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A Study on ESG Perception of Real Estate Managers

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Abstract

Purpose: This study conducted an empirical study to identify the current status of real estate managers' ESG awareness and to derive recommendations for improvement. **Research design, data and methodology: A** survey was conducted among those who actually manage real estate assets regardless of region. Descriptive statistical analysis, paired sample t-test, and IPA analysis were conducted using SPSS 27.0 statistical package. **Results:** The results of the t-test showed that respondents perceived their on-site management achievements to be lower than their perceived importance in all areas of ESG. In the IPA matrix, the mean of achievement is higher than 3, which is moderate. Environment (E) was found to be relatively low in importance. In the Social (S) aspect, the achievement level was low compared to its importance, and Governance (G) was found to be low in importance. **Conclusions:** Based on the analysis, it seems that policies are needed to emphasize the importance of environmental issues such as greenhouse gas reduction in the environment (E) sector and to strengthen realistic achievement in the social (S) and governance (G) sectors.

Keywords: building ESG management, property manager awareness, real estate asset management

JEL Classification Code: R10, R31, R38, R58

1. Introduction

Our planet is facing great challenges due to climate change, and climate change caused by global warming is already having a huge impact on our daily lives. We are facing unprecedented natural disasters and new diseases such as coronavirus due to climate change. (Hong, 2020) The world has been trying to respond to climate change for a long time already. The United Nations (UN) has been committed to responding to climate change globally through the United Nations Conference on Environment & Development (UNCED) in Rio in 1992, the Kyoto Conference of Parties (COP3) in 1997, and the Conference of Parties (COP21) in 2015, known as the Paris Agreement. With the goal of carbon neutrality by 2050, each country has established an autonomous NDC (Nationally Determined Contribution), which is a kind of interim check, to help curb greenhouse gases. To join these international efforts, Korea is also presenting its NDC to the international community and strengthening transparency and accountability. The building sector is no exception. According to the upward revision of the 2030 National Greenhouse Gas Reduction Target (NDC) announced by the relevant ministries in October 2021, the building sector alone needs to reduce 17.1 million tons of CO_{2eq} compared to 2018 by 2030 (Jointly related ministries, 2021).

The importance of ESG is growing in tandem with the climate change crisis. ESG is an acronym for Environment (E), Social (S), and Governance (G), and is a representative component of non-financial performance. ESG can be said

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to be the process of making an organization's efforts for environmental (E) and social (S) factors (G) measurable through indicators (Byun, & Woo, 2022). The mandatory disclosure of information related to climate change response is a global trend. Among the issues related to the environment (E) of ESG, climate change is the core, and how a company or organization responds to climate change is disclosed through ESG disclosure indicators (Oh et al., 2021). ESG is also important in the real estate sector. While ESG is a non-financial performance indicator, it is also known to affect real estate values. Globally, real estate assets that fall short of ESG criteria are being excluded from investments, and it appears that by adhering to ESG standards, economic utility increases and the formation of a premium in asset value is possible (Samsung Securities Research Center, 2020).

However, according to the Ministry of Trade, Industry and Energy's 2023 press release, the GHG reduction performance of the real estate sector in Korea is far from the target. As of March 2023, the cumulative number of zero-energy buildings was 73,000, and the cumulative number of green remodeling projects was 2,950, falling short of the targets of 1.6 million and 47,000, respectively, and there is an urgent need for improvement. The National Assembly's analysis of current issues for 2023 confirmed that greenhouse gas emissions are expected to increase due to increased energy consumption after the corona pandemic, making it difficult for the country to achieve its overall 2030 reduction target. To resolve the above situation, it is analyzed that institutional management such as various policies and securing technologies for the transition to a low-carbon structure of the entire economy will be important in the future (National Assembly Budget and Policy Office, 2023).

In recent years, companies as tenants have preferred to move into buildings that are eco-friendly and take into account the well-being of tenants rather than economic incentives such as rent free or concessions. From a building owner's perspective, eco-friendly buildings are becoming a more economically and socially rational choice (Moon, 2022).

Based on the above, it can be said that in order to reduce greenhouse gas emissions in the building sector, direct technical R&D such as building-integrated photovoltaic management system technology related to green remodeling performance is important, but social and institutional approaches must be combined with these efforts to approach the achievement of more meaningful goals. To achieve this, it can be said that it is crucial, now more than ever, for building owners and managers in the real estate sector to undergo a comprehensive shift in their perception of ESG and to enhance their capabilities, aiming for the betterment of the Earth (Planet), People, and the appreciation of building value. In particular, real estate managers, armed with expertise, inevitably have a profound impact on the buildings they manage.

However, there is a dearth of existing academic research on real estate managers' comprehensive ESG awareness and competencies. Most existing research on ESG in the real estate sector primarily introduces and implements the concept of ESG into real estate or is limited to specific areas such as energy and environment (E). There is no empirical research on the integration of ESG in real estate managers.

In light of the above, this study concluded that it is necessary to conduct an empirical study to identify the current status of real estate managers' ESG awareness in the building sector. This study aims to identify what attributes related to ESG real estate (building) managers consider important and to determine their current level of performance in these areas. In other words, by investigating and analyzing the differences in the importance and performance (or execution) of each ESG area as perceived in the real estate management field, this study aims to determine which aspects require improvement and which areas should be maintained as strengths. For this purpose, 286 real estate managers working in the field were surveyed about their ESG awareness and IPA (Importance Performance Analysis) was conducted. SPSS 27 was used as the statistical program.

