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Article

The Impact of the Environmental Management System According to ISO:14006:2020 on the Strategic Flexibility of Diyala State Company

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Abstract: This study examines the impact of the environmental management system requirements according to the international standard (ISO:14006:2020) on the strategic flexibility at Diyala State Company, chosen as a suitable research site. It seeks to answer two key questions: To what extent does the company meet the requirements of the ISO:14006:2020 standard? And, does the environmental management system, according to this standard, affect the company's strategic flexibility? Eight requirements from the standard were tested. The study utilized a descriptive-analytical approach, using a questionnaire as the primary tool, which was distributed to a sample of 50 participants. The findings revealed a gap of 22.6% in implementing the environmental management system requirements, largely due to weaknesses in applying and documenting certain elements. The higher level of application resulted from the company's reliance on a quality management system that meets the requirements of the ISO:9001:2015 standard, focusing on environmental protection plans, programs, and policies. To reduce this gap, the study identified strengths to enhance and weaknesses to address for each requirement. The study also found that the application of the environmental management system according to ISO:14006:2020 positively impacts the company's strategic flexibility. Therefore, the study recommends developing action plans to implement this system's requirements to facilitate certification acquisition, adopting continuous improvement as a working methodology, and making it an ongoing organizational practice.

Keywords: Environmental Management System, ISO:14006:2020, Strategic Flexibility, Diyala State Company

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1. Introduction

Attention to environmental issues has become a key factor in improving human quality of life. Organizations are increasingly committed to sustainable development aimed at environmental conservation, which has led to adopting environmental management systems as an integral part of their operations. These

systems facilitate processes within organizations to align with both internal and external environmental considerations, thus protecting stakeholders—both internal and external—and ensuring flexibility in responding to various changes. The global trend toward such considerations led the International Organization for Standardization to issue ISO:14006:2020, which specifies the requirements for an effective environmental management system, focusing on the eco-design of organizational procedures and products. This research explores the impact of these requirements on the strategic flexibility of Diyala State Company. Identifying the gap in meeting these standards and measuring their influence on the company's strategic flexibility offers insights into the company's commitment to its employees and environmental protection, and its strength in facing challenges. This commitment drives improvements in environmental protection practices and human resource welfare, leading to enhanced strategic flexibility that enables the organization to meet environmental challenges and adapt to local Iraqi environmental changes. To cover all aspects, the research is divided into four sections. The first section discusses the research methodology; the second examines the theoretical background of environmental management systems and strategic flexibility. The third section evaluates the research variables in the targeted field, and the research concludes with findings and recommendations.

2. Materials and Methods

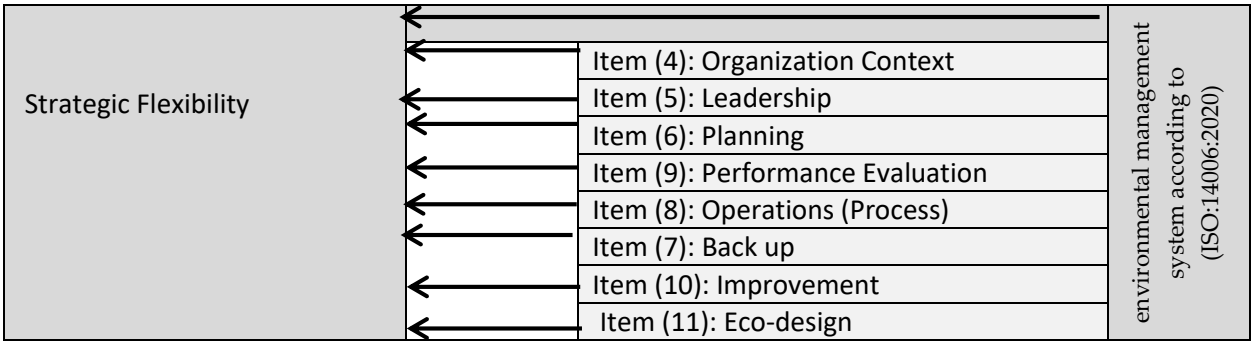
- **Research Problem**: Many Iraqi manufacturing organizations lack an activated environmental management system or, at the very least, the application of relevant international standards, particularly the eco-design guidance standard ISO:14006:2020. This study focuses on Diyala State Company, where preliminary findings revealed that this standard has not been implemented nor reviewed by relevant personnel. The company's environmental management system is incorporated into its quality management system under ISO:9001:2015 certification. Therefore, this research seeks to identify the prerequisites for implementing eco-design requirements to enhance adaptability to environmental changes and achieve a sustainable alignment between organizational procedures and products with environmental conservation goals. Based on this, the research problem is formulated in two primary questions: (1) What is the gap between the environmental management system requirements according to ISO:14006:2020 and current practices at Diyala State Company? (2) Does implementing the ISO:14006:2020 standard impact the company's strategic flexibility?
- **Research Significance**: The importance of this research lies in its focus on a highly relevant topic, particularly in the current decade where there is an increasing demand for manufacturing and service organizations to consider their environmental impact. This research is the first of its kind at Diyala State Company using the ISO:14006:2020 standard, which offers the company a pathway to meeting or obtaining this certification, thereby aligning with global standards and enhancing strategic flexibility to adapt to developments.

- **Research Objective**: The study aims to measure and identify the environmental management system requirements based on ISO:14006:2020 at Diyala State

Company, measuring the gap between current and target implementation levels. It will highlight the positive environmental impacts resulting from this system both internally and externally and measure its effect on the company's strategic flexibility while increasing environmental awareness and eco-design understanding among the stakeholders.

Research Operational Model: The model demonstrates the relationships between variables, as shown below:

Figure (1): Research Operational Model (Main and Sub Variables and Hypotheses)



Hypotheses: The research aims to test the following hypotheses:

The environmental management system according to ISO:14006:2020 requirements is not sufficiently available at Diyala State Company.

Implementing the environmental management system based on ISO:14006:2020 does not impact the strategic flexibility of Diyala State Company.

2- Field Research Procedures

Research Population and Sample: Diyala State Company was chosen as the research site due to the lack of studies investigating the relationship between current variables, especially environmental management system studies. The company's production processes and products may emit harmful environmental pollutants, affecting employees and customers alike. Therefore, the company was selected for this study due to its qualified workforce, with a sample of 50 individuals involved in quality management, environmental management, occupational health and safety management, and select company leaders.

Research Methodology: Given the detailed requirements for measuring the environmental management system, the study adopted a descriptive-analytical approach, best suited for identifying the gap between the company's actual practices and the ideal environmental management system requirements.

