which factor has a higher percentage.

4. ANALYSIS RESULT

The answers given by 32 industrial practitioners from the Turkish GB industry were analyzed, and the results obtained were evaluated through the PESTEL method. According to these findings, six main factor groups such as political, economic, social, technological, environmental, and legal, were discussed in the following sections in a detailed manner.

4.1. Political Factors

Political factors had a “high” importance level (3.94) and a “moderate” current level of impact (3.37) (Tables 2 and 3). Since subvention’s score was very high for importance level and high for current level of impact, it is one of the most significant factors for the GB construction industry in Turkey. These show that the GB industry in Turkey is in a need of investment and that the industry is a newly emerging market. Although various initiatives to promote the GB investment in Turkey have already been initiated at the industrial and governmental level, main steps, such as tax and duties reduction, bureaucratic process simplification, increase in floor area ratio, grant and low interest loans, have not yet been taken. Thus, the insufficient support of authorities in terms of subvention can be regarded as a factor that slows down the speed of the GB industry.

Table 2. RII and importance levels of political sub-factors

No.	Political factors	RII	Importance level	5	4	3	2	1	Overall ranking	Result
1	Subvention	4.53	VH	68.75	21.88	3.12	6.25	0.00	5	√
2	Tax policy	3.93	H	39.39	27.27	21.21	12.13	0.00	20	
3	Political stability	3.77	H	29.03	35.49	22.58	9.67	3.22	24	
4	Customs policy	3.53	H	25.00	31.25	21.88	15.62	6.25	27	
	General Average	3.94	H							

Table 3. RII and current levels of impact of political sub-factors

No.	Political factors	RII	Current level of impact	5	4	3	2	1	Overall ranking	Result
1	Subvention	3.87	H	50.00	15.62	15.62	9.38	9.38	2	√
2	Tax policy	3.45	H	29.03	25.80	19.35	12.91	12.91	15	
3	Political stability	3.27	M	18.18	30.30	24.24	15.15	12.13	24	
4	Customs policy	2.87	M	15.63	18.75	25.00	18.75	21.87	28	
	General Average	3.37	M							

4.2. Economic Factors

Economic factors had a “high” (3.77) importance level and a “medium” (3.45) current level of impact (Tables 4 and 5). Although economic factors were composed of five sub-factors with a “high” importance level, they remained in the lower order with respect to sub-factors of other groups. In terms of the current level of impact, exchange rates, real estate prices, and interest rates were sub-factors with the “high” current level of impact. The fact that these three sub-factors had a highly variable structure in Turkey for many years can affect the GB industry negatively by creating a distrust effect on investors.

Table 4. RII and importance levels of economic sub-factors

No.	Economic factors	RII	Importance level	5	4	3	2	1	Overall ranking	Result
1	Real estate prices	4.00	H	31.25	43.75	18.75	6.25	0.00	19	
2	Interest rates	3.90	H	37.50	34.38	12.50	12.50	3.12	22	
3	Exchange rates	3.90	H	46.88	15.63	21.87	12.50	3.12	23	
4	Inflation rates	3.59	H	28.13	28.13	25.00	12.50	6.24	25	
5	Average income per capita	3.48	H	22.58	25.80	35.48	9.67	6.45	28	
General Average		3.77	H							

Table 5. RII and current levels of impact of economic sub-factors

No.	Economic factors	RII	Current level of impact	5	4	3	2	1	Overall ranking	Result
1	Exchange rates	3.72	H	40.63	21.87	12.50	18.75	6.25	6	√
2	Real estate prices	3.63	H	18.75	43.75	25.00	6.25	6.25	8	√
3	Interest rates	3.63	H	31.25	25.00	25.00	12.50	6.25	9	√
4	Inflation rate	3.38	M	15.63	34.38	31.25	9.37	9.37	17	
5	Average income per capita	2.88	M	15.63	21.87	15.63	28.12	18.75	27	
General Average		3.45	H							

4.3. Social Factors

The importance level of social factors was “high” (3.79) and the current impact level was “medium” (3.13) (Tables 6 and 7). Considering six sub-factors, the quality of life (comfort) perception was highest in the general ranking with “very high” importance level (4.47) and with “high” current level of impact (3.69). This is because effects of GB on (i) the creation of a popular alternative by accelerating the implementation in the last decade, (ii) the use of advanced technology facilities, (iii) the resemblance to intelligent buildings and sometimes the design of intelligent GB, and (iv) the higher initial investment cost makes the quality of life (comfort) perception for investors more important and creates an expectation in this respect.

