

The effect of adopting green management in the application of ecodesign requirements according ISO 14006:2020 An analytical study of the opinions of a sample of managers in the Department of Engineering Reconstruction- one of the formations of the ministry of construction, housing and public municipalities

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Abstract:

The study aims to test the relationship and impact between green management and eco-design requirements in accordance with the guiding specification ISO 14006:2020.

The problem of the study was the presence of a weakness in the environmental awareness of employees in the Department of Engineering Reconstruction, one of the information of the Ministry of Construction, housing, municipalities and Public works, which negatively affects the achievement of the requirements of ecological design.

the study relied on the descriptive analytical approach in polling. use sample members, and questionnaire to analyze the responses of a sample of the 43 managers working in the Engineering Reconstruction Department. After evaluating and testing the validity and reliability of the study's measurement tools, the data was analyzed and hypotheses tested using appropriate statistical tools.

The results showed that the research department showed an interest in applying the requirements of ecological design in accordance with the guiding specification ISO 14006:2020 and improving its general level by adopting green management., as well as employing the green supply chain to improve (support, operation, performance evaluation, improvement, eco-design activities).

The department under study succeeded in adopting green productivity and green supply chain in improving planning and raising the level of leadership, while adopting the green strategy to improve the context of the organization.

Keywords: Eco-Design, Green Management, ISO14006: 2020.

1. Introduction:

At its core, green management is about recognizing how work practices or production methods affect the environment and working to make changes that reduce this impact and make business more sustainable. This often includes measures to reduce raw materials, water, energy used, and reduce waste.

As for eco-design, it is an approach to designing products and services, taking into consideration the environmental impacts during the life cycle of the product. From the criteria (functional, structural, economic, and aesthetic) as well as environmental criteria [1].

Accordingly, the study dealt with the green management variable as an independent variable with its dimensions (green human resources, green marketing, green productivity, green supply chain, green strategy, and ecological design according to the guiding specification ISO14006:2020), a dependent variable with its dimensions (organization context, leadership, planning, support, operation, performance evaluation, eco-design activities in design and development). the main study problem was determined by the presence of a weakness in the environmental awareness of employees, which



negatively affects the achievement of eco-design requirements according to the guiding specification (ISO14006:2020).

In the Department of Engineering Construction, One of the formations of the Ministry of Construction, Housing, Municipalities and Public Works (the field of study) represented by its central departments and a sample of directors amounted to (43) directors. The questionnaire was used as a main tool for the study, as well as personal interviews and field visits. Ready-made statistical software (SPSS V.28) to analyze answers.

Recently, researchers have pointed the necessity of adopting green management. In his study, Al-Jabari (2018) [2] referred to " Green management in the hospital sector: Case Study in Augusta Victoria Hospital / Jerusalem", which he conducted at Al-Mutala' Hospital in Jerusalem for a sample of 400 workers, The most prominent results were that there is a direct link between the application of green management and the hospital sector, and that the quality of services is significantly positively affected by the application of green management systems in the hospital, and this is proven by the hospital obtaining various international quality certificates whose systems are largely related to green environmental management.

As for Shaarawy, (2020) [3] he presented a study entitled "Green management and its relationship to achieving competitive advantage among banks operating in the central and southern West Bank," which was conducted in the 14 banks operating in the central and southern West Bank, The most prominent results were the existence of a positive and direct correlation between green management and its dimensions (green human resources, green productivity, green strategy, and environmentally friendly practices) and achieving competitive advantage. The following table indicates the symbols and their descriptions used in the study.

Х	Arithmetic mean
SD	Standard deviation
LSD	Least Significant Difference
EMS	Environmental Management System
QMS	Quality Management System
А	The value of the dependent variable when the value of the independent variable
is (0) or n	ot significant
В	The effect of the independent variable on the dependent variable (marginal
slope)	
R 2	coefficient of determination or interpretation
AR 2	Modified determination factor
F	scheduled value
Т	scheduled value
Р	scheduled value

Table (1) Symbols and its descriptions

Source: Prepared by the researcher

2. Research methodology and some previous studies

2.1 Research methodology

2.1.1Search Problem

Given the importance of green management and the interest of most of the organizations of developed countries in it, and the importance of eco-design in reducing the environmental impacts of products, and due to the scarcity of the number of Iraqi organizations that adhere to it, it became necessary to conduct this study, As the researcher carried out an analytical study It was found that there is a weakness in the environmental awareness of employees in the Department of Engineering Reconstruction, one of the formations of the Ministry of Construction, Housing, Municipalities and ISSN: 2618-0278 Vol. 5No. 14 June 2023



Public Works (the field of study), which negatively affects the achievement of the requirements of Specification ISO14006:2020. Hence, the main problem of the study is embodied in the following main question:Does the adoption of green management affect the Application requirements Specification ISO 14006:2020?