2. Literature Review

2.1. The concept and background of ESG

The United Nations adopted the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 at the United Nations Conference on Environment and Development in Rio, Brazil. It categorized countries into Annex I, Annex II, and non-Annex I. Annex I countries were obligated to reduce their greenhouse gas emissions, while Annex II countries were obligated to provide financial and technology transfers to developing countries. The 1997 Kyoto Conference of the Parties (COP3) to the United Nations Framework Convention on Climate Change, also known as the Kyoto Protocol, established GHG reduction obligations for industrialized countries only. The Kyoto Protocol also introduced the Clean Development Mechanism, Emissions Trading System, and Joint Implementation System (Ministry of Foreign Affairs , n.d).

In 2015, the Conference of the Parties (COP21), also known as the Paris Agreement, was held. In the Paris Agreement, it was agreed to strive to limit warming to less than 1.5 degrees Celsius above pre-industrial levels by 2100, based on the findings of the Intergovernmental Panel on Climate Change (IPCC). The main difference between the

Kyoto Protocol and the Paris Agreement is that the obligation to reduce GHG emissions falls on all parties, without distinguishing between developed and developing countries. All parties are required to contribute to the reduction of greenhouse gases by establishing voluntary Nationally Determined Contributions (NDCs). The 2018 IPCC report suggested a goal of achieving carbon neutrality (Net-zero) by 2050 (Choi, 2021).

Countries around the world are running toward carbon neutrality. More than two-thirds of the world's countries have declared or are working toward carbon neutrality. Europe has set a goal of reducing greenhouse gas emissions by 50% by 2030 compared to 2019, and Japan has set a goal of reducing greenhouse gas emissions by 85 billion tons by 2050 compared to 2019 (Kim et al., 2021).

In December 2020, the Moon Jae-in administration announced the "2050 Carbon Neutrality Vision". It established a carbon neutrality committee and decided on a carbon neutrality scenario and a national greenhouse gas reduction target (NDC) for 2030. According to Seoul's 2050 Carbon Neutrality Strategy, the city's main carbon neutrality strategies in the building sector include promoting green remodeling of old buildings, mandating zero-energy buildings for new buildings, and establishing a total greenhouse gas emission system for buildings. The Yoon Seok-yeol administration has established a step-by-step blueprint for carbon-neutral green growth in 2023. The annual GHG reduction targets for the building sector established by the Yoon Seok-yeol administration are shown in <Table 1>.

Table 1: NDC for Each Country

Year	Country name	Target Year	Reduction targets	Base Year
1	Germany	2030	55	1990
2	Taiwan	2050	70	2005
3	Russia	2030	70	1990
4	United States	2030	50-52	2005
5	Spain	2030	23	1990
6	United Kingdom	2030	57	1990
7	Japan	2030	46	2013
8	China	2030	65	2005
9	Canada	2030	40-45	2005
10	France	2030	39.5	1990
11	South Korea	2030	40	2018

Source: World Legal Information Center website

Table 2: Korea's annual goal of reducing greenhouse gas emissions compared to 2018

Year	2018	2023	2024	2025	2026	2027	2028	2029	2030
Net Emissions	52.1	47.6	47.0	46.0	44.5	42.5	40.2	37.5	35.0
Cumulative Reduction	0	4.5	5.1	6.1	7.6	9.6	11.9	14.6	17.1

Source: Quoted from the press release issued by the Ministry of Trade, Industry and Energy on March 21, 2023

Lee (2020) explains that ESG is a representative factor that constitutes non-financial performance, and that non-financial performance centered on ESG increases corporate sustainability. Considering both the outcome aspect of management activities, which is represented by financial performance, and the process aspect, which is represented by non-financial performance, non-financial performance centered on ESG increases corporate sustainability. Lee and Choi (2021) described ESG as a type of investment risk management strategy that manages non-financial indicators of environment (E), society (S), and governance (G) in order for companies to make stable profits from a long-term perspective. If corporate social responsibility (CSR) is a strategy from a corporate perspective, ESG is a strategy from an investor perspective.

In the real estate sector, Environment(E) is closely related to climate change and is the metric that gets the most attention. There is a sense of urgency that the environmental problems facing humanity are irreversible beyond a certain limit. It is an indicator that has been accepted as an active investment indicator from a passive compliance indicator of environmental standards in the past.

Social (S) indicators are recognized as quantified investment criteria from an investor's perspective, moving away from the concept of simple passive good deeds performed by companies. (Han, 2021) In the real estate sector, human rights, community, consumer rights and welfare, information security, tenant screening, health, safety, and community development are the main evaluation items of the social sector. (UN Principles for Responsible Investment)

Governance (G) comes from the Latin word meaning to coordinate, and is often translated as governance. The OECD defines governance as a structure and system that encompasses a series of relationships among stakeholders and sets the direction and objectives of a company. (See the OECD website.) Kim (2003) explains that the core of corporate governance lies in how authority and responsibility regarding management are distributed among stakeholders. Choi (2006) explains that governance can be said to be an operating system that coordinates interests among stakeholders, but the definition of corporate governance varies among scholars. The National Institute of Standards and Technology (2011) defines the governance of an organization as a system for making decisions and

implementing those decisions in order to pursue the organization's goals. Based on the above studies, governance can be defined differently by different scholars, but in general, it can be described as an organizational decision-making process or a system related to it. In the real estate sector, indicators related to governance include ethical management, information protection, ESG clauses in lease agreements, ESG incentive policies, building data collection management, legal and institutional management, disaster management, and stakeholder management. (UN Principles for Responsible Investment)

2.2. Greenhouse Gas System and Eco-Friendly Research

The highest level of legislation related to GHG regulation in South Korea is the Act on Carbon Neutrality and Green Growth for Climate Crisis Response (hereinafter referred to as the Carbon Neutrality Act). The Carbon Neutrality Act is the legal basis for realizing the Green New Deal policy announced by the government in 2020-2021 and for moving towards a carbon-neutral society. The main contents of the Carbon Neutrality Act include setting the goal of carbon neutrality in 2050, proposing a national greenhouse gas reduction target (NDC) of 40% in 2030, and establishing basic principles for the transition to a carbon-neutral society (Lee, 2021).