Table 6. RII and importance levels of social sub-factors

No.	Social factors	RII	Importance level	5	4	3	2	1	Overall ranking	Result
1	Quality of life (comfort) perception	4.47	VH	53.12	40.63	6.25	0.00	0.00	7	√
2	New customer needs	4.28	VH	37.50	53.12	9.38	0.00	0.00	12	
3	Education level of people	4.09	H	40.62	37.50	15.62	3.13	3.13	15	
4	Customer habits	4.03	H	37.50	34.38	21.87	6.25	0.00	17	
5	Growth rate of population	3.25	M	18.75	21.87	31.25	21.88	6.25	29	
6	Demographic structure of population (age distribution)	2.63	M	6.25	6.25	43.25	31.25	12.5	30	
	General Average	3.79	H							

Table 7. RII and current levels of impact of social sub-factors

No.	Social factors	RII	Current level of impact	5	4	3	2	1	Overall ranking	Result
1	Quality of life (comfort) perception	3.69	H	31.25	37.50	9.38	12.50	9.38	7	√
2	New customer needs	3.53	H	28.13	25.00	28.13	9.37	9.37	12	
3	Education level of people	3.38	M	21.88	28.12	28.12	9.38	12.5	18	
4	Customer habits	3.34	M	25.00	28.13	15.62	18.75	12.5	22	
5	Growth rate of population	2.59	L	12.50	6.25	28.13	34.37	18.75	29	
6	Demographic structure of population (age distribution)	2.25	L	3.12	6.25	34.38	25.00	31.25	30	
	General Average	3.13	M							

4.4. Technological Factors

The second most important group among six factor groups was found as technological factors with “very high” importance level (4.34) and “high” current level of impact (3.53) (Tables 8 and 9).

Table 8. RII and importance levels of technological sub-factors

No.	Technological factors	RII	Importance level	5	4	3	2	1	Overall ranking	Result
1	Presence of qualified construction contractors	4.50	VH	59.37	31.25	9.38	0.00	0.00	6	√
2	Presence of qualified building materials	4.41	VH	53.13	40.62	0.00	6.25	0.00	8	√
3	Advanced technology (automation) facilities	4.34	VH	46.88	40.62	12.50	0.00	0.00	10	√
4	Innovation possibilities	4.28	VH	43.75	40.63	15.62	0.00	0.00	13	
5	Presence of qualified construction workforce	4.19	H	40.63	40.63	15.62	3.12	0.00	14	
	General Average	4.34	VH							

Table 9. RII and current levels of impact of technological sub-factors

No.	Technological factors	RII	Current level of impact	5	4	3	2	1	Overall ranking	Result
1	The presence of qualified construction contractors	3,75	H	31.25	31.25	25.00	6.25	6.25	5	√
2	Advanced technology (automation) facilities	3,59	H	25.00	28.13	31.25	12.50	3.12	10	√
3	Presence of qualified building materials	3,56	H	25.00	34.38	18.75	15.62	6.25	11	
4	Innovation possibilities	3,43	H	15.62	37.50	25.00	18.75	3.13	16	
5	Presence of qualified construction workforce	3,31	M	15.63	34.37	28.12	9.38	12.50	23	
	General Average	3,53	H							

Within this group, presence of qualified construction contractors, presence of qualified construction materials, and advanced technology (automation) facilities were placed in top rankings with their "very high" importance levels. In terms of the current level of impact, presence of qualified construction contractors and advanced technology (automation) facilities found their places among the top ranking. In fact, qualified contractors, qualified materials, and advanced technology (automation) facilities are essential for the GB industry. Nevertheless, the reduction of the existing impact levels of the same factors reveals that there are shortcomings in practice in Turkey. In other words, sufficient qualified contractors, easily accessible and

economical construction materials, and automation facilities in the GB industry in Turkey can be found with difficulty compared to traditional buildings.