From this main question, the following sub-questions emerge: Are the dimensions of green management available in the Engineering Reconstruction Department? And what is its level?, What is the reality of adopting ecological design according to the requirements of the guiding specification?, (ISO 14006:2020) in the Department of Engineering Construction?, Is there a correlation between green management and ecological design according to the guiding specification (ISO 14006:2020) in the Department of Engineering Reconstruction?, Is there an impact of green management on ecological design according to the requirements of the guiding specification (ISO 14006:2020) in the Department of Engineering Reconstruction?, Is there an impact of green management on ecological design according to the requirements of the guiding specification (ISO 14006:2020) in the Department of Engineering Reconstruction?

The objectives of the study are derived from the questions highlighted by the study problem and are determined as follows: Determining the degree of availability of the dimensions of green management in the Engineering Reconstruction Department, Diagnosing the level of application of the engineering reconstruction department of ecological design according to the requirements of the guiding specification (ISO 14006: 2020), Determining the correlation relationship between green management and eco-design according to the requirements of the guiding specification (ISO 14006:2020), Determining the dimensions of green management in ecological design according to the requirements of the guiding specification (ISO 14006:2020), Determining the dimensions of green management in ecological design according to the requirements of the guiding specification (ISO 14006:2020), Determining the dimensions of green management in ecological design according to the requirements of the guiding specification (ISO 14006:2020), Determining the dimensions of green management in ecological design according to the requirements of the guiding specification (ISO 14006:2020), Determining the dimensions of green management in ecological design according to the requirements of the guiding specification (ISO 14006:2020)

The importance of the study is as follows: Presenting a conceptual framework that clarifies the two variables of green management and eco-design in accordance with the requirements of the guiding specification (ISO 14006:2020), as these concepts are recent and unclear to Iraqi organizations in general and the organization under a study in particular, Awareness and guidance of the senior management in the Department of Engineering Reconstruction of the importance of green management and the need to adopt it and how to work with it, develop and maintain it, Informing management and eco-design and the benefits it will achieve for them, Assisting the Engineering Reconstruction Department of the guiding green management in applying the requirements of the guiding specification ISO 14006:2020 to obtain a competitive advantage in the local market.

The study took a period of time that extended from $2/3\ 2022$ to 4/25/2022. During this period, sources and data were collected for the preparation of the study, in addition to conducting field coexistence and conducting personal interviews at the research site for the purpose of obtaining data from some experts and specialists in the field of study.

For the purpose of analyzing the data contained in the questionnaire, the Statistical Package for the Social Sciences (SPSS V.28) program was used to perform a simple regression method analysis, for the purposes of data analysis, and to find the equation of the trend line method, and for the purposes of analyzing the statistical data of the study variables, and testing its hypotheses. The following criteria and tests will be approved:Normal distribution test for the study variables to verify that the data are distributed normally using the Skewness-Kurtosis scales, Content Validity Test using the questionnaire sent to the refereed experts, Reliability test In order to ensure the stability of the internal consistency of the answers of the sample members in terms of the paragraphs of the questionnaire, using the scale (Cronbach's Alpha), Frequency distribution, and percentages It is about displaying data in order to describe the answers of the study sample members, and it was used through frequency tables, Arithmetic mean (X) It is used to determine the level of answering the paragraphs, and to know the level of the sub-axes, or the average of that group, Standard deviation (SD) It is used to measure the degree of dispersion of the answers value from the arithmetic mean, as the lower its value, the higher the degree of concentration of the answers from the arithmetic mean, Coefficient of variation It is used to find out the relative level of dispersion of the answers from the arithmetic mean, and to determine the importance of the study variables, (Spearman) (Coefficient of Correlation) It shows the strength of the relationship between the study variables at the level of dimensions as a whole,



Coefficient of Determination which characterizes the variance between variables, Test (T) used to determine the level of morale for the parameters, Test (F) used to determine the significance of the model, Simple regression coefficient (β) It is used to measure the effect of an independent variable on the dependent variable,

Factor analysis to diagnose the most important paragraphs affecting the ecological design according to the specification (ISO14006:2020), (LSD, Least Significant Difference) test It is used to determine the differences between the mean of two independent samples.

3. The theoretical Part

Preamble

Environment Peripheral Neighborhood Commerce, Animal Welfare, Equity, Sustainability, In Business, Boolean, Boolean, Commercial District, Commercial District, Boolean When Zone Green Products or Derived Products, Problem May be Green Process [4].

Green management is a paradigm that includes improved environmental awareness, use of energy resources, environmentally friendly technologies, waste reuse, and recycling activities from organizations' own production activities to packaging and delivery to consumers. Green management is oriented towards the environment, so green management is simply a new way of thinking associated with gaining more awareness of how an organization operates and how its actions affect the environment [5].