In addition, GHG emissions are regulated under the Act on the Allocation and Trading of Greenhouse Gas Emission Rights, the Act on Supporting the Creation of Green Buildings, the Eco-friendly land management in the Basic Land Act, and the Building Management Act. In terms of Seoul's municipal ordinances, the city is making efforts to move toward a carbon-neutral society with the Ordinance on the Establishment and Operation of the Seoul Climate Change Fund, Carbon Neutrality for Responding to the Climate Crisis in Seoul, the Basic Ordinance on Green Growth in Seoul, and the Basic Ordinance on Green Growth (Jongno-gu Office, 2023).

Ben Dalton and one other (2018) conducted a study titled "The Proposition of Green Value in Real Estate." In this research, they aggregated 42 studies that examined the relationship between energy efficiency and real estate prices. They searched two general databases and eight academic databases to perform a meta-analysis and a discounted cash flow (DCF) analysis, aiming to find evidence of an increase in the eco-friendly premium. Kim (2007) quantitatively analyzed the data by climate scenario in a study on the change in heating and cooling energy demand of buildings due to warming by climate change scenarios. Lee (2013) conducted a study analyzing the impact on the building sector according to climate change scenarios. In this study Through climate change scenario modeling, he predicted the effects of climate change and proposed energy-saving solutions for buildings. Kim (2021) concluded that Korea's 2050 carbon neutrality goal cannot be achieved without the building sector and suggested policy measures for the building sector. Moon (2022) conducted a literature review on how to utilize ESG in real estate to reduce greenhouse gas emissions in the building sector. Kang and Yeo (2014) studied how the green building certification system, an environmental sector, affects real estate value (price) in apartment buildings using a hedonic model. So and Jo (2018) studied how eco-friendly characteristics affect the value (price) of office buildings.

2.3. Real Estate Management

Real estate management can be divided into three main categories: asset management (AM), property management (PM), and facility management (FM). Leasing management (LM) is often categorized separately from PM. If the real estate market is divided into the commercial market and the residential market by purpose, the commercial market is classified as AM or PM and is managed by large domestic and foreign corporations. The residential market, on the other hand, is managed by relatively small real estate agencies (Noh & Woo, 2022).

2.4. The Necessity of ESG in Building

Warren-Myers (2022) examines the concept of sustainability and conducts a literature review on how to consider sustainability in valuation practice. In HEITMAN's report (2019), the risks in the real estate sector due to climate change were categorized and presented as physical risks, market transition risks, policy and regulatory change risks, resource utilization change risks, and market position and evaluation change risks. Kim and Yeo (2018) stated that the building sector has a large potential to reduce GHGs compared to other industrial sectors and that GHGs can be reduced economically compared to other sectors. A report by Samsung Securities Research Center (2020) explains that if the real estate sector fails to respond appropriately to climate change, real estate asset values may eventually decline due to the increasing costs of maintaining real estate infrastructure as climate change recurs. Lee (2022) emphasizes the need to establish a corporate sustainable management model to respond to climate-related risks. Syeda Marjia Hossain and others two persons (2023) surveyed commercial real estate valuers in the United Kingdom to determine the extent to which they are aware of RICS guidance on sustainability and whether they collect, analyze, and report data on sustainability attributes during the valuation process.

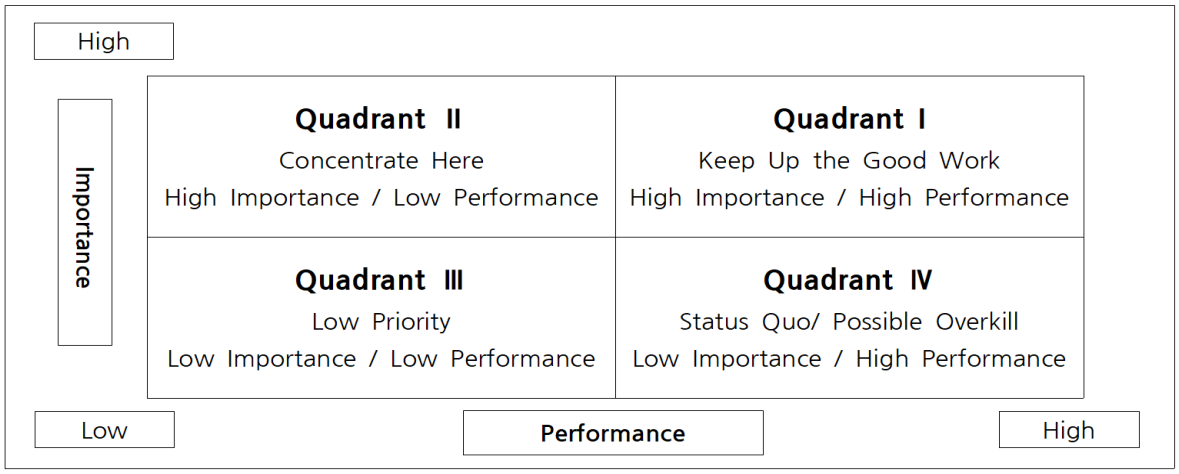

Figure 1: IPA matrix

3. The Differentiation of the Research

Our study differs from previous research in the following ways.