Data Collection and Analysis: Secondary research data were collected from available literature, while primary data were gathered through a questionnaire designed to achieve the research objectives and answer its questions, supplemented by (interviews with relevant individuals and in-depth observations). To test the hypotheses, descriptive statistical tests and impact assessments were used in the application section.

Section Two: Theoretical Framework of the Research

First: Concept of Environmental Management System:

In recent decades, considerable attention has been given to environmental standards as one of the essential requirements for improving the quality of life.

Organizations, therefore, tend to study these requirements and integrate them with functional, economic, and aesthetic standards in product design (goods or services) (Al-Dulaimi, 2022: 42). The emergence of the concept of sustainable development has greatly influenced this notion. Consequently, the ISO 14000 standard was introduced after the United Nations Conference on Environment and Development in 1992 and following a recommendation from the Environmental Advisory Group in 1993 (Al-Khafaji and Al-Taei, 2020: 265). Specifically, it was adopted in 1996 and was supported by the Earth Summit document released in 2002, which urged nations to increase their environmental commitment and rationalize resource consumption (Abdullah and Al-Khazraji, 2021: 1692). It was later revised in 2004 (Abbas, 2018: 73). Thus, the concepts of economic, social, and environmental sustainability and their dimensions have played a role in the emergence of the Environmental Management System and in defining approaches to environmental design in organizations, aiming to support sustainable development on a global scale. Furthermore, it strives to achieve what is known as the unified global system for implementing an environmental management system to improve organizations' operational and environmental performance to protect the environment and demonstrate their commitment to these standards (Abdul Karim, 2017: 37).

One of the reasons organizations integrate eco-friendly designs (ecological) into product design and development is the growing concern about environmental damage and the recognition of business opportunities related to resource efficiency. This includes understanding the product life cycle by identifying environmental requirements associated with the product, expressed as environmental impacts within the life cycle (Muhammad & Khali, 2023: 25). Zaidan and Al-Khatib (2020: 96) suggest that the Environmental Management System seeks continuous improvement, not only through organizational management and employee empowerment but also by engaging stakeholders (government and local community) to effectively implement it. Al-Anbari et al. (2016: 104) add that this management must have a high degree of autonomy and operate within the organizational structure to adapt the organization's processes to external entities, integrating the environmental requirements of the hosting environment into its operations and procedures to protect both the environment and the employees, ultimately achieving environmental efficiency.

The Environmental Management System is the result of many ideas such as green management, clean management, and sustainability. Such ideas have become integral to the organization's processes and procedures, with the organization not viewing them as external threats to be countered but as part of its social responsibility (Ibrahim, 2019: 367). Thus, the Environmental Management System has become one of the most widely implemented work systems, managing the organization's processes, procedures, policies, and programs to protect the environment in which it operates (Murmura et al., 2017: 3). All organizational processes focus on achieving a positive relationship with the environment and reducing negative impacts (Muhammad & Khali, 2022: 101). Environmental management is defined as "a continuous cycle of planning, organizing, implementing, and reviewing to improve organizational performance in meeting

its environmental commitments and requirements" (Muhammad, 2009: 166). According to Lftah (2016: 119), it is the "establishment of environmental policies and action plans to reduce the waste generated from industrial human activities, starting with raw materials, through production stages, to the final product and all aspects related to the environment." It is also defined as "the policies, treatments, procedures, commitments, and action plans that prevent all forms of environmental pollution" (Hussein and Al-Wahab, 2023: 250).

The Environmental Management System, as defined by the ISO 14001:2015 standard, is "a management system used to control environmental aspects, fulfill specified commitments, and address risks related to opportunities and threats." It is also described as "a system of functions implemented to develop the organization's strategies toward the environment and monitor its processes to achieve environmental goals and objectives" (Wong & Others, 2016: 1). Furthermore, it is defined as "the functional relationship between society and the surrounding environment, characterized by ecological unity within nature, resulting from the interaction between living organisms and the natural environment" (Muhammad & Khalil, 2023: 25). Therefore, sound environmental management or an effective Environmental Management System involves planning, organizing, directing, and controlling processes that align with development, ultimately leading to a better environment for present and future generations. The environmental design associated with this management is defined, according to the ISO 14006:2020 guidelines, as "a systematic approach that considers environmental aspects in design and development to minimize harmful environmental impacts throughout the product life cycle" (Muhammad & Khalil, 2023: 25).