This is what ecological design aims at, as it is an approach to designing a product with environmental impacts throughout its entire life cycle, or a concept that takes into account the environmental impact of resources, materials and end-of-life scenarios in front of the design project and reduces the environmental impact of the product, i.e. the product is designed taking into account environmental conditions.

3.1 Benefits of applying green management

There are many benefits that accrue to organizations as a result of carrying out appropriate activities for green management, including [3], [5] as follows:

1. Trust in the eyes of customers and achieve a good reputation for the organization, as the environmental commitment of the organization helps to win social support, gain new customers, consolidate the relationship with existing customers and possess a competitive advantage.

2. Cost reduction by saving energy produced using solar panels and recycling by making waste more useful.

3. Paying attention to the health and safety of employees and increasing business performance through environmental regulations and environmental innovations.

3.2 Dimensions of Green Management

Green management has many dimensions, as indicated by [6] as follows:

1. Green Human Resources: they are the activities involved in the development, implementation and continuous maintenance of a system that aims to make the organization and its employees friendly to the environment and coordination with the external environment to achieve sustainable development goals for the society in which the organization is located [7].



- 2. Green Marketing: Green marketing revolves around the extent to which business organizations are committed to dealing with environmentally friendly products, which include products that are not harmful to the natural environment and society, as well as carrying out marketing activities within the framework of commitment to environmental responsibility within specific controls to ensure their preservation and avoid harm to them [7].
- 3. Green Productivity: Green productivity is of great importance in improving productivity and limiting the harmful environmental effects of the activities of organizations for several reasons, including environmental efficiency, professionalism and health risk, economic competition, industrial policies, international environmental treaties, customer demands and the need to establish ecological relationships, environment and trade [8].
- 4. Green Supply Chain: The term green supply chain refers to the application of environmental management principles to a full range of activities across the entire customer demand cycle, and can be defined as the process by which environmental concerns are incorporated into supply chain management practices including reverse logistics [9].
- 5. The Green Strategy: The green strategy pursued by organizations aims to reduce harmful environmental impacts and is an integrated strategy that has a positive impact on the environment by facilitating the process of transition to green management, adopting a common culture, and demonstrating the benefits of adopting green management in terms of cost [7].

3.3 Eco design

Ecology is the science that is concerned with the relationship between living organisms and the environment around them, according to which energy and materials exchange to make up an ecosystem, and ecology is the study of the relationship of animals and plants with their natural environment [10].

As for the ecosystem, it refers to the functional relationship between society and the surrounding environment, which is characterized by ecological unity within nature, which is the system resulting from the interaction between living organisms and the natural environment [11].

Eco design has become important to many organizations due to its ability to reduce costs (ex. by reducing the use of energy and materials), meet legal obligations, and reduce the environmental impact of the organization and its products while at the same time increasing expectations among customers to reduce the environmental impacts of products in line with concerns Related to climate change, resource depletion and pollution, as ecological design is defined in accordance with the guiding specification (ISO14006:2020) as a systematic approach that takes into account the environmental aspects in design and development with the aim of reducing harmful environmental effects throughout the life cycle of the product.

There are a number of reasons why the organization integrates eco-design into design and development, as clarified by [12]as follows:

- a. Increased concern about damage to the environment (ex. climate change, resource depletion, biodiversity loss and pollution).
- b. Recognize business opportunities related to resource efficiency and circular economy (ex. strategies to enable lower carbon and water use as well as product life extension strategies including product reuse, repair, refurbishment, and recycling).
- c. Facilitates life cycle thinking by identifying environmental requirements relating to the product expressed by customers and other interested external and internal parties and avoiding unintended shifting of environmental influences within the life cycle.

Therefore, when creating eco-design strategies, it is important to consider a number of factors, including (ISO14006:2020) as follows:



- a. Factors that encourage organizations to improve the environmental performance of their products, ex. environmental legislation, environmental opinions and perceptions of customers and other stakeholders, competition activities, environmental requirements as expressed by NGOs.
- b. Factors that provide organizations with financial or technological support or resources to improve the environmental performance of their products, ex. increased interest in the financial world in environmental issues, particularly with regard to investment opportunities, contributions from upstream and downstream stakeholders (ex. suppliers and recyclers), environmental knowledge of enterprises Research, universities and trade associations, technical developments.

3.4 Guidance Standard (ISO14006:2020) / Environmental Management Systems - Guidelines for Integrating Eco design

This specification provides guidance to assist organizations in creating, documenting, implementing, maintaining, and improving their management of ecological design as part of an Environmental Management System (EMS).