First, the existing ESG studies in the building sector are limited to introducing ESG in the real estate sector or emphasizing the need for it, but this study selects each relevant indicator and conducts an empirical study.

Second, while previous studies have focused on specific sectors, such as technical studies on greenhouse gas reduction in the real estate building sector and studies on sustainability and valuation, this study emphasizes the importance of ESG and conducts an integrated study on ESG.

Third, there is no existing research on real estate managers, who are most closely related to real estate, but this study aims to identify the current status of ESG awareness among real estate managers and provide relevant implications.

4. Research Method and Variables

4.1. Research Method

IPA analysis is an analytical technique proposed by Martilla and James and is used in the field of management strategy when two or more decisions are to be made. IPA has the advantage of displaying the average values of respondents' responses based on the importance and performance of a product or service on a graph in a quartile plot, making it easy to analysis comparatively and visually understand. Currently, it is being used as marketing materials in various fields such as service, education, travel, and tourism (Lee & Kim, 2023). The IPA analysis method is simple and not difficult to apply, and it can derive the items that need to be improved first by reviewing the importance and performance together. The four quadrants on the graph (IPA Matrix) can be interpreted as retention, focus, low priority, and overabundance (Shim & Kim, 2019).

4.2. Definition and Measurement of Variables

GRI Standard was established as a globally applicable sustainability reporting guideline by the United Nations Environment Program (UNEP) based on a report issued in 1997 by the Coalition for Environmentally Responsible Economics (CERES), a non-profit environmental organization in the United States. GRI can be used universally across all companies and industries without distinction. As of 2021, it is the most widely adopted standard, with more than 15,000 organizations worldwide publishing reports using the GRI guidelines. GRI calls for more responsible behavior and adherence to principles on environmental and social issues in corporate management (Han, 2021).

The revised GRI Standards for 2021 are broadly organized into Universal Standards, Sector Standards, and Topic Standards. The Universal Standards can be further categorized into GRI 1-F foundation, GRI 2-General Disclosure, and GRI 3-Material Topics. The universal standard encompasses contents about significant impacts on the environment and society in an organization's structure, roles, strategy, and overall management activities. GRI 200 is about economic performance, GRI 300 is about environmental performance, and GRI 400 is about social performance. (GRI website) In this regard, Choi et al. (2022) analyzed sustainability reports using the GRI standard published in the last 10 years and derived 14 key

issues.

The UN Principles for Responsible Investment (UN PRI) is a set of responsible investment principles developed by the United Nations in consultation with large asset management organizations, and represents the core values that should be reflected in investments. UN PRI aims to enhance the sustainable growth of the market by actively responding to ESG issues of the companies in which large global asset managers invest beyond short-term performance (Won, 2010). The UN PRI suggests due diligence items that should be considered when investing in the building (real estate) sector as shown in <Table 3>.

Table 3: UNPRI Due Diligence List

Classification	Due Diligence List
Environment (E)	Biodiversity and habitat, climate change, soil contamination, energy consumption, greenhouse gas emissions, indoor air quality, location and related infrastructure, materials, pollution prevention, disaster resilience, renewable energy, sustainable procurement, waste management, and water consumption.
Social (S)	Community development, controversial tenants, health and well-being of residents and contractors and the community, human rights, accessibility, inclusion and diversity, labor standards and work environment, social enterprise partnerships, stakeholder relations, and occupant amenities - showers, changing rooms.
Governance (G)	Prohibition of bribery and money laundering, cybersecurity, board diversity, independence of board composition, remuneration policy (ESG incentives), data security, fines for non-compliance with laws and regulations, ESG clauses in contracts, data collection and management systems, Purchasing procurement criteria and requirements, tenant engagement frameworks

One of the standards frequently used for ESG evaluation in the real estate sector is the GRESB (Global Real Estate Sustainability Benchmark). The GRESB is a benchmark for assessing ESG performance in the real estate sector and has been the standard for assessing sustainability in real estate around the world since 2009. The GRESB covers leadership, policy, reporting, risk management, greenhouse gases, tenants and communities, water for use, waste, and materials as investment criteria for sustainability in the real estate sector (Samsung Securities Research Center, 2020).

In addition, various certification systems have been developed around the world to assess the greenness and sustainability of buildings. BREEAM (Building Research Establishment Environmental Assessment Method), the first UK green building certification system, is the first green building certification system. LEED (Leadership in Energy and Environmental Design) is a U.S. green building certification system that is globally recognized as one of the most prestigious. The U.S. Green Building Council (USGBC) developed the certification (Yeom, 2014). LEED certification consists of four stages: online registration, evaluation application, review, and certification, and emphasizes the integration of design and construction, and is viewed as a process from the design stage to occupancy. However, it clearly distinguishes at which stage each evaluation item is positioned. BREEAM certification is also based on the integration of the entire building process, but it also allows for optional step-by-step certification. The process is divided into design, post-construction, and occupancy phases, depending on the life cycle of the building. Only the post-construction phase assessment is mandatory, while the rest are optional (Lee et al., 2023).