Second: The International Standard ISO:14006:2020

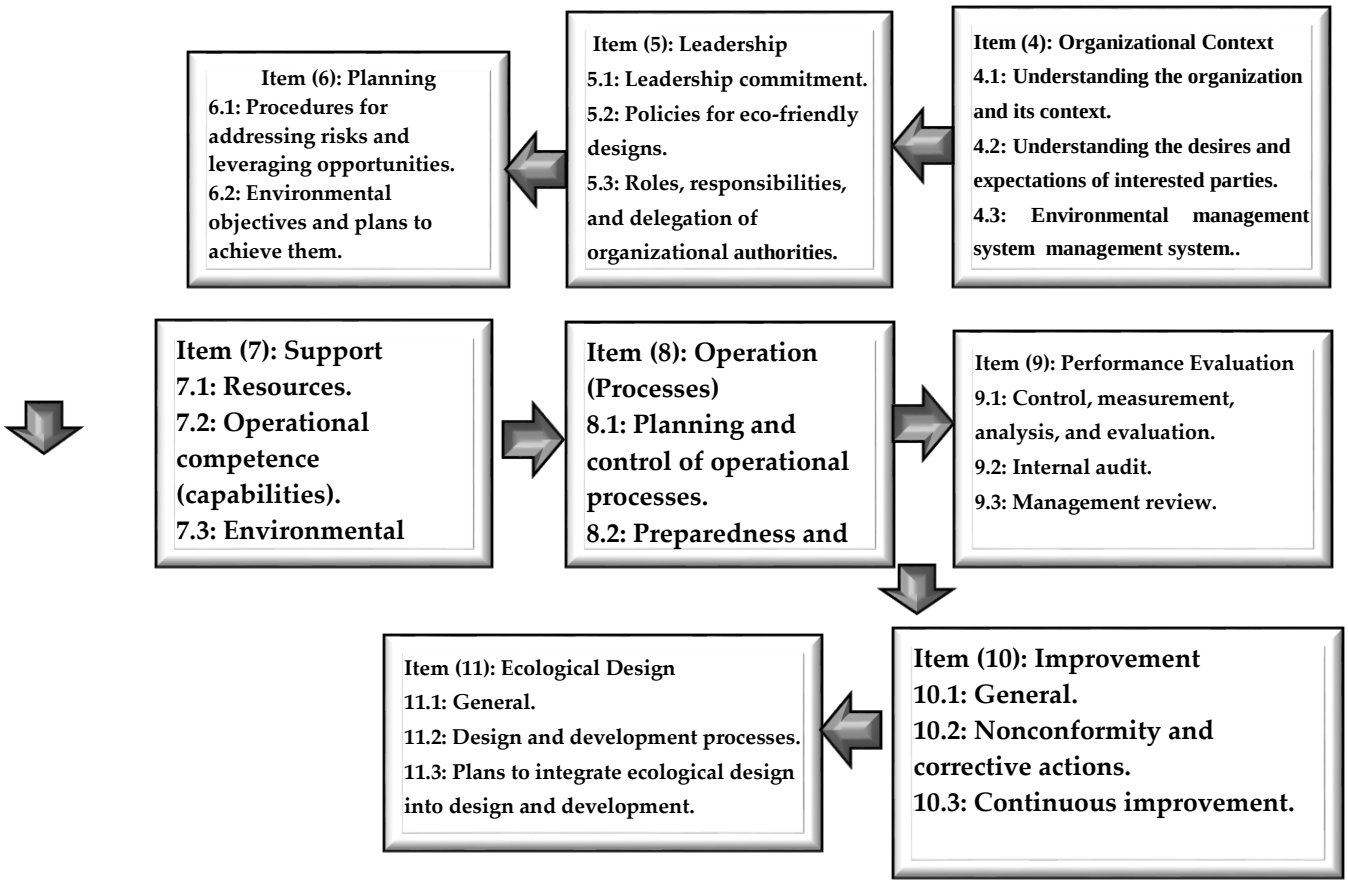
In today's world, organizations that are not environmentally friendly are viewed with high sensitivity. Consequently, most organizations have adopted green or sustainable management practices, as well as social responsibility initiatives, to enhance their image (Al-Dulaimi, 2022: 1). For an organization to be environmentally responsible, it must implement Environmental Management System (EMS) standards, primarily the ISO:14000 standard. This standard is considered an environmental system integral to the strategy of any organization (Ibrahim, 2019: 368). This family includes ten standards published on the ISO website, including ISO:14006:2020, which is the focus of our current study. Some of these standards provide general information, while others focus on specific areas, such as cost accounting, material flow in organizations, supply chain specifics, and eco-design (Rod, 2022: 237). It is worth mentioning that the guidelines of this standard are applicable to all organizations, regardless of their type, size, or products (Muhammad & Khalil, 2023: 26). This standard is primarily relevant for organizations with an EMS, whether integrated with a Quality Management System (QMS) or not. It is also useful for organizations with only a QMS and for those without any formal management system but interested in minimizing the negative environmental impacts of their products (ISO:14006:2020).

ISO:14006:2020 is an eco-design standard, meaning it addresses designing products with environmental considerations throughout their life cycle, aiming to

mitigate environmental risks that challenge organizations and turn these challenges into opportunities for improving environmental performance, reputation, and ethical commitment to environmental responsibility (Muhammad & Khalil, 2022: 99). This version is the second release of the ISO:14006 family, following the previous ISO:14006:2011, and serves as a substitute for the Spanish standard UNE:150301 (Al-Dulaimi, 2022: 51). It is part of the ISO:14000 family of environmental management systems, which aims to reduce harmful environmental impacts of innovations and inventions by adhering to environmental regulations alongside the life cycle assessment tool for product design and development, known as eco-design. According to ISO:14006:2020, the steps for developing an eco-friendly project are as follows: (1) define product functions, (2) determine key environmental criteria (e.g., stakeholder environmental demands and assessment of environmental aspects), (3) establish environmental protection strategies, (4) set environmental objectives, (5) define product specifications, and (6) develop technical solutions. These six stages encompass the eco-design processes of an organization, including the life cycle assessment of products from material acquisition to usage and end-of-life handling (Barboza, 2022: 188). ISO:14006:2020 is defined as "guidelines to assist organizations in establishing, documenting, implementing, maintaining, and improving eco-design as part of the EMS" (Al-Dulaimi, 2022: 51).

The primary goal of this standard is to reduce negative impacts associated with products. ISO:14006:2020, as noted by Arana et al. (2013: 203), aims to guide organizations interested in integrating environmental considerations into product design and development processes to control negative impacts throughout their life cycle. It also represents a field of integrated design that emphasizes natural environmental preservation and coordinates relationships with the environment. The standard aims to create an integrated system that includes a range of criteria (functional, structural, economic, and aesthetic) in addition to environmental standards (Muhammad & Khalil, 2022: 99). Overall, ISO:14006:2020 provides guidelines to help organizations improve their eco-design management and performance in terms of creation, documentation, implementation, maintenance, and integration as part of the organization's environmental management system (Al-Dulaimi, 2022: 51). The standard consists of eleven clauses, eight of which are key components that will be addressed in the research's practical section, as illustrated in the following figure:

Figure 2: Key Clauses of ISO:14006:2020 Standard



Source: Researcher, based on ISO:14006:2020 Standard clauses.

Third: Strategic Flexibility

Strategic flexibility refers to an organization's ability to identify critical changes in the external environment and swiftly redirect resources in response to these changes (Hussein et al., 2020: 83). These changes often occur amidst uncertainties, and Hussein (2016: 75) describes strategic flexibility as "the organization's adaptability through skills and activities that guide its strategic decisions." Similarly, Hassen & Salman (2022: 209) define it as "an organization's capacity to respond quickly to environmental changes, adapt to them, and gain and maintain competitive advantage in the business environment." It has also been defined as "an organization's dual and relative control over its environment" (Aliqabi, 2019: 18). This perspective has led scholars and researchers to see strategic flexibility from two views: either the organization adapts to the environment, or it proactively influences it.

In the context of this research, strategic flexibility is seen as both responsive and proactive—whether it is a forward-looking or reactive approach, offensive or defensive. Flexible organizations shape the environment by being pioneers or respond to rapid, complex changes by adapting to them (Sultan & Amin, 2021: 571). Therefore, the current study adopts the definition by Herhausen et al. (2020: 435), which describes strategic flexibility as "the organization's ability to proactively or reactively adapt to changing circumstances with a range of internal and external options."