4.5. Environmental Factors

Among six main factors, the top group was found to be environmental factors with "very high" importance level (4.46) (Table 10) and "high" current level of impact (3.45) (Table 11). Given that the purpose of GBs is to protect the environment, the importance of this factor group can be easily understood. Sub-factors apart from geographical location were in the top five rankings in terms of the importance level and the current level of impact. However, as in all other factor groups, there was a decrease in the current level of impact of sub-factors in this group. The decrease in (i) local, national, and international applications on environment, (ii) energy infrastructure and efficiency, (iii) recycled / converted construction material market, and (iv) waste management points out shortcomings and difficulties in practice. Although there is proper legislation in terms of applications on the environment side, there are drawbacks especially in the control and supervision of such applications.

Table 10. RII and importance levels of environmental sub-factors

No.	Environmental factors	RII	Importance level	5	4	3	2	1	Overall ranking	Result
1	Energy infrastructure and efficiency	4.75	VH	78.10	18.70	3.10	0.00	0.00	1	√
2	Local, national, and international applications on environment	4.68	VH	71.90	25.00	3.10	0.00	0.00	2	√
3	Ecological sustainability	4.68	VH	75.00	21.80	0.00	3.20	0.00	3	√
4	Waste management	4.41	VH	56.25	31.25	9.40	3.10	0.00	9	√
5	Recycled / converted construction material market	4.31	VH	53.12	31.25	9.38	6.25	0.00	11	
6	Geographic location	3.93	H	34.37	40.63	12.5	9.37	3.13	21	
	General Average	4.46	VH							

The lack of knowledge and experience observed in design and construction in Turkey is a factor that reduces the efficiency level of renewable energy systems. Given recycled / converted materials, the supply and demand of such materials in the industry is very limited, contractors cannot easily reach them, and these materials generally create weak and poor quality perception on customers. Regarding waste management, although a number of legal regulations have been made in Turkey for the construction industry in recent years, it is known that the industry is still far from good waste disposal and recycling practices. In Turkey, there are only a few facilities that recycle construction and demolition wastes. The decline in ecological sustainability may be due to the perception that it may not bring an economic benefit to investors.

Table 11. RII and current levels of impact of environmental sub-factors

No.	Environmental factors	RII	Current level of impact	5	4	3	2	1	Overall ranking	Result
1	Local, national, and international applications on environment	3.81	H	37.50	28.13	21.87	3.12	9.38	3	√
2	Energy infrastructure and efficiency	3.78	H	34.38	34.38	15.62	6.34	9.38	4	√
3	Ecological sustainability	3.47	H	28.12	28.12	18.76	12.50	12.50	14	
4	Recycled / converted construction material market	3.34	M	21.87	31.25	18.75	15.63	12.50	19	
5	Waste management	3.34	M	18.75	31.25	25.00	15.63	9.37	20	
6	Geographic location	2.93	M	9.37	25.00	25.00	31.26	9.37	26	
	General Average	3.45	H							

4.6. Legal Factors

Legal factors were a group with "high" importance level (4.07) (Table 12) and "high" current level of impact (3.44) (Table 13). Among four sub-factors, environmental regulations, which is ranked fourth in terms of the importance level and first in terms of the current level of impact, is significant. This can be explained by the fact that the concept of environment is the most important component of the GB industry and that legal arrangements to be made in this regard are expected to directly and strongly influence the industry. Although some progress has been achieved in legislation in the context of European Union harmonization in Turkey, there are various difficulties in terms of the implementation and adaption of laws. Also, public and private sectors cannot completely perform their own duties due to several reasons (physical disabilities, financial constraints, etc.).