The guidelines are intended to be applicable to all organizations, regardless of type, size and product offered. This standard is primarily intended for organizations that have an Environmental Management System (EMS) whether it is integrated with a Quality Management System (QMS) or not. This standard is useful Also for organizations that only have quality management, as well as for organizations that do not have a formal management system or quality management system, but are interested in minimizing the negative environmental impacts associated with the product (ISO14006:2020).

4. Applied Part

4.1 Presentation, diagnosis and analysis of green management, requirements of ecological design according to the guiding specification (ISO 14006-2020)

The current topic aims to diagnose the reality of the main study variables through their dimensions and paragraphs, represented by green management and the requirements of ecological design (ISO 14006:2020), in the light of the answers of (40) observations. , the relative difference coefficient, as well as the relative weight (relative importance) in order to know the application gap for each paragraph, dimension and variable, as the researcher relied on the five point Likert scale grading in the survey of the sample's opinions, the answer level was limited between (5-1), and at five levels as shown in Table (2).

	Table (2) Like	rt Rankings and Availability	
Resolution grading Arit	hmetic mean d	egree of approval	
Relative importance			
don't totally agree	1->1.80	very low	Very weak
interest less than 36%		-	-
do not agree	1.80-	Weak interest from greater	(52%<-36)
		>2.6	50 Low
Not sure	2.60-	Average interest from greater	(68%<-52%)
		>3.40	Moderate
agree	3.40->4.20	good attention from	u (84% <-68%)
Available			



Totally agree	4.20-5.00	very available		
High interest is greater that	an 84%			
hypothetical mean = $15 \setminus 5$ =	= 3			
= 5-1 = 4∖5= 0.80				
Category length				
Gap=1 - relative attention				

Source: SPSS V.28 output

4.2 Presentation and diagnosis of the independent variable green management

The independent variable is green management, and it was measured through five sub-dimensions (green human resources, green marketing, green productivity, green supply chain, green strategy), as represented by the number of paragraphs (31) paragraphs, and according to the scale [4].

The descriptive statistical analysis of the green management variable concluded that it obtained a high-level arithmetic mean (3.63) through the adoption by the Department of Engineering Reconstruction, a culture that aims to be environmentally friendly, resulting from the adoption by its senior management of all procedures, strategies, policies, programs and tactics that are environmentally friendly and reduce pollution. rationalizing expenditures, recycling its products, achieving social responsibility and linking its reputation, image and brand to green management, As the department was interested in these behaviors with a good percentage (72.6%), while it was clear that its leaders agreed on the availability of green management, with a relative coefficient of variation (11.73%), and an interest gap of (27.4%), while it obtained a standard deviation (0.426), and the table (3) explains this.

	Arithmetic	standard	Relative	Variation	relative	Priority
Paragraphs	mean	deviation	importance	coefficient	gap	· ·
1. The	3.72	0.876	74.4	23.54	25.6	4
organization's						
human resource						
department has						
insights into green						
practices						
2. The organization	3.57	0.984	71.4	27.56	28.6	5
conducts periodic						
checks for						
employees						
3. The organization	4.42	0.712	88.4	16.10	11.6	2
trains employees						
on environmental						
safety aspects						
4. The organization	3.20	1.042	64	32.56	36	6
provides incentives						
to employees in the						
event that they						
submit proposals						
to solve						
environmental						
problems						
5. The	4.37	0.585	87.4	13.38	12.6	1
administration						

 Table (3) analysis and diagnosis of green management (n = 40)



works to provide transportation and mass transportation for employees						
employees						
6. The organization secures qualified personnel to operate its systems to implement green productivity	3.87	0.882	77.4	22.79	22.6	3
green human resources	3.86	0.562	77.2	14.55	22.8	Third
7. The organization adopts green marketing plans	3.22	0.697	64.4	21.64	35.6	3
8. The organization makes efficient use of available resources to preserve the environment	3.82	0.549	76.4	14.37	23.6	1
9. Green marketing gives the organization the opportunity to make more profit	3.62	0.774	72.4	21.38	27.6	2
10. The organization's adoption of the green marketing philosophy contributes to increasing consumer loyalty	3.45	0.782	69	22.66	31	4
11. The organization motivates the consumer to buy environmentally friendly goods	3.55	0.875	71	24.64	29	7
12. The organization announces the green product in a detailed manner	3.40	0.777	68	22.84	32	5
13. The organization works to reduce pollution resulting from the distribution of its products	3.50	0.816	70	23.31	30	6