The dimensions of strategic flexibility are diverse and vary depending on researchers' perspectives, environmental contexts, and the angle from which flexibility is viewed. There are over fifteen types, including: (1) proactive strategic

flexibility, (2) responsive strategic flexibility, (3) HR skills flexibility, (4) activity flexibility, (5) market flexibility, (6) competitive flexibility, (7) production flexibility, (8) operational flexibility, (9) materials handling flexibility, (10) machine flexibility, (11) process flexibility, (12) expansion flexibility, (13) size flexibility, (14) strategic renewal flexibility, (15) agility flexibility, (16) resource orientation flexibility, and (17) coordination flexibility. The dimensions selected in this study are aligned with environmental management system requirements, adopting a holistic, unrestricted view.

Section Three: Analysis and Discussion of Applied Data

First: Measuring Study Variables

1- Analysis of Environmental Management System Data according to ISO 14006:2020 Criteria: After collecting data from the research field through a questionnaire, we present here the method of analysis and interpretation based on the arithmetic mean, standard deviation, relative importance, and the gap between the actual and desired status. We then rank the items and dimensions according to the coefficient of variation as follows:

Item (4): Context of the Organization: This item was analyzed in the following table:

Table (1): General Description of Sample Responses for the Context of the Organization (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
2	0.23	0.77	0.193	0.745	3.85	We identify internal environmental issues that affect our ability to achieve the desired outcomes of the environmental management system	Item (4): Context of Organization
3	0.24	0.76	0.232	0.882	3.80	We identify external environmental issues that affect our ability to achieve the desired outcomes of the environmental management system	
1	0.125	0.785	0.176	0.693	3.92	The organization understands environmental conditions that may impact or be impacted by us	
Second	0.229	0.771	0.19	0.734	3.856	4.1: Understanding the Organization and Its Context	
1	0.22	0.78	0.21	0.822	3.9	We define the scope and boundaries of the environmental management system based on our capabilities	
2	0.228	0.772	0.229	0.886	3.86	We consider the environmental impact of our products when implementing the environmental management system	
Third	0.224	0.776	0.202	0.785	3.88	4.2: Understanding the Needs and Expectations of Interested Parties	
1	0.17	0.83	0.179	0.744	4.15	We implement, update, and continuously improve our environmental management system	

2	0.228	0.772	0.196	0.765	3.89	We integrate environmental management requirements into our work processes and functions	
First	0.196	0.804	0.184	0.742	4.02	4.3: Environmental Management System	
Third	0.217	0.783	0.177	0.695	3.918	Overall Average for Context of the Organization	

Results

The results of Table 1 indicate the following:

1- The Environmental Management System variable in Diyala General Company ranked first among other dimensions for the Context of the Organization, with a general arithmetic mean of 4.02 and a relatively low standard deviation, indicating consistency in responses regarding this variable. The coefficient of variation was 18.4%, with an implementation level of 80.4%, and a gap of less than 20%. This is due to the presence of an environmental management system within the company that requires continuous updating and alignment with all company procedures and processes, especially those related to environmentally friendly designs.

2- The variables Understanding the Organization and Its Context and Understanding the Needs and Expectations of Interested Parties ranked second and third, respectively, with arithmetic means of 3.856 and 3.88, coefficients of variation of 19% and 20.2%, and implementation levels of 77.1% and 77.6%, resulting in gaps of 22.9% and 22.4%. This calls for deeper focus on environmental issues related to management systems and the environmental impacts of the company's products.

3- The Context of the Organization item ranked third among the ISO 14006:2020 criteria, with an arithmetic mean of 3.918, a coefficient of variation of 17.7%, an overall implementation level of 78.3%, and a relative gap of 21.7%. This indicates the need for the company to enhance its understanding of the organization's context and the expectations of interested parties concerning the environmental management system and associated designs. It is notable that the company has an effective environmental management system.

Item (5): Leadership and Management: Analyzed in the following table:

Table (2): General Description of Sample Responses for Leadership (n = 50

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
1	0.232	0.768	0.19	0.733	3.84	Our management adopts and commits to leading the environmental management system, considering it one of its main responsibilities.	Item (5): Leadership
2	0.228	0.772	0.212	0.821	3.86	Senior management allocates appropriate resources for the planning and implementation of environmental design	
First	0.23	0.77	0.187	0.721	3.85	5.1: Leadership Commitment	

2	0.216	0.784	0.223	0.877	3.92	We improve our public reputation through environmentally friendly designs	
3	0.212	0.788	0.226	0.894	3.94	We meet public expectations related to our environmental performance and products	
1	0.224	0.776	0.188	0.731	3.88	We comply with environmental legal and social responsibility requirements	
Second	0.217	0.782	0.189	0.742	3.913	5.2: Policies for Environmentally Friendly Designs	
4	0.225	0.775	0.206	0.80	3.876	We adopt environmentally friendly design strategies when setting environmental objectives and addressing supply chain risks	
3	0.234	0.766	0.205	0.788	3.83	Our environmental policy adheres to international environmental management system standards	
1	0.248	0.752	0.203	0.764	3.76	We continuously assess the effectiveness of environmental design performance	
2	0.21	0.79	0.205	0.810	3.95	All company departments (procurement, production, quality, etc.) participate in improving environmental performance	
third	0.23	0.77	0.19	0.733	3.854	.5.3: Roles, Responsibilities, and Delegation of Authorities	
Fourth	0.226	0.774	0.179	0.694	3.872	Overall Average for Leadership	

The results of Table 2 indicate the following:

1- The Leadership Commitment variable in Diyala General Company ranked first among other dimensions for Leadership and Management, with a general arithmetic mean of 3.85, a low standard deviation of 0.721, indicating consistent responses for this variable. The coefficient of variation was 18.7%, with an implementation level of 77% and a gap of 23%. This reflects the company's adoption and commitment to the environmental management system and its allocation of appropriate resources for environmental designs, though further support is needed to reach the target level.

2- The Policies for Environmentally Friendly Designs and Roles, Responsibilities, and Delegation of Authorities variables ranked second and third, with arithmetic means of 3.913 and 3.854, coefficients of variation of 18.9% and 19%, and implementation levels of 78.2% and 77%, resulting in gaps of 21.7% and 23%. This calls for a more serious adoption of environmentally friendly design strategies and continuous assessment of the company's environmentally friendly performance.

3- The Leadership and Management item ranked fourth among the ISO 14006:2020 criteria, with an arithmetic mean of 3.872, a coefficient of variation of 17.9%, an overall implementation level of 77.4%, and a relative gap of 22.6%. This highlights the need for all company departments to engage in enhancing environmental performance and seriously commit to meeting all legal environmental requirements, as well as an ideal commitment to social responsibility toward the environment.