Table 22. RII and importance levels of legal sub-factors

No.	Legal factors	RII	Importance level	5	4	3	2	1	Overall ranking	Result
1	Environmental regulations	4.59	VH	65.63	28.12	6.25	0.00	0.00	4	√
2	Difficulties in adaptation of the certification system	4.06	H	31.25	56.25	6.25	0.00	6.25	16	
3	Consumer related regulations	4.03	H	31.25	46.88	15.63	6.25	0.00	18	
4	Regulations on import	3.59	H	25.00	34.38	18.75	18.75	3.12	26	
	General Average	4.07	H							

Table 13. RII and current levels of impact of legal sub-factors

No.	Legal factors	RII	Current level of impact	5	4	3	2	1	Overall ranking	Result
1	Environmental regulations	3.90	H	37.50	31.25	18.75	9.38	3.12	1	√
2	Difficulties in adaptation of the certification system	3.50	H	21.87	31.25	28.13	12.50	6.25	13	
3	Consumer related regulations	3.34	M	12.50	37.50	25.00	21.88	3.12	21	
4	Regulations on import	3.00	M	18.75	9.38	34.37	27.12	9.38	25	
	General Average	3.44	H							

5. DISCUSSION

Results of the study are shown between Tables 2 and 13. In the Result column, the most significant ten sub-factors were marked with "√". These were four of environmental factors (with "very high" importance level), three of technological factors (with "very high" importance level), and one from each group of political, social, and legal factors (with "very high" importance level). However, none of sub-factors from economic factors with "very high" importance level was placed in this list (Table 14). Among the five groups of factors, environmental factors group is in the first place with its very high importance level on affecting the GB industry. It is followed by group of technological factors again with very high importance level. The other groups of factors have high importance level and were listed as legal factors, political factors, and social factors respectively.

Table 34. A summary of results of importance levels of factors affecting the green building industry

Group of factors	Importance Level	Overall ranking
Political factors	High	4
Subvention	Very High	5
Economic factors	High	6
Social Factors	High	5
Quality of life (comfort) perception	Very High	7
Technological factors	Very High	2
Presence of qualified construction contractors	Very High	6
Presence of qualified building materials	Very High	8
Advanced technology (automation) facilities	Very High	10

Environmental factors	Very High	1
Energy infrastructure and efficiency	Very High	1
Local, national, and international applications on environment	Very High	2
Ecological sustainability	Very High	3
Waste management	Very High	9
Legal factors	High	3
Environmental regulations	Very High	4

Energy infrastructure and efficiency sub-factor covers targets such as energy efficient building desing and construction, clean and renewable energy generation or supply. Table 14 reveals that this sub-factor has the highest importance level on the GB industry. The reason behind this may be the lack of knowledge and experience on design and construction activities of GB technology in Turkey. The second most important sub-factor is local, national, and international applications on environment (Table 14). Although there are not many gaps in the legislation in terms of environmental practices, there may be deficiencies in the control and supervision of GB applications in Turkey. Therefore, scantiness of GB applications may have significant negative affect on investors and practioners of GB techonology. Ecological sustainability is another sub-factor of environmental factors which have very high importance level. However, the common opinion that ecological sustainability has no economic benefit for investors may lead a lack of support of investors on GB technology in Turkey. Environmental regulations represents legal factors as the most important sub-factor affecting the GB industry. This is because, environment is the most suitable concept to represent and affect the GB industry. The sub-factor subvention have the highest importance level score of political factors. The lack of subsidies in an emerging market may result in a poor market demand and therefore subsidies provided for GB applications seem to be useful for investors. Presence of qualified contractors is in the sixth place of the list given in Table 14 and GB contractors should have extra characteristics which may be better communication skills and knowledge concerning GBs. Quality of life (comfort) perception is the only social factor in the list and have very high importance level. This sub-factor covers favorable temperature, air quality, better lighting, less noise, and the overall indoor comfort of the buildings. For the benefit of GB investors, these characteristics may be advertised more with a special emphasis by the marketing experts. Presence of qualified building materials is another technological sub-factor with very high importance level. However, in Turkey, there is no permanent material market which needed for the GB construction. Establishing such a market will probably have a positive effect on the GB industry in Turkey. The last sub-factor of environmental factors in the list is waste management. This is also have very high importance level and recycling/reusing efforts to be made during construction and operation stages should be paid great attention for the sake of the GB industry. The tenth sub-factor in the list presented in Table 14, is advanced technology (automation) facilities with very high importance level. It is clear that GB production should be supported by advanced technology and to achieve this, a domestic and high-tech industry needs to be developed.