green marketing	3.51	0.519	70.2	14.78	29.8	the fourth
14. The organization sets production plans that take into account the environmental aspects	4.00	0.679	80	16.97	20	2
15. The organization takes all measures to reduce environmental pollution	4.15	0.622	83	14.98	17	1
16. The organization seeks to innovate new environmentally friendly means	3.87	0.686	77.4	17.72	22.6	3
17. The organization works to provide an infrastructure for the application of green productivity	3.60	0.744	72	20.66	28	4
18. The organization uses technology to reduce noise	3.75	0.776	75	20.69	25	5
19. The organization uses alternative energy sources	2.85	0.984	57	34.52	43	7
20. The organization evaluates the economic benefit it has achieved as a result of the application of green productivity	3.25	0.926	65	28.49	35	6
green productivity	3.63	0.504	72.6	13.88	27.4	Second
21. The organization is committed to purchasing environmentally friendly raw materials	3.47	0.784	69.4	22.59	30.6	3
22. The organization is keen to deal with a supplier that complies with environmental laws	3.77	0.659	75.4	17.48	24.6	1
23. The organization is committed to clean	3.45	0.749	69	21.71	31	2



production						
(environmentally						
friendly)						
24. The organization	3.00	0.877	60	29.23	40	4
provides adequate					-	
distribution channels						
to retrieve the						
materials to be re-						
imported						
aroon supply chain	3 12	0.504	68.4	17 36	31.6	Fifth
	3.42	0.334		17.50	31.0	rnun -
25. The organization	3.82	0.075	/0.4	1/.0/	23.0	5
adopts a green						
strategic plan		0.640			• (
26. The plans in the	3.70	0.648	74	17.51	26	4
organization are						
based on the impact						
of the product on the						
environment						
27. The	4.02	0.576	80.4	14.32	19.6	1
organization's						
mission includes						
preserving the						
environment						
28. The organization	3.30	0.966	66	29.27	34	7
complies with the						
environmental laws						
in force in the						
country						
29. The organization	3.47	0.678	69.4	19.53	30.6	6
evaluates the impact						
of its products on the						
environment						
30. Senior	4.12	0.607	82.4	14.73	17.6	2
management seeks to	7012	0.007	02.4	140/0	17.0	-
narticinate in						
conferences and						
sominars related to						
the environment						
31 The organization	3 70	0.648	74	17 51	26	3
S1. The organization	5.70	0.040	/4	17.31	20	5
seeks to develop						
plans to meet the						
chanenges of the						
enects of the product						
on the environment	2.50					
green strategy	3.73	0.484	74.6	12.97	25.4	the first
green management	3.63	0.426	72.6	11.73	27.4	

Source: SPSS V.28 output

4.3 Description and diagnosis of the dependent variable, requirements for ecological design, according to the guiding specification (ISO 14006:2020)



The dependent variable (responder) is represented by the requirements of ecological design (ISO14006:2020), and it was measured through eight sub-dimensions (organization context, leadership, planning, support, operation, performance evaluation, improvement, eco-design activities in design and development), which represents the dimension (126) paragraphs, and according to the standard (ISO 14006:2020), the descriptive statistical analysis of the eco-design requirements concluded that the dependent variable obtained an arithmetic mean (3.76) of moderate level and less than the hypothetical mean of the research (3), which indicates weakness and resulting from the limitation The department's possession of capabilities related to future factors that They are adopted in the field of planning for long-term activities directed at preparing their capabilities for strategic projects in various potential markets, as the department paid attention to these practices with an average rate of (24.8%), while it was clear that the sample views were agreed and homogeneous on their availability, with a relative difference factor (12.47%), while it was the variable overall has a standard deviation of (0.469), and the subsequent table (4) shows this.

Variables	Arithmetic	standard	Relative	T-test	effect	Variation	Ranking
	mean	deviation	gap		size	coefficient	
green human	3.86	0.562	22.8	9.703	0.573	14.55	3
resources							
green marketing	3.51	0.519	29.8	6.217	0.529	14.78	4
green	3.63	0.504	27.4	7.973	0.514	13.88	2
productivity							
green supply	3.42	0.594	31.6	4.523	0.606	17.36	5
chain							
green strategy	3.73	0.484	25.4	9.598	0.494	12.97	1
green	3.63	0.426	27.4	9.404	0.434	11.73	The first
management							
organization	3.70	0.537	26	8.287	0.548	14.51	5
context							
Leadership	3.75	0.512	25	9.206	0.523	13.65	4
Planning	3.75	0.550	25	8.564	0.561	14.67	6
the support	3.64	0.620	27.20	6.550	0.632	17.03	8
the operation	3.77	0.503	24.6	9.704	0.513	13.34	3
Performance	3.75	0.584	25	8.138	0.596	15.57	7
evaluation							
Improvement	3.85	0.503	23	10.682	0.513	13.06	1
Eco design	3.82	0.508	23.6	10.171	0.518	13.29	2
activities for							
design and							
development							
Eco-Design	3.76	0.469	24.8	10.276	0.479	12.47	Second
Requirements							
(ISO							
14006:2020)							
The general						3.70	
medium of study							