Korea's green building certification system has a green building certification known as G-SEED (Green Standard for Energy and Environment). G-SEED is a system that certifies the eco-friendly qualifications of buildings that contribute to reducing environmental burdens such as resource, energy, and pollutant emissions from the entire life cycle of buildings, from the production of construction materials to the design, construction, maintenance, and disposal of buildings. The specialized areas of green building certification include land use and transportation, energy and environmental pollution, materials and resources, water cycle management, maintenance, ecological environment, and indoor environment, and a total of 50 detailed certification items are operated (Jeong & Yun, 2023). The evaluation items of LEED, BREEAM, and G-SEED are summarized as <Table 4> (Kim et al., 2022). The UNPRI checklist utilizes the list of general ESG issues to be investigated in real estate asset due diligence proposed by UNPRI.

Table 4: Eco-friendly Certification Evaluation Items

Classification	Country	Year	Evaluation metrics
G-SEED	South Korea	2013	Land Use and Transportation, Energy and Environmental Pollution, Materials and Resources, Water Cycle Management, Maintenance, Ecological Environment, Indoor Environment
LEED	United States	1998	Integrated Processes, Region and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmospheric Environment, Materials and Resources, Indoor Environmental Quality
BREEAM	United Kingdom	1991	Energy, Health and Wellness, New Technologies, Land Use, Materials, Management, Pollution, Transportation, Waste, Water for use

Table 5: Source of Variables

Classification		①	②	③	④	⑤	⑥	⑦	Adoption
Environment (E)	**Energy**	○	○	○	○	○	○	○	○
	Biodiversity habitats	○	○	○		○			
	Water Resources	○	○	○	○	○	○	○	○
	GHGs	○	○	○	○	○	○	○	○
	Atmospheric Environment							○	
	Environmental regulations	○	○	○	○	○	○	○	○

	Soil contamination	○		○					
	Materials		○	○		○	○	○	
	Waste Management	○	○	○				○	
	Procurement	○		○					
	Renewable Energy	○							
	Product Services	○	○						
	Transportation	○	○				○	○	
	Indoor air quality	○		○	○	○	○	○	○
Social(S)	**Safety**	○	○	○	○				○
	Employment		○						
	Community development	○							
	Community	○	○	○	○				○
	Partner ESG	○	○	○	○				○
	Tenant wellness	○	○	○	○				○
	Tenant screening	○							
	Education and training		○						
	Human Rights	○		○					
	Equality		○	○					
	Discrimination		○	○					
	Stakeholder relationships	○		○					
	Labor Standards	○	○	○	○				○
Governance (G)	**Risk**	○	○	○	○				○
	Cybersecurity	○		○					
	Board diversity	○		○					
	Board independence	○							
	Ethical Management	○	○	○	○				○
	Legal Operations	○	○	○	○				○
	Tenant ESG	○	○	○	○				○
	ESG incentives	○							
	Dedicated ESG staff			○					
	ESG goals			○					
	Energy data	○	○	○	○				○

Sources: ①UNPRI, ②GRI, ③GRESB, ④Yoon-Young Choi et al, ⑤Dahae Kim et al, ⑥ Dahae Kim et al, ⑦Dahae Kim et al

The definitions and measurement items of the variables used in this study are as follows. Environment (E), Society (S), and Governance (G) were divided into five components, and the importance and achievement of each were surveyed using a 5-point Likert scale.

Table 6: Importance metrics

Importance questions		Variable descriptions	Measurement
Environment (E)	Energy	Manage energy in buildings	Likert 5-point scale 1. Very unimportant 2. Somewhat unimportant 3. Usually 4. Somewhat important 5. Very important
	Water Resources	Manage water resources in buildings	
	GHGs	Manage your building's greenhouse gas emissions	
	Environmental Regulations	Building environmental compliance	
	Indoor Air Quality	Manage indoor air quality in buildings	
Social(S)	Safety	Residents and workers' Industrial Safety Management	
	Community	Social contributions to the community	
	Partner ESG	ESG compliance terms in partner contracts	
	Tenant Wellness	Consider the health and well-being of your tenants	
	Labor Standards	Labor and wellness compliance	
Governance (G)	Risk	Manage building hazards (risks)	
	Ethical Management	Strengthening ethical management in buildings	
	Legal Operations	Rent Protection Act and Adhere to operational standards	
	Tenant ESG	ESG compliance in leasing	
	Energy Data	Manage energy collection in buildings	

Table 7: Achievement metrics

Achievement questions		Variable descriptions	Measurement
Environment (E)	Energy	Manage energy in buildings	Likert 5-point scale 1. Very bad 2. Somewhat wrong 3. Usually 4. Somewhat good 5. Very Good
	Water Resources	Manage water resources in buildings	
	GHGs	Greenhouse gases in buildings Emissions Management	
	Environmental Regulations	Building environmental compliance	
	Indoor Air Quality	Manage indoor air quality in buildings	
Social(S)	Safety	Residents and workers' Industrial Safety Management	
	Community	The Social contributions	
	Partners ESG	When contracting with a vendor ESG compliance conditions	
	Tenant Wellness	Consider the health and well-being of your tenants	
	Labor Standards	Labor and benefits (wellness) Legal compliance	
Governance (G)	Risk	Manage building hazards (risks)	
	Ethical Management	Strengthening ethical management in buildings	
	Legal Operations	Comply with rent control laws and operating standards	
	Tenant ESG	ESG compliance in leasing	
	Energy Data	Manage energy collection in buildings	

5. Research Results

In this study, we surveyed 286 people currently working in real estate management about their ESG awareness. Questions were asked on a 5-point Likert scale, with 1 being very low and 5 being very high. Based on the collected information, we conducted an IPA analysis. SPSS 27.0 was used as the statistical program.