Clause (6): Planning

This clause was analyzed in the following table:

Table (3): General Description of Sample Responses for the Planning Clause (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
1	0.264	0.736	0.212	0.782	3.68	Identify and manage the risks and opportunities associated with eco-design	Item (6): Planning
2	0.27	0.73	0.212	0.776	3.65	Assess and prioritize all relevant environmental aspects accurately	
3	0.236	0.764	0.217	0.832	3.82	Identify, implement, and maintain effective risk/opportunity management procedures	
Second	0.256	0.743	0.188	0.702	3.716	6.1: Risk and Opportunity Management Procedures	
3	0.242	0.758	0.240	0.91	3.79	Identify environmental aspects of products and related activities	
2	0.194	0.806	0.227	0.915	4.03	Include explicit environmental goals and implementation mechanisms in our plans	
1	0.198	0.802	0.210	0.844	4.01	Relevant functions review results to confirm achievement of goals	
First	0.211	0.788	0.179	0.708	3.943	6.2: Environmental Goals and Plans for Achieving Them	
Seventh	0.234	0.766	0.18	0.692	3.83	Overall Average for Planning Item	

The results in Table (3) indicate the following:

1- The "Environmental Goals" variable in Diyala Company ranked first among the dimensions comprising the Planning clause, with an overall mean of 3.943 and a relatively low standard deviation of 0.708, showing consistency in responses. The coefficient of variation was 17.9%, with an implementation rate of 78.8%, resulting in a gap of 21.1%. This is attributed to the company's management identifying environmental aspects of its products and activities and reviewing results to ensure goal achievement.

2- The "Risk and Opportunity Management Procedures" variable ranked second, with a mean of 3.716 and a coefficient of variation of 18.8%, an implementation rate of 74.3%, and a gap of 25.6%. This calls for an in-depth identification of risks and opportunities related to eco-design and prioritizing them accurately.

3- The Planning clause ranked seventh among the ISO 14006:2020 clauses, with a mean of 3.83, a coefficient of variation of 18%, an overall implementation rate of 76.6%, and a gap of 23.4%, highlighting the need for the company to evaluate and prioritize environmental aspects accurately and ensure effective implementation and maintenance.

Item (7): Support

This item was analyzed in the following table:

Table (4): General Description of Sample Responses for the Support Clause (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
1	0.204	0.796	0.191	0.762	3.98	Identify, maintain, improve, and develop required resources (human, financial, technological) for the Environmental Management System	Item (7): Support
3	0.276	0.724	0.219	0.796	3.62	Identify necessary resources for eco-friendly design within development processes	
2	0.23	0.77	0.208	0.802	3.85	Have adequate infrastructure and information systems for eco-design	
Fourth	0.236	0.763	0.186	0.712	3.816	7.1: Resources	
2	0.242	0.758	0.203	0.77	3.79	Attract qualified personnel with expertise, education, and skills in Environmental Management	
1	0.204	0.796	0.176	0.701	3.98	Environmental Management officials can easily communicate environmental importance	
Second	0.223	0.777	0.178	0.695	3.885	7.2: Work Efficiency (Capabilities)	
1	0.158	0.842	0.155	0.655	4.21	Promote awareness of Environmental Management System benefits	
2	0.215	0.784	0.183	0.719	3.922	Environmental Management staff are sufficiently knowledgeable about eco-design impacts over a product's lifecycle	
First	0.186	0.813	0.168	0.684	4.066	7.3: Environmental Awareness	
3	0.202	0.798	0.203	0.81	3.99	Have effective, advanced internal and external communications related to Environmental Management	
2	0.274	0.726	0.196	0.715	3.63	Inform external parties (suppliers, customers, governmental bodies, etc.) of our actions to improve environmental performance	
1	0.178	0.822	0.181	0.744	4.11	Focus on conveying environmental performance information across all company departments and levels	
Third	0.218	0.782	0.181	0.708	3.91	7.4: Stakeholder Communication	
First	0.216	0.784	0.173	0.681	3.92	Overall Average for Support Item	

The results in Table (4) show that:

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
2	0.244	0.756	0.211	0.799	3.78	We establish processes that meet environmental management system requirements, monitor, and maintain them	Item (8): Operations
3	0.289	0.710	0.235	0.836	3.554	We focus on integrating eco-design into our design and development processes	
1	0.206	0.794	0.194	0.772	3.97	We keep documented information (standards) to ensure processes are carried out as planned	
Second	0.248	0.751	0.210	0.792	3.756	8.1: Operational Planning and Control	
3	0.241	0.758	0.228	0.865	3.791	Managing opportunities and risks is a key part of our design and development processes	
2	0.231	0.768	0.212	0.815	3.844	We adopt environmental health and safety standards when planning, executing, and reviewing processes	
1	0.197	0.802	0.195	0.784	4.011	We keep documented information (standards) to ensure emergency response processes are carried out as planned	
First	0.223	0.776	0.182	0.708	3.882	8.2: Emergency Preparedness and Response	
Fifth	0.236	0.764	0.18	0.688	3.82	Overall Average for Operation Item (Processes)	

1- The "Environmental Awareness" and "Work Efficiency" variables in Diyala Company ranked first and second, with means of 4.066 and 3.885, and coefficients of variation of 16.8% and 17.8%, with implementation rates of 81.3% and 77.7%, respectively. The gaps were 18.6% and 22.3%, indicating effective communication systems for productive engagement with internal and external stakeholders.

2- The "Stakeholder Communication" and "Resources" variables ranked third and fourth, with means of 3.91 and 3.816, and coefficients of variation of 18.1% and 18.6%, implementation rates of 78.2% and 76.3%, and gaps of 21.8% and 23.6%. This calls for identifying essential resources for eco-friendly design within development processes and serious communication with external parties.

3- The Support item ranked first among the ISO 14006:2020 clauses, with a mean of 3.92, a coefficient of variation of 17.3%, an overall implementation rate of 78.4%, and a gap of 21.6%, calling on the company to continue promoting environmental management benefits and communicating them to external stakeholders.

Item (8): Operations

This item was analyzed in the following table:

Table (5): General Description of Sample Responses to the Operation Clause (Processes) (n = 50)

The results in Table 5 indicate the following:

1- The variable "Emergency Preparedness and Response" in the company ranked first among the dimensions forming the "Operation" item, achieving an overall arithmetic mean of 3.882 with a standard deviation of 0.708, showing

consistency in responses regarding this variable. It had a coefficient of variation of 18.2%, an implementation rate of 77.6%, and a gap of 22.3%. This is attributed to the

2- company's environmental system maintaining the required documentation for emergency response operations and executing them as planned.