Table (4) Arrange the data of the research variables according to their relative coefficient of variation

Source: SPSS V.28 output



4.4 Testing and analyzing the correlation between the two variables of the study (green management, eco-design requirements according to the guiding specification (ISO 14006:2020)

The study aims to identify the nature and type of the relationship (correlation) between the two variables of the study (green management) as an independent variable, and (the requirements of ecological design according to the indicative specification (ISO 14006:2020)) as a dependent variable, as the researcher tries to improve it through her interest in the independent variable or one of its dimensions, After the researcher surveyed the opinions of the sample of (40) views in the Department of Engineering Reconstruction under study, she conducted an analysis of the study data extracted for the independent variable green management and its five dimensions (green human resources, green marketing, green productivity, green supply chain, green strategy), with The adopted variable and its eight dimensions (organizational context, leadership, planning, support, operation, performance evaluation, improvement, eco-design activities in design and development), used the simple correlation coefficient (Pearson), given that the sample is greater than (30) observations and distributed normally. In addition to the dependence of the multiple linear regression coefficient on the correlation with the Pearson method, and it was based on the level of significance (0.05) for comparison and acceptance or rejection of the results. The positive (positive) relationship, and the negative (inverse), so the interpretation of the first for any increase in interest in the first variable will necessarily lead to an increase in the second with the same value of the correlation coefficient, as for the second, the interest in the first will lead to weak interest in the second and vice versa [13], and the table (5) Clarifies the interpretation of the relationship, bearing in mind that the value of the correlation coefficient is confined between (1+/-) without passing through the zero value because it negates the existence of the relationship.

strong bonding relationship	Medium Correlation	weak correlation
0.50 +/- < r > 1 +/-	0.30 +/- < r > 0.50 +/-	0 < r > 0.30 +/-
D 11 1		

 Table (5) The value of the correlation coefficients, the type and strength of the relationship

Source: Prepared by the researcher based on the above-mentioned source

4.4.1 Analysis of the correlation between green management and eco-design requirements according to the guiding specification (ISO 14006:2020)

The first main hypothesis of the study was formulated, which is concerned with verifying the correlation relationship (there is a significant correlation between green management and its dimensions with the requirements of ecological design according to the indicative specification (ISO14006:2020) and its dimensions), as the table (6) shows the positive direct correlation relationships between management Green and its dimensions with the requirements of ecological design according to the guiding specification (ISO 14006:2020) and its dimensions, the results were as follows:

Table (6) The correlation matrix between green management and eco-design	requirements according to the
guiding specification (ISO 14006+2020)	

	guiding specification (150 1100012020)							
	green	green	green	green	green	green		
	human	marketing	productivity	supply	strategy	management		
	resources			chain				
organization	0.555**	0.574**	0.701**	0.665**	0.814**	0.822**		
context	0.000	0.000	0.000	0.000	0.000	0.000		
Leadership	0.496**	0.618**	0.663**	0.673**	0.668**	0.778**		
	0.000	0.000	0.000	0.000	0.000	0.000		
Planning	0.282	0.561**	0.582**	0.697**	0.577**	0.674**		
_	0.078	0.000	0.000	0.000	0.000	0.000		
the support	0.239	0.505**	0.467**	0.649**	0.529**	0.598**		
	0.137	0.000	0.002	0.000	0.000	0.000		



the operation	0.285	0.415**	0.419**	0.485**	0.386*	0.499**
_	0.074	0.008	0.007	0.002	0.014	0.000
Performance	0.217	0.481**	0.411**	0.641**	0.431**	0.548**
evaluation	0.178	0.002	0.009	0.000	0.005	0.000
Improvement	0.280	0.389*	0.352*	0.554**	0.431**	0.505**
	0.080	0.013	0.026	0.000	0.005	0.000
Eco design	0.160	0.396*	0.428**	0.560**	0.350*	0.475**
activities for						
design and	0.324	0.010	0.006	0.000	0.027	0.002
development						
design	0.357*	0.564**	0.574**	0.706**	0.599**	0.700**
requirements	0.024	0.000	0.000	0.000	0.000	0.000
number of	3	0	0	Q	0	0
relationships	5	,	,	,	,	,
Relationships	33 3/10/2	100%	100%	100%	100%	100%
ratio	33.34 /0	100 /0	100 /0	100 /0	100 /0	100 /0
relationship	medium to	medium to	medium to	medium	medium	medium to
strength	strong	strong	strong	to strong	to strong	strong
Sample volume	40	40	40	40	40	40