According to the results presented in Table 15, three of economic factors (with “high” current level of impact), two from each group of technological and environmental factors (with “high” current level of impact), and one from each group of political, legal, and social factors (with “high” current level of impact) are among ten most effective factors.

Table 45. A summary of results of current impact levels of factors affecting the green building industry

Group of factors	Current level of importance	Overall ranking
Political factors	Moderate	5
Subvention	High	2
Economic factors	High	2
Exchange rates	High	6
Real estate prices	High	8
Interest rates	High	9
Social factors	Moderate	6
Quality of life (comfort) perception	High	7
Technological factors	High	1
Presence of qualified construction contractors	High	5
Advanced technology (automation) facilities	High	10
Environmental factors	High	3
Local, national, and international applications on environment	High	3
Energy infrastructure and efficiency	High	4
Legal factors	High	4
Environmental regulations	High	1

Results of current impact levels of factors affecting the GB industry present that ranking order of group of factors is different from the list in Table 14. In Table 15, group of techonoligical factors is in the first place of the list. After that group of economic factors, environmental factors, legal factors, political factors were ranked respectively. The main difference of lists in Table 14 and Table 15 is sub-factors of the group of economic factors. According to current level of importance of sub-factors, exchange rates, real estate prices, and interest rates were listed as significant sub-factors affecting the GB industry. Exchange rates can be considered as one of the most important prices in any economy due to the potential of affecting all other prices and its importance level is high in Table 15. Therefore, it can be asserted that current exchange rates of an economy may have significant role on GB investments. Sub-factor of real estates prices has high importance level. The reason behing this, a green certification may differentiate the end-product and allow to charge a better price to some customers. Another sub-factor of economic factors, interest rates, has important potential to affect the GB industry. This is because, contractors usually having credits from banks for continuous cashflows of material, equipment, and labor supplies.

6. IMPLICATIONS AND LIMITATIONS

The present study has a number of research implications. In the study, Turkish GB industry was analysed and in different geographical locations the respondents may approach to this topic from another perspective. Therefore, future researches may bring potential differences of results in different geographical areas. In addition, specific conditions of the region under study may change the criteria and their weights.

The study was based on views of professionals and there is always a chance for professionals to change their views over time. Also, professionals from other industries may have different opinion on GB industry so that the other industries should also be investigated.

The research has some practical implications. The results obtained may be utilized as an initial point for further industrial policies and legislative plans by strategy-makers. In addition, the results can also be a trigger to encourage investors and professioanls for GB applications.

Lastly, the current study has some limitations as well. In the sub-factors selection of the PESTEL analysis, only three LEED professionals were interviewed. Therefore, it would be better to m interview more than three professionals during the selection process of sub-factors. In this way, a larger scope of professionals may contribute to the study and offer some different sub-factors. All these limitations should be considered in construing the outcomes.

7. CONCLUSIONS

In this study, among six factor groups, environmental factors were determined as the most important factor according to the importance level. Moreover, this group were ranked as the third most important group regarding its "high" current level of impact. The second most important factor was technological factors with a "very high" importance level. Also, they were found to be in the first place with "high" importance level. Legal factors with "high" importance level and current level of impact took place in third and fourth rankings, respectively. Political factors were ranked fourth and fifth place with their "high" importance level and "moderate" current level of impact. Economic factors was in the sixth place with "high" importance level and second with "high" current impact level. Social factors were ranked fifth with "high" importance level and sixth with "moderate" current level of impact. As a result, it is seen that environment is the forerunner. In addition, the importance of quality materials due to the use of technological elements used in the construction phase of green buildings and the passive systems they contain was revealed by importance indices of technological factors. Economic factors were the least important group although they were in the second rank in terms of the current impact level. Looking at political factors, subsidy (governmental investment incentive) was at the forefront. In terms of social factors, the quality of life (comfort) perception was the forerunner. When legal factors are examined, environmental regulations attract attention. This shows that the most important dynamism of the industry, i.e., the environment concept, is an organic part of the green building industry, and regulations to be made in this regard will further strengthen the industry. In conclusion, it is necessary for industrial professionals to intensify their work on the top ten factors. Similarly, it will be more useful for researchers, who would like to take this topic further, to conduct detailed studies on these ten factors rather than repeating a group and factor analysis.

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