2- The variable "Planning and Control of Operational Processes" ranked second, with an arithmetic mean of 3.756 and a coefficient of variation of 21%. Its implementation rate was 75.1%, resulting in a gap of 24.8%. This highlights the need for designing processes that meet the requirements of the Environmental Management System, with a focus on integrating environmentally supportive design into these processes.

3- The "Operation" item ranked fifth among the items in the specification (ISO:14006:2020), with an arithmetic mean of 3.82, a coefficient of variation of 18%, an overall implementation level of 76.6%, and a relative gap of 23.6%. This underscores the need for the company to support all activities and processes related to creating environmentally supportive designs and sustaining them.

Item 9: Performance Evaluation: This item is analyzed in the following table.

Table (6): General Description of Sample Responses to the Performance Evaluation Clause (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
1	0.244	0.755	0.216	0.816	3.776	We monitor, measure, analyze, and evaluate our environmental performance regularly	Item 9: Performance Evaluation
2	0.266	0.734	0.218	0.802	3.67	Our environmental performance monitoring and measurement include eco-design goals	
Third	0.255	0.744	0.207	0.772	3.723	9.1: Control, Measurement, Analysis, and Evaluation	
2	0.224	0.776	0.2	0.776	3.88	We conduct periodic internal audits to evaluate our performance and compliance commitments	
1	0.218	0.782	0.193	0.756	3.91	We retain documented information as evidence of internal audit programs and their outcomes	
First	0.221	0.779	0.188	0.733	3.895	9.2: Internal Audit	
1	0.224	0.775	0.210	0.815	3.877	Senior management reviews the environmental management system regularly to ensure its sustainability and effectiveness	
2	0.259	0.740	0.211	0.784	3.702	Senior management reviews opportunities to improve eco-design performance within the context of the environmental management system	
Second	0.242	0.757	0.198	0.754	3.789	9.3: Management Review	
sixth	0.239	0.761	0.18	0.685	3.802	Overall Average for Performance Evaluation Item	

The results in Table 6 indicate the following:

1- The variable "Internal Audit" in Diyala General Company ranked first among the other dimensions forming the "Performance Evaluation" item, achieving an overall arithmetic mean of 3.895 with a standard deviation of 0.733, indicating consistency in responses regarding this variable. It had a coefficient of variation of 18.8% and an implementation rate of 77.9%, resulting in a gap of 22.1%. This is attributed to the company maintaining documented information related to internal audit programs.

2- The variables "Management Review" and "Control, Measurement, and Analysis Operations" ranked second and third, respectively, with arithmetic means of 3.789 and 3.723, and coefficients of variation of 19.8% and 20.7%. Their implementation rates were 75.7% and 74.4%, respectively, which are acceptable levels, resulting in gap levels of 24.2% and 25.5%. This highlights the need to emphasize environmental design objectives and include them in the company's performance measurement.

3- The "Performance Evaluation" item ranked sixth among the items in the specification (ISO:14006:2020), with an arithmetic mean of 3.802, a coefficient of variation of 18%, an overall implementation level of 76.1%, and a relative gap of 23.9%. This underscores the need for further monitoring, measuring, analyzing, and evaluating environmental performance periodically, as well as management review of opportunities to improve environmentally supportive designs within the context of the Environmental Management System.

Item (10): Improvement

This item was analyzed in the following table:

Table (7): General Description of Sample Responses on the Improvement Item (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
1	0.220	0.779	0.214	0.834	3.896	We identify opportunities to improve the environmental management system in our company	Item (10): Improvement
2	0.254	0.746	0.215	0.802	3.73	We implement necessary actions to achieve desired outcomes from environmentally friendly design	
Third	0.237	0.762	0.205	0.782	3.813	10.1: General	
2	0.204	0.796	0.207	0.826	3.98	We respond to non-compliance, assess it, and take corrective actions to address it	
1	0.198	0.802	0.198	0.796	4.01	We take corrective or preventive actions when redesigning our processes, activities, and products	
First	0.201	0.799	0.188	0.753	3.995	10.2: Non-compliance and Corrective Actions	
1	0.184	0.815	0.201	0.822	4.077	We adopt continuous improvement actions in our activities and work to achieve the environmental management system's objectives	
2	0.219	0.780	0.206	0.804	3.902	We consider environmental management system requirements in our design and development processes	

Second	0.202	0.797	0.196	0.784	3.989	10.3: Continuous Improvement	
Second	0.213	0.786	0.177	0.696	3.932	Average for the Improvement Item	

Table (7) Results Indicated that:

1- The "Non-compliance and Corrective Actions" variable in Diyala General Company ranked first among other dimensions forming the Improvement item, with an overall mean of (3.995) and a standard deviation of (0.753), indicating consistency in responses for this variable, with a coefficient of variation at (18.8%), an application level of (79.9%), and a gap of (20.1%). This is attributed to the company's practice of evaluating non-compliance cases and taking corrective actions to address them, considering these in redesigning processes and products.

2- The "Continuous Improvement" and "General Improvement" variables ranked second and third, respectively, with means of (3.989 and 3.813), coefficient variations of (19.6% and 20.5%), and application levels of (79.7% and 76.2%)—decent ratios. Thus, the gap levels for each were (20.2% and 23.7%), suggesting the need for continuous improvement measures in the company's environmental management-related activities, alongside implementing environmentally friendly design actions.

3- The Improvement item ranked second among ISO:14006:2020 standards, with a mean of (3.932), a coefficient of variation at (17.7%), an overall application level of (78.6%), and a relative gap of (21.3%), calling for more focus on environmental management requirements in the company's design and development processes.