Source: SPSS V.28 output

Through the previous table, it is clear that green management, as the independent variable for the current study, achieved nine correlations out of nine with the approved variable, the requirements of ecological design (ISO 14006:2020) and its eight dimensions. Significantly significant with the requirements of ecological design (ISO 14006:2020) in general (0.700**) is strong, and with the context of the organization a significant positive direct correlation (0.822**) relationship, and with leadership (0.778**) a strong direct relationship, and with Planning (0.674**) is strong, With support (0.598**) a strong significant relationship, and with performance evaluation (0.548**) a strong direct correlation, and with operation (0.499**) a moderately strong direct correlation, and with Eco-design activities (0.475**) have a direct correlation of medium strength, as the probability value ranged (0.000-0.002) and all of them are less than the probability value (0.05). The Ecological (ISO 14006: 2020) and its strong to medium strength dimensions and what improves it, and accordingly accepts the first main research hypothesis (there is a significant correlation relationship between green management and its dimensions with the requirements of ecological design according to the indicative specification (ISO 14006: 2020).

according to the guiding specification ISO (14006: 2020)

The second main hypothesis of the study was determined: There is a significant effect of the combined green management dimensions (green human resources, green marketing, green productivity, green supply chain, green strategy) in the requirements of ecological design according to the specification (ISO 14006:2020) and its dimensions: the context of the organization Leadership, planning, operational support, performance evaluation, improvement, eco-design activities) and to verify the validity of the hypothesis or not, the multiple linear regression model was implemented, as well as the adoption of the tabular (T) value indicators (2.0232), and the tabular (f) value (4.093) at the probability value (0.05) to reject and accept the hypothesis.

4.5.1 The dimensions of green management collectively affect the requirements of ecological design according to the guiding specification (ISO 14006: 2020) significantly.



 Table (7) shows the effect of the dimensions of green management combined in the requirements of ecological design according to the guiding specification (ISO 14006:2020) and as follows:

	Eco-design requirements										
	Α	В	AR ²	R ²	P - V	Т	F				
green		0.030			0.825	0.223					
human	1.349		0.532	0.547			22.367				
resources	(0.002)						0.000				
green		0.173			0.224	1.238	-				
marketing											
green		0.247			0.053	2.002					
productivity											
green		0.442			0.000	4.221					
supply											
chain											
green		0.025			0.899	0.127	1				
strategy											

Source: SPSS V.28 output

The results of Table (7) showed the presence of an interpretation coefficient of (0.547) and a probability value (0.000), and a corrected interpretation coefficient (0.532), as it was able to measure the combined green management dimensions (green human resources, green marketing, green productivity, green supply chain, green strategy). From the interpretation of (53.2%) of the changes that occur in the requirements of ecological design according to the guiding specification (ISO 14006:2020), while the remaining percentage (46.8%) is attributed to other variables that were not included in the tested model, and it was found that the value of (F) Calculated for the model (22.367) and with a probability value of (0.000) significant model, which is a strong model that indicates the synergy of dimensions and is statistically approved, as the value of the computed quantitative test exceeds its scheduled value (4.093).

While it was found that there is a positive effect of the green supply chain of (0.442) with a probability value (0.000), and the calculated (T) value (4.221), which is more than the scheduled value (2.0232) at the degree of freedom (39), which indicates the investment of the model by (20%) To raise the level of eco-design requirements in the Department of Engineering Reconstruction, and from all the results reviewed, the second main hypothesis is accepted (the dimensions of green management collectively affect the requirements of eco-design significantly), according to the following equation:

Eco Design Requirements (Y) = (1.349) + 0.442 * (Green Supply Chain). (1)

5. Conclusions

1. It became clear the interest of the department under study in its green human resources and in improving the level of its green management as a result of its work on providing transportation and mass transportation, as well as providing incentives to them when they submit proposals to solve environmental problems, but they were not fulfilling the ambition.

2. Shows the interest of the researched department in green marketing, which results from its efficient investment of available resources to preserve the environment, and to motivate consumers to purchase environmentally friendly products, which motivates them to improve their green management.

3. The Department of Engineering Reconstruction has proven its interest in green productivity and in what contributes to its green management, especially as it takes the necessary measures to reduce the environmental pollution associated with its operations, but it uses alternative energy sources weakly.



4. The department has adopted the green supply chain, so it has been keen to deal with resources in compliance with environmental laws, in addition to providing distribution channels for the recovery of materials to be re-supplied in a moderate manner.

5. The Department of Engineering Reconstruction has turned to the green strategy, which motivates it to enhance green management by having a message that contains methods of preserving the environment, as well as its commitment to the environmental laws in force in Iraq.

6. The department demonstrated its understanding of the context resulting from its work on monitoring and reviewing information related to internal and external issues related to its environmental management system, as well as identifying issues affecting its ability to achieve its desired results at the external level.