5.1. Demographic Analysis

The demographic analysis is shown in Table 8. In the gender analysis, there were 219 males (76.6%), more than females.

The majority of respondents are in their 30s and 40s with 212 (74.1%). The highest educational attainment of the respondents showed that 209 people (73.1%) had a bachelor's degree. In terms of marital status, 211 respondents (73.8%) were married. For affiliation, those affiliated with external asset management companies and those managing office buildings accounted for a total of 203 respondents (71%), making up the majority. The management of buildings over a certain size can be divided into management by internal employees such as management support teams and management by contracting with external management companies. Relatively small buildings tend to be managed by real estate brokers who broker transactions because they are not as difficult to manage. Each group is expected to have different expertise,

background, and experience, but they all have one thing in common: they manage each building on behalf of the owner and from the same perspective as the owner.

The majority of respondents had more than 10 years of experience at 85 (29.7%), followed by 3+ years to less than 6 years at 73 (25.5%).

Table 8: Demographic Analysis Results

Classification		Frequency	Percentage
Gender	**man**	**219**	**76.6**
	woman	67	23.4
Age	20s	15	5.2
	30s	**109**	**38.1**
	40s	**103**	**36.0**
	50s6	37	12.9
	60+ years old	22	7.7
Education	GED	10	3.5
	College Graduate	18	6.3
	College	**209**	**73.1**
	Graduate or higher	49	17.1
Marriage	Unmarried	69	24.1
	Married	**211**	**73.8**
	Breakup or bereavement	6	2.1
Affiliation	**Buildings (BuildingManagement)**	**98**	**34.3**
	External Asset Managers	**105**	**36.7**
	Real Estate Agency	83	29.0
Career	Less than 1 year	16	5.6
	More than 1 year ~ less than 3 years	60	21.0
	More than 3 years ~ less than 6 years	**73**	**25.5**
	More than 6 years ~ less than 10 years	52	18.2
	More than 10 years	**85**	**29.7**

5.2. Paired t-test

For the IPA analysis of the results, a paired sample t-test was conducted to verify the difference between the importance and performance(execution) values, and the results are shown in <Table 9>.

Table 9: Paired t-test Results

Classification		Importance Average	Performance Average	Importance Performance gap	t-value	Note Probability (both sides)
Environment (E)	Energy	4.077	3.549	0.528	9.220	0.000
	Water Resources	**4.241**	**3.472**	**0.769**	**13.548**	**0.000**
	GHGs	**4.084**	**3.350**	**0.734**	**11.543**	**0.000**
	Environmental regulations	3.836	3.643	0.192	2.958	0.003
	Indoor air quality	3.955	3.591	0.364	6.387	0.000
Socail	Safety	4.304	3.755	0.549	9.066	0.000
(S)	**Community**	**4.010**	**3.220**	**0.790**	**11.933**	**0.000**
	Collaborator ESG	**4.017**	**3.175**	**0.843**	**13.285**	**0.000**
	Tenant wellness	3.965	3.336	0.629	10.575	0.000
	Labor Standards	**4.168**	**3.332**	**0.836**	**12.658**	**0.000**
Governance (G)	Risk	4.423	3.832	0.591	9.722	0.000
	Ethical Management	4.031	3.500	0.531	9.810	0.000
	Legal Operations	4.378	3.804	0.573	10.039	0.000
	Tenant ESG	**4.227**	**3.469**	**0.759**	**11.954**	**0.000**
	Energy data	**4.168**	**3.381**	**0.787**	**11.522**	**0.000**

Based on the test results, statistically significant differences were found in all areas within the Environment (E) categories. Notably, building water resource management and greenhouse gas management showed high differences with values of 0.769 and 0.734, respectively. In the Social (S) category, there are statistically significant differences in all categories, especially in ESG compliance conditions when contracting with partner companies, labor and welfare (well-being) management, and social contributions to the community, which showed high differences with values of 0.843, 0.836, and 0.790. In the Governance (G) category, there are statistically significant differences in all categories, especially in the collection of tenant ESG and energy data in buildings, with a difference of 0.759 and 0.787.

Taken together, we found that importance was statistically significantly higher than achievement for all factors. This suggests that across all factors, property managers feel that their overall performance(execution) in the field is low relative to their perceived importance.

It can also be said that the larger the difference in importance and achievement, the more prioritized measures are needed. The significant differences in both GHG reduction in Environment (E) and energy data collection in Governance (G) suggest that the level of GHG reduction in the field is still insufficient. The Environment (E) water resources variable is related to energy conservation and GHG reduction, but this may be due to the low cost of water supply in Korea. Social (S) contribution to the community, labor and welfare (well-being) compliance, and ESG management of partner companies are recognized as important indicators for GHG reduction and building value enhancement, but it can be interpreted that managers feel that they are not reflected well in their real estate management compared to their perceived importance.