Item (11): Ecological (Environmentally Friendly) Design Activities

This item was analyzed in the following table:

Table (8): General Description of Sample Responses on Ecological Design Activities (Environmentally Friendly) Item (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Main and Sub-Criteria of ISO 14006:2020	
1	0.222	0.777	0.205	0.8	3.888	Environmental management system managers understand environmentally friendly design and development processes well	Item (11): Ecological (Environmentally Friendly) Design Activities
2	0.220	0.779	0.214	0.834	3.896	We identify training and educational needs for those involved in environmentally friendly design and development procedures	
3	0.254	0.746	0.215	0.8021	3.73	We identify product specifications and preferences and translate them into product functions	
Second	0.232	0.767	0.203	0.782	3.838	11.1: General	
2	0.264	0.736	0.210	0.776	3.68	We identify necessary specifications for those involved and incorporate them into our product specifications	
1	0.199	0.8002	0.208	0.836	4.001	Our processes, procedures, and products	

						follow environmentally friendly designs	
First	0.231	0.768	0.196	0.753	3.840	11.2: Design and Development Processes	
2	0.197	0.802	0.2004	0.804	4.011	We understand the environmental aspects that should be considered in design and development	
1	0.198	0.801	0.2001	0.802	4.007	We accurately identify resource needs when developing environmentally friendly design plans	
3	0.279	0.7204	0.234	0.844	3.602	We continuously review and improve our environmental design and development plans	
Third	0.225	0.774	0.206	0.798	3.873	11.3: Integrating Ecological Design into Design and Development Plans	
Eighth	0.23	0.77	0.187	0.722	3.85	Average for Ecological Design Activities Item	

Table (8) Results Indicated:

1- The "Design and Development Processes" variable in Diyala General Company ranked first among other dimensions forming the Ecological Design Activities (Environmentally Friendly) item, with an overall mean of (3.84), a standard deviation of (0.753), showing consistency in responses, a coefficient of variation of (19.6%), an application level of (76.8%), and a gap of (23.1%). This result indicates the company's efforts to ensure environmentally friendly designs in its processes and products.

2- The "General Design" and "Integrating Ecological Design Plans" variables ranked second and third, with means of (3.838 and 3.873), coefficient variations of (20.3% and 20.6%), and application levels of (76.7% and 77.4%). The gap levels for each were (23.2% and 22.5%), reflecting the company's continuous review of design and development plans to align with environmental performance goals but indicating a need for further improvements.

3- The Ecological Design Activities (Environmentally Friendly) item ranked eighth among ISO:14006:2020 standards, with a mean of (3.85), a coefficient of variation at (18.7%), an overall application level of (77%), and a relative gap of (23%), indicating a need for increased attention to product specifications and translating them into product functionalities.

Discussion

2- Analysis of Strategic Flexibility Variable Data

In this section, we examine the interpretation of the strategic flexibility variable results based on the mean, standard deviation, coefficient of variation, relative significance, realized gap size, and the ordering of items, as follows:

Table (10): General Description of Sample Responses on Strategic Flexibility Variable (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Strategic Flexibility Variable	
5	0.247	0.753	0.197	0.744	3.765	We act as a leading company for change in our field	Strategic Flexibility
11	0.260	0.739	0.206	0.765	3.698	Our strategies are innovative to address the environment and its threats	
6	0.223	0.776	0.199	0.775	3.882	We diversify our options to expand in various markets and face competitors' threats	
3	0.243	0.756	0.195	0.738	3.781	We adopt new technologies with global standards for company operations	
9	0.245	0.754	0.204	0.771	3.772	Our company encourages the development of flexible manufacturing systems to enhance our business and products	
13	0.244	0.755	0.208	0.788	3.777	Our plans address recession to tackle unexpected events	
14	0.245	0.755	0.209	0.791	3.775	We consider emergencies when devising our overall strategies	
16	0.262	0.737	0.217	0.801	3.688	We invest in opportunities that arise from our plans to address environmental changes	
12	0.215	0.784	0.207	0.812	3.922	We strive to offer products that compete with those available in the market	
10	0.224	0.775	0.205	0.798	3.877	We accurately diagnose environmental changes in our competitive markets and plan to address them	
8	0.231	0.768	0.202	0.777	3.843	We identify diverse customer needs and strive to meet them	
4	0.269	0.730	0.197	0.722	3.654	We adjust our production processes and capacities to meet market demand for our products	
17	0.275	0.724	0.222	0.805	3.621	We modify product features to meet customer requirements	
15	0.249	0.751	0.216	0.812	3.755	We have the capability to create various supply chains specific to us	
1	0.201	0.798	0.181	0.723	3.994	Our organizational structure clearly and flexibly defines responsibilities, authorities, and communications across different levels	
2	0.197	0.802	0.182	0.734	4.011	There is high cooperation and coordination among all company departments in resources and information	
7	0.213	0.786	0.199	0.786	3.932	The company can allocate its financial, human, and material resources to address external environmental changes	
Second	0.238	0.761	0.177	0.677	3.808	Overall Mean for Strategic Flexibility Variable	

Table 10 shows that:

1- Items 15 and 16 ranked first and second, with means of 3.994 and 4.011, standard deviations of 0.723 and 0.734, coefficients of variation of 18.1% and 18.2%, application rates of 79.8% and 80.2%, and gaps of 20.1% and 19.7%, respectively.

These indicate a flexible, clear organizational structure with defined roles, as well as high cooperation among departments.

2- Items 13, 8, and 14 ranked last, with mean scores between 3.621 and 3.757, coefficients of variation of 21.6%, 21.7%, and 22.2%, application rates of 75.1%, 73.7%, and 72.4%, and gaps of 24.9%, 26.2%, and 27.5%, respectively. These suggest the need to enhance flexibility in supply chains, environmental adaptability, and customer-centered product modifications.

3- The overall strategic flexibility variable achieved a mean of 3.808, with a coefficient of variation of 17.7%, an application rate of 76.1%, and a relative gap of 23.8%, highlighting the need to focus on enhancing strategic flexibility further.

2. Hypothesis Testing

Hypothesis 1: This hypothesis posits that "An environmental management system, per ISO:14006:2020 standards, is not sufficiently implemented at Diyala Company." Results show that the overall average requirement for ISO:14006:2020 achieved a mean of 3.868, standard deviation of 0.682, coefficient of variation of 0.176, application rate of 0.774, and gap size of 0.226, which indicates satisfactory standard compliance. Thus, we reject the null hypothesis and accept the alternative hypothesis that the environmental management system per ISO:14006:2020 standards is adequately implemented.

Table (11): general description of the answers about ISO:14006:2020 (n = 50)

Rank	Gap Size	Relative Importance	Coefficient of Variation	Standard Deviation	Arithmetic Mean	Key Elements of ISO:14006:2020	
3	0.217	0.783	0.177	0.695	3.918	Organizational Context	1
4	0.226	0.774	0.179	0.694	3.872	Leadership	2
7	0.234	0.766	0.18	0.692	3.830	Planning	3
1	0.216	0.784	0.173	0.681	3.920	Support	4
5	0.236	0.764	0.18	0.688	3.820	Operations	5
6	0.239	0.761	0.18	0.685	3.802	Performance Evaluation	6
2	0.213	0.786	0.177	0.696	3.932	Improvement	7
8	0.230	0.770	0.187	0.722	3.850	Ecological Design Activities	8
First	0.226	0.773	0.176	0.682	3.868	Overall Average for ISO:14006:2020	

Hypothesis 2: (There is no effect of the environmental management system, according to ISO:14006:2020 standards, on Diyala Company's strategic flexibility).