7. The department has tended to understand the needs and expectations of the concerned parties and to improve the level of their context by working on Identifying the needs and expectations related to their requirements and identifying the parties related to the environmental management system.

8. The Department of Engineering Reconstruction has determined the scope of the environmental management system in a way that enhances the context of its work, especially since it took into account when analyzing the field of the system related to ecological design, determining the limits of design and development and its applicability to environmental management, as well as the limits and applicability to determine the field of work within it.

9. It became clear the department's tendency to adopt the environmental management system, which contributes to improving its context by integrating the requirements of the system and thinking about the life cycle in its various functions, as well as establishing the environmental management system, its application, maintenance, and continuous improvement.

10. The Department of Engineering Reconstruction adopted leadership and commitment, so it adopted the environmental management system and complied with it, as well as ensuring the planned and implemented eco-design strategies, working on its maintenance, and taking into account all stages of the life cycle of its products.

11. The department was concerned with the advantages of the eco-design procedure, which enhances the ability of its leadership to meet the expectations related to the environmental performance associated with its products, in addition to its keenness to identify good opportunities to work in new markets and to provide new products that are better than their predecessors.

12. The department has maintained the strategic aspects of eco-design by addressing the strategic aspects related to design and setting the environmental goal, and working to encourage creativity and innovation and present new models of work that contribute to value generation, especially those related to the allocation of human, technical and financial resources to facilitate planning, implementation and improvement of that design.

13. The department directed its attention to the environmental policy to ensure the improvement of its leadership level, which resulted from taking the environmental policy into consideration of the environmental issues related to its products and eco-design, so it proceeded to develop, implement and maintain this policy with various pillars.

6.Recommendations

1. Increasing the interest of the directors of the surveyed department in its green human resources by motivating workers and providing incentives to them when they submit proposals to solve environmental problems.

2. Increasing the department's interest in green marketing through the administration's adoption of green marketing plans, the announcement of the green product in a detailed manner, and the adoption of the green marketing philosophy, which contributes to increasing consumer loyalty.

3. Increasing the department's interest in green productivity through the use of alternative energy sources, providing an infrastructure for applying green productivity, using advanced technology to reduce noise, innovating new environmentally friendly means, setting production plans that take into account environmental aspects, and taking the necessary measures to reduce environmental pollution. ISSN: 2618-0278 Vol. 5No. 14 June 2023



4. Increasing the department's interest in the green supply chain by providing sufficient distribution channels to retrieve the materials to be re-supplied, and its commitment to clean production (environmentally friendly), purchasing environmentally friendly raw materials, and dealing with a supplier that adheres to environmental laws.

5. Increasing the department's interest in the green strategy by adhering to the environmental laws in force in the country, evaluating the impact of its products on the environment, developing plans to meet the challenges of the product's effects on the environment, adopting plans based on the extent of the product's impact on the environment, adopting and adopting a green strategic plan, and including its mission to preserve on the environment, and the participation of managers in conferences and seminars related to the environment.

6. Increasing the department's interest in understanding the organization and its context by identifying external issues that affect the department's ability to achieve the desired results from the environmental management system and identifying internal issues related to the department's environmental management system.

7. Increasing the department's interest in leadership and commitment through senior management planning, implementing and maintaining eco-design strategies at all stages of the product life cycle, allocating appropriate resources to ensure planning and implementing environmental design, and that the department's environmental management system includes eco-design and is linked to business strategies, and demonstrates leadership and adherence to the environmental management system.

8. Increasing the department's interest in the efficiency of human resources by providing the necessary resources to establish the eco-design within the design, development, implementation and improvement of the eco-design.

9. Increasing the department's interest in communications by paying attention to internal communications about the environmental performance of products between the various levels and functions of the organization from bottom to top, top to bottom and horizontal, including those directly and indirectly responsible for design and development.

10. Increasing the department's interest in development design and planning by making ecological design an integral part of design and development planning, and using environmental standards in the review, verification and validation stages.

11. Increasing the department's interest in internal auditing by taking into account the results of previous internal and external audits and other relevant environmental performance results (such as monitoring and measurement) in the audit program, and outsourcing when designing and developing, and that the internal audit includes an eco-design audit, creation, implementation and maintenance of program(s) Internal audits and internal audits to provide information on whether the EMS has achieved the desired results.

12. Increasing the department's interest in continuous improvement by improving the suitability, adequacy and effectiveness of the environmental management system to improve environmental performance, and that the environmental management system takes into account the design and development, including eco-design, in order to enhance the environmental performance associated with the product.

13. Increasing the department's interest in developing a plan to integrate ecological design with design and development by understanding the main environmental impacts of products and where they occur in the life cycle, understanding the relevant life cycles of individual products and business models,



understanding the most important requirements from internal and external interested parties, and understanding how to organize design and development.

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