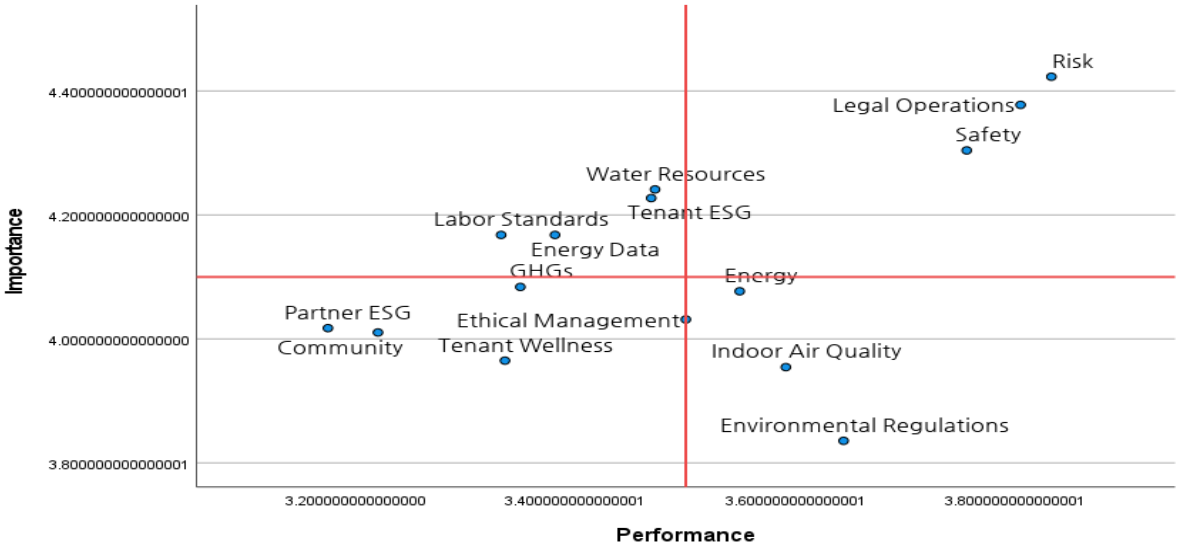

Figure 2: IPA Matrix Results

5.3. IPA (Importance - Performance) Matrix

In this study, the importance and performance of ESG management by 286 managers in building management were averaged for each variable, divided into quadrants, and displayed on a graph. The criterion for dividing the quadrants was the overall average value of importance and achievement. The horizontal axis was set to performance(execution) and the vertical axis to importance. The results of the analysis are summarized in the IPA matrix and table as shown in <Figure 2> and <Table 10>.

Table 10: IPA Matrix Results

Classification	Metrics	Importance	Performance
1st quadrant (Keep Up the Good Work)	Risk (G)	4.423	3.832
	Legal Operations (G)	4.378	3.804
	Safe (S)	4.304	3.755
Second quadrant (Concentrate Here)	Water Resource (E)	4.241	3.472
	Tenant ESG (G)	4.227	3.469
	Labor Standards (S)	4.168	3.332
	Energy data (G)	4.168	3.381
3rd quadrant (Low Priority)	Greenhouse gases (E)	4.084	3.350
	Supplier ESG (S)	4.017	3.175
	Community (S)	4.010	3.220
	Tenant Wellbeing (S)	3.965	3.336
Four quadrants (Maintaining Status Quo/ Possible Ovekill)	Energy (E)	4.077	3.549
	Ethics (G)	4.031	3.500
	Indoor Air Quality (E)	3.955	3.591
	Environmental regulations (E)	3.836	3.643

The mean of importance is 4.126, which is high when compared to the normal value of 3. The mean for accomplishment is also 3.494, which is higher than the moderate 3. This means that there is a high level of agreement on the importance of ESG, but there are still difficulties in implementing (reflecting) the importance in practice, which may be due to the mindset of property owners and the lack of social conditions.

The first quadrant is the (maintaining dominance) quadrant, where both importance and performance are high in the organization. Risk management (G), Operations by law (G), and safety management (S) are areas that managers recognize as highly important and are actually managed well. Risk management is an issue that can be directly related to the value of the building, and occupational safety management is also recognized as very important in our society. If governance is viewed as a democratic decision-making process, then operations based on laws and internal regulations can be a significant issue, as they exclude the personal judgments of owners and lead to more rational decisions.

The second quadrant (priority improvement) includes water resources management (E), ESG compliance in lease agreements (G), labor and welfare compliance (S), and energy data collection management (G), which are areas that managers perceive to be of high importance in their organizations, but where actual performance is relatively low and needs to be improved. Water resources management

is traditionally considered an important area in the environmental sector, and it usually involves investments in facilities. Requiring ESG compliance from tenants in lease agreements can be even more important when the tenant is a corporation. However, the reality is that this is rarely done. It can be said that there are hardly any buildings that include ESG clauses in special contract provisions as of now. Realistically, there's a high likelihood that both building owners and tenants lack awareness of ESG and are not adequately prepared for it. Compliance with labor and well-being laws and regulations is a difficult area to improve if approached only from a cost-saving perspective. The collection of energy data from buildings is a prerequisite for reducing greenhouse gas emissions. It also necessitates preliminary expenditures, such as platform development, facility investment, and training for managers.

The third quadrant (low priority) includes greenhouse gas reduction (E), ESG compliance requirements when contracting with partners (S), social contributions to the community (S), and consideration of the health and well-being of tenants (well-being), and represents areas of low importance and performance. Although relatively low, they are all above a moderate 3. When considering ESG in building management, it can be said that it requires relatively more deliberation. GHG reduction and ESG implementation of suppliers are areas that must be improved in the future if GHG reduction obligations are imposed on buildings. Recently, major real estate companies have been verifying up to Scope 3 levels when publishing their ESG reports, and this matter is certainly important for real estate managers. Social contributions to the community or tenant health and well-being may not be considered important to managers, but they can be important enough to improve the value of the building.