We can analyze the overall influence of the environmental management system's standards as per ISO:14006:2020 on strategic flexibility, as illustrated in the table below:

Table (12): Impact of Environmental Management System Based on ISO 14006:2020 Standards on Strategic Flexibility

Response	R2	Direction	Sig.	S.E.	C.R.	βS	β	α	Explanatory
Strategic Flexibility	.327	←--	.000	.044	8.147	.554	.564	1.589	Environmental Management
Response	R2	Direction	P.	S.E.	C.R.	βS	β	α	Dimensions

Strategic Flexibility	.397	←--	.016	.031	3.237	.343	.344	1.834	Organizational Context
		←--	.022	.051	2.991	.303	.316		Leadership
		←--	.031	.048	3.436	.386	.388		Planning
		←--	.005	.038	3.790	.260	.263		Support
		←--	.000	.046	4.077	.281	.288		Operation
		←--	.028	.043	4.998	.302	.304		Performance
		←--	.005	.040	4.004	.251	.254		Improvement
		←--	.004	.042	3.030	.221	.222		Eco-Design

Table (12) illustrates the significance of the Environmental Management System (EMS) per ISO 14006:2020 standards as an explanatory variable influencing the strategic flexibility of Diyala Company. The findings suggest that the total impact value of EMS on strategic flexibility is $\beta = 0.564$, indicating a strong effect, with a relatively low standard error (S.E. = 0.044) and a critical ratio (C.R. = 8.147) at a significance level of (Sig = .000). This means that a one-unit standard deviation increase in the requirements of EMS in line with ISO 14006:2020 would lead to a 56.4% increase in the company's strategic flexibility. The constant value ($\alpha = 1.589$) indicates the presence of strategic flexibility even without EMS requirements.

The impact of ISO 14006:2020 standards' sub-variables on Diyala Company's strategic flexibility is also significant, with all p-values less than 0.05 and critical ratios above the acceptance threshold (C.R. > 1.96), indicating the model's robustness. The impact values ranged between $\beta = 0.222$ and $\beta = 0.388$, representing moderate to strong influence. These results confirm the hypothesis and suggest the following linear regression equation for strategic flexibility:

Strategic Flexibility = 1.589 + 0.564 (Environmental Management System)

As indicated by the results in (Table 12), the international standard (ISO:14006:2020) clauses have a significant effect as sub-explanatory variables on the strategic flexibility of Diyala General Company. This is evidenced by all significance levels being ((Sig < 0.5) and the critical ratio being greater than the defined acceptance criterion of (C.R. > 1.96), which suggests the stability of the estimated model, indicating the significance of the effect. The effect values ranged from ($\beta = 0.222$) to ($\beta = 0.388$), indicating a moderate to strong effect, with all standard errors being less than (S.E = 0.05). This means that an increase of one standard deviation in any variable (clause) of the standard will lead to an increase in the company's strategic flexibility by one standard deviation unit. The constant value of ($\alpha = 1.834$) indicates that there is strategic flexibility at this level in the company even in the absence of any clause from the international standard (ISO:14006:2020), and its presence will inevitably increase its value.

Based on the results of the causal relationship between the explanatory and response variables, we accept the second main hypothesis. The estimated impact relationship and the calculated statistical indicators for the significant clauses of the international standard (ISO:14006:2020) in the strategic flexibility of Diyala Company can be represented in a multiple linear regression equation, representing the estimation equation for this hypothesis, as follows:

Strategic Flexibility = 1.834 + 0.344 (Organizational Context) + 0.316 (Leadership) + 0.388 (Planning) + 0.263 (Support and Endorsement) + 0.288 (Operations) + 0.304 (Performance Evaluation) + 0.254 (Improvement) + 0.222 (Ecological Design)

Chapter Four: Final Framework of the Study

1. Conclusions

1- The findings indicate that Diyala General Company has an infrastructure prepared for implementing the (ISO:14006:2020) standard and engages seriously with both internal and external stakeholders, as shown by the overall application level of the standard's elements, which was good. However, it still requires further activation and updating.

2- The departments of Quality and Occupational Safety, along with their support for the company's Environmental Management System and adherence to environmental regulations, have enabled the company to achieve a high level of compliance with the (ISO:14006:2020) standard, minimizing the gap as much as possible. This compliance also helped the company earn the global Quality Standard (ISO:9001:2015).

3- The field results indicated that the seventh element, "Support and Endorsement," ranked first, suggesting that the company's management has full awareness of environmental protection and preservation.

4- The results show that the company operates with high efficiency and effectiveness, supported by its strong communication systems with relevant internal and external stakeholders, particularly regarding its environmental performance.

5- Despite achieving a good level of application and having quality specialists, the findings indicate that the company still needs more specialists in Environmental Management in general and in ecological design in particular.

6- Implementing the elements of (ISO:14006:2020) has increased the company's strategic flexibility and its ability to respond to unexpected environmental changes.

7- The relative importance of the standard's elements varied within the company due to its focus on certain aspects of the Environmental Management System while showing weakness or negligence in others.

2. Recommendations

1- Enhance the requirements of the Environmental Management System according to the (ISO:14006:2020) standard to achieve the company's strategic flexibility and contribute to sustainable performance, especially in ecological design.

2- Strengthen the company's strategic flexibility to better prepare for threats, environmental changes, and competitive shifts over the long term, especially regarding environmental transformations.

3- Ensure the effective application of the Environmental Management System for ecological designs by aligning the efforts of all company departments with the Occupational Safety Department, Environmental Management Division, and Quality Management Division. This will help achieve an acceptable level of environmental impact control and improve the company's environmental performance.

4- Follow up on ecological design plans and activities to align with global trends in maintaining a sustainable environment.

5- The company must adopt a continuous improvement approach in all procedures, particularly in ecological design practices, and upgrade them according to the latest standards, establishing this approach as an operational method and context for the company.

6- Form committees of Environmental Management specialists to monitor the company's technical and administrative procedures, conduct internal audits, accurately identify internal and external environmental issues, and communicate with and monitor the concerned environmental parties for improvement and documentation.

7- Increase awareness of the importance of the Environmental Management System and, in particular, ecological designs by organizing training courses, scientific seminars, or workshops, and ensuring these are documented

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