The fourth quadrant (status quo) includes energy management of the building (E), ethical management enhancement of the building (G), indoor air quality management of the building (E), and compliance with environmental regulations of the building (E), which have low relative importance but high performance(execution), indicating that they are well managed. Energy management and indoor air quality management are related to cost savings and the HVAC (Heating, Ventilation, and Air Conditioning) system. Compliance with environmental regulations is a given and must naturally be adhered to; hence, even from an FM (Facility Management) perspective, these are traditionally well-managed areas. In some prior studies, governance is interpreted as ethical management itself (Kwak, 2022). While there are differences in the perceived importance of compliance with laws and ethical regulations, the performance level appears high.

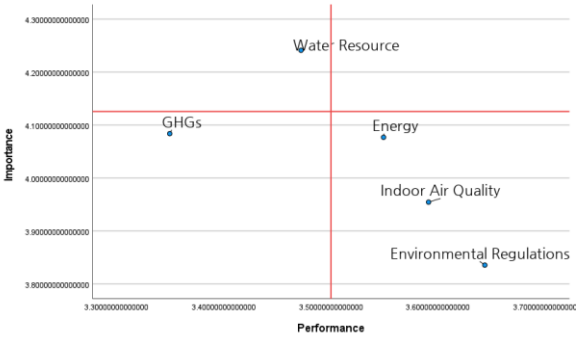

Figure 3: Environment IPA Matrix Results

Figure 2: Social Matrix Results

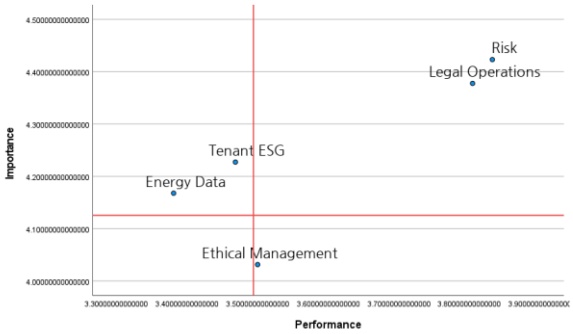

Figure 3: Governance Matrix Results

When the IPA matrix is analyzed by ESG dimension, most of the Environmental (E) sector variables are in the third and fourth quadrants of low importance. There is no area for maintaining superiority (Quadrant I), and water resources are relatively emphasized as the key area for improvement. Additionally, the areas to maintain include energy, indoor air quality, and environmental laws and regulations. Greenhouse gases are relatively low in importance and performance (execution). Social (S) sector variables are mostly located in the second and third quadrants of low performance. Governance (G) sector variables are mostly located in the first and second quadrant

with high importance. And there are no Governance (G) variables in the third quadrant with low importance and performance. And in the Social (S) sector, labor standards are a key improvement area. If labor standards are considered as a cost and approach only as a matter of labor standards compliance, the welfare of workers may fall through the cracks. From the analysis, it is evident that there is a need for policy implications in the real estate sector that emphasize the importance of the Environmental (E) sector and strengthen the performance (execution) in the Social (S) and Governance (G) sectors.

6. Conclusions

This study examines the perceptions of real estate managers on ESG by surveying real estate managers in the field and analyzes them empirically. Global ESG disclosure indicators such as UNPRI, GRI, and GRESB, and Indicators of domestic and international eco-certification systems such as LEED, BREEAM, and G-SEED were utilized as variables for the study. The analysis method utilized paired samples t-test and IPA (Importance-Performance) matrix. The results of the t-test analysis showed that in all ESG sectors, the on-site performance was significantly lower than the importance. The results of the IPA matrix show that the mean of both importance and performance is higher than the moderate value of 3. Analyzing the results by dividing the four quadrants by the mean values of importance and performance, the results are as follows.

First, in Environment (E), managers tend to view variables (metrics) as relatively less important. Second, in the Social (S) sectors, managers feel low performance relative to their importance. Third, in the Governance (G) sectors, real estate managers were found to perceive their performance as low.

In summary, considering the ESG awareness of real estate managers, it can be concluded that ESG awareness among real estate managers requires policies that more emphasize the importance in the environment sectors and strengthen the realistic performance (execution) of real estate management in the social and governance sectors. Based on the results of this study, managers should take a deeper look at the indicators and recommendations that can be implemented for each building they manage. A good alternative is to use a platform that integrates and manages all the data related to the building.

This study is significant in that it is the first empirical study on the ESG perceptions of real estate managers who work closely with real estate with specialized knowledge. It is not a study that simply introduces ESG concepts to real estate or applies them to a specific field, but emphasizes the importance of all areas of ESG in building management and finds implications. Strengthening the ESG awareness of managers in the building sector can be the beginning of a change that not only reduces greenhouse gas emissions but also enhances building value. Companies should approach ESG with sincerity, not as a passing fad or trend (Kang, 2023). The same level of approach is needed in real estate management.

A limitation of this study is the lack of objective data to measure performance(execution), leading to the substitution of that part with perception surveys. In the future, we expect to be able to provide more robust results and draw more reasonable conclusions when objective ESG management performance in the real estate management field is accumulated and the sample size is increased